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Physiotherapy in the Management of Long COVID: Preparing for the Rising Tide

The arrival of COVID-19 was a wakeup call for Aotearoa New Zealand and the emergence of associated post-viral fatigue syndrome came as a surprise to some. To cardio-respiratory physiotherapists, however, this was not news. Early on in the pandemic, our small but dedicated cardiorespiratory special interest group (CRSIG) committee were assimilating as much of the fast-emerging data as we could in anticipation of this likely sting in the tail. As early as April 2020 we developed a flyer for GPs that highlighted some of the possible symptoms of what we now know as long COVID. We have continued to advocate for recognition of long COVID and its devastating impact, something that has provided our profession with credibility and respect among those living with the condition (Owen, 2022). Globally, the advocacy role of physiotherapy in this space has been appreciated; too often, patients have experienced a lack of validation from health providers.

Beyond advocacy, physiotherapists are well placed to support those with long COVID in the management of their symptoms. In the absence of a cure, providing strategies to reduce the impact of persistent symptoms on people's lives is important. Common presentations include breathlessness, fatigue, dysfunctional breathing, chronic cough, and orthostatic intolerance. As physiotherapists, we already have many of the necessary skills to support management of these symptoms from our involvement with other population groups, such as those with chronic respiratory conditions, those living with cancer or neurological conditions, and those experiencing concussion. Additionally, we have the expertise to advise on whether and when to return to exercise, something that is far from straightforward in the context of post-COVID recovery. It is recognised that overdoing it and 'pushing through' acute COVID-19 symptoms may increase the likelihood of developing long COVID, as might returning to exercise too early after an acute COVID-19 infection (Salman et al., 2021). Furthermore, in some people living with long COVID, such as those with post exertional symptom exacerbation (PESE), exercise is not recommended, as it can worsen symptoms (Humphreys et al., 2020; Twomey et al., 2022). Navigating the post-COVID landscape in terms of exercise requires health professionals who can advise on frequency, duration, and intensity, and can monitor patients appropriately. Again, these are skills physiotherapists already use, albeit in different population groups.

It is likely that most individuals with long COVID will present to primary care, in the first instance, and this highlights the importance of all physiotherapists, irrespective of their clinical specialty, being ready to manage these patients. Validating the patient experience is vital. Too many patients overseas have lost confidence in health professionals due to their inability to listen and really hear what the patient is saying. It is okay to acknowledge that we do not know everything about long COVID, nor do we, as yet, have established treatments. We need to be prepared to learn from the experts, which includes those living with long COVID. This sentiment is highlighted by responses to a question I posed on Twitter in November 2021 using the Twitter name @sarah_rhodes_PT. "Anyone with lived experience of long COVID, what is the most important thing I need to know in the planning of a long COVID clinic?" The four most frequent responses were: validate people's experiences; be ready to learn; the value of planning, prioritising, and pacing; and prioritise biomedical investigations and treatment early. We can also learn much from our overseas physiotherapy colleagues who have been instrumental in setting up long COVID services and are leading the work on long COVID rehabilitation (Brown et al., 2020; Tucker et al., 2022). Their willingness to share their experiences – both positive and negative – provides a great learning opportunity for us here in Aotearoa New Zealand, without having to reinvent the wheel.

While we don't know everything, there is plenty we have learned up to this point that allows us to support our patients with long COVID. Having practical guidelines on how to assess symptoms and potential management strategies is an important start. Screening for key symptoms such as fatigue and breathing pattern dysfunction can be undertaken using the De Paul symptom questionnaire (Sunnquist et al., 2019) and Nijmegen questionnaire (Health Navigator New Zealand, 2020), respectively. Determining whether a patient has PESE, postural orthostatic tachycardia syndrome (POTS), or anything suggestive of cardiac involvement is necessary to ensure any rehabilitation programme is appropriate and safe for the individual. Tools such as the De Paul symptom questionnaire (PEM domain) and NASA 10-minute lean test (Bateman Horne Center, n.d.) can be used to assess for PESE and POTS, respectively. In those with suspected cardiac involvement, referral to a cardiologist is required to rule out myocarditis. It is vital that rehabilitation strategies are tailored to the individual and are symptom-led. There are some excellent resources available including Long Covid Physio (2022) and the British Heart Foundation (2022).

The long COVID situation brings into sharp focus the inequities that exist in access to health care. The most affected groups are likely to be Māori and Pasifika since these populations are disproportionately affected by the acute infection rates. We also know these communities can be marginalised and less likely to access health services in their existing form. It is imperative that we are listening to and hearing these communities in order to develop services that work for them to ensure equity of access to health care. Greater involvement of those with lived experience, and who are most affected, in actively informing the development of research questions and the development of patient-reported outcome measures is a step in the right direction.

The true value of physiotherapy in the management of long COVID is as part of a team of health professionals. This could include occupational therapists, speech and language therapists, clinical psychologists, and nurses, among others, to ensure a holistic rehabilitative approach to long COVID management, along with clear referral pathways to hospital-based services where needed. If the projected numbers of those living with long COVID eventuate, GPs are likely to be overwhelmed. Physiotherapists have the skills to add their support to long COVID services to help reduce the overall health burden in Aotearoa New Zealand.

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‘Collapsed Arches’, ‘Ripped Plantar Fasciae’, and ‘Heel Spurs’: The Painful Language of Plantar Heel Pain

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ABSTRACT

The words spoken by clinicians can profoundly impact a person’s perception of their body. Words may influence pain, as pain is a measure of perceived threat. Words such as tear, rupture, degeneration, instability, and damage may increase perceived threat. Similarly, pathologising ‘abnormal’ anatomical variation may leave people feeling vulnerable and fragile. This article aimed to explore the potential consequences of particular words and narratives commonly used to describe plantar heel pain and justify interventions used to treat plantar heel pain. Drawing on the existing body of pain-science research, the authors argue that some of the language and narratives used in the literature and practice may potentially be threat invoking/nocebic. In addition, we argue that justifying interventions such as orthoses by stating that they normalise foot function may leave patients feeling broken, deficient, and abnormal. In response, we provide several recommendations for clinicians to help them avoid invoking threat when describing plantar heel pain and justifying interventions for it.

McGrath, R. L., Murray, A. W., Maw, R. A., & Searle, D. J. (2022). ‘Collapsed arches’, ‘ripped plantar fasciae’, and ‘heel spurs’: The painful language of plantar heel pain. *New Zealand Journal of Physiotherapy, 50*(2), 58–63. https://doi.org/10.15619/NZJP/50.2.02

Key Words: Biomechanics, Foot, Lower Extremity, Orthoses, Pain, Podiatry

INTRODUCTION

Plantar heel pain (PHP) is a common and often non-traumatic musculoskeletal pain condition that affects approximately one in 10 people at some point in their lifetime (Rosenbaum et al., 2014). Despite its prevalence, very few studies that explore the experiences, perspectives, and beliefs of people with PHP have been published (Cotchett et al., 2020; Morrissey et al., 2021), resulting in an evidence base that is pathology-focused rather than person-centred. To date, the existing literature on the assessment and management of PHP consists primarily of studies designed to investigate and compare the efficacy of various biomechanical and biological interventions (Morrissey et al., 2021). Consequently, the clinical practice guidelines and reviews that have been completed on the management of PHP in the past decade focus little on patient education and do not discuss the impact of the words and narratives used by clinicians on their patients’ perceptions of their body and pain (Babatunde et al., 2019; Landorf, 2015; Martin et al., 2014; Morrissey et al., 2021).

The best practice guide by Morrissey et al. (2021) is of particular significance, as it was the first clinical guideline to recommend pain education as part of the management of PHP. As part of their recommendations, Morrissey et al. stated that it is important to teach people with PHP about the meaning of pain and the relationship between pain and tissue damage. Additionally, Morrissey et al. recommended that clinicians consider how patient education can be used to reduce pain-related fear. The purpose of this paper is to: (1) highlight examples of potentially threat-invoking/nocebic language being used to describe PHP and justify interventions for PHP, and (2) discuss the potential impact of using biological and biomedical narratives. Following this discussion, we provide several examples of how PHP and its management can be explained to patients through a biopsychosocial lens.

THE MEANING OF PAIN

While local tissue pathology can contribute to a person’s experience of pain via peripheral nociception, according to Caneiro, Bunzli, and O’Sullivan (2021), Holopainen (2021), Moseley and Butler (2017), and Palsson et al. (2019), the pain experience is more accurately viewed as a multidimensional, biopsychosocial experience that is associated with perceived bodily threat. In many situations, pain is beneficial as it alerts the individual that they may need to take action to protect their bodily integrity (Coninx & Stilwell, 2021). However, pain is not always a reliable measure of tissue damage or pathology (Caneiro, Alaiti, et al., 2021; Moseley & Butler, 2017). For example, pathological radiographic findings in asymptomatic individuals are common at the shoulder (Girish et al., 2011), elbow (Bastian et al., 2019), knee (Horga et al., 2020), spine (Brinjikji et al., 2015), and foot and ankle (Ehrmann et al., 2014; Galli et al., 2014; Gregg et al., 2006; Hall et al., 2015; Owens et al., 2011). Furthermore, people may experience pain in the absence of tissue pathology. An example of this is persistent pain, whereby a person experiences pain beyond normal healing (Treede et al., 2015).

In addition to being an unreliable measure of tissue damage, pain may also lead to a vicious cycle of pain-related distress, pain-related fear, pain catastrophisation, unhelpful health behaviours (i.e., movement avoidance), and disability, which then can perpetuate or heighten a person's pain experience (Caneiro, Smith, et al., 2021; Palsson et al., 2019). Drawing on the common-sense model of illness representation, Caneiro, Smith, et al. (2021) and Palsson et al. (2019) argue that a person's beliefs about their pain can influence their health outcomes. According to the model, a person experiencing pain attempts to make sense of their pain by creating a cognitive representation of it shaped by the person's existing beliefs about the identity, cause, consequences, timeline, and controllability of their pain (Caneiro, Smith, et al., 2021; Palsson et al., 2019). However, a person's cognitive representation of their pain experience is not fixed and can be reinforced or challenged based on new information (Caneiro, Smith, et al., 2021; Palsson et al., 2019).

Several researchers have raised concerns that some of the narratives and language used by clinicians with patients experiencing musculoskeletal pain may be potentially threat-invoking and harmful (Caneiro, Bunzli, & O'Sullivan, 2021; Friedman et al., 2021; Moseley & Butler, 2017; Palsson et al., 2019; Setchell et al., 2017; Stewart & Loftus, 2018). A mixed method study of people's beliefs about the cause of low back pain found that 89% of participants reported having been told by their health professional that their pain was caused by damage or disease (Setchell et al., 2017). Explaining pain in terms of tissue pathology may reinforce patients' belief that their pain is an accurate measure of tissue damage and may drive patients to unhelpful behaviours (i.e., activity avoidance) in an attempt to protect their bodily integrity (Caneiro, Bunzli, & O'Sullivan, 2021). These unhelpful behaviours may then lead to a negative cycle of fear-avoidance, disability, and further pain (Caneiro, Bunzli, & O'Sullivan, 2021).

WORDS CAN HURT

Friedman et al. (2021) and Stewart and Loftus (2018) argue the use of terms such as degeneration, tear, instability, and damage to describe pathoanatomical findings may potentially be threat invoking and harmful to people experiencing pain. Similarly, Moseley and Butler (2017) argue that metaphorical diagnoses, such as 'heel spurs' to describe "radiological evidence of an adaptive strengthening of the bony insertion of the plantar fascia", and 'collapsed arches' to describe a pes planus foot type may elevate a person's perceived level of threat and magnify their pain experience (p. 161). These words do not hurt by themselves, but rather, depending on the individual may reinforce or instil beliefs that are unhelpful in their journey from fear to safety (Caneiro, Smith, et al., 2021). Empirical research supports these concerns, with Zadro et al. (2021) and O'Keeffe et al. (2022) finding that the use of pathoanatomical labels (i.e., rotator cuff tear or disc bulge) are associated with a poorer prognosis than non-specific labels (i.e., episode of shoulder pain or episode of low back pain).

Educational material developed by the American Academy of Orthopaedic Surgeons (AAOS) (2019) and aimed at people with PHP, could be considered to have used potentially threat-invoking language. The handout described PHP as the result of too much pressure on the plantar fascia, which "damages the tissue", resulting in it becoming "inflamed" (AAOS, 2019, p. 1). The handout also included an image that shows an incomplete tear of the plantar fascia labelled as a strain. These explanations of PHP were reported by Morrissey et al. (2021) and Cotchett et al. (2020) during interviews with people experiencing PHP. Morrissey et al. (2021) reported that one person explained PHP as an "inflamed damaged [plantar fascia] which needs to heal/repair" while another person stated that they think they had "torn a ligament" (p. 1114). In a supplementary document attached to their article, Cotchett et al. (2020) reported descriptors such as 'ripped plantar fascia', 'broken bone', 'bone spur', 'damaged ligament', and 'nerve dysfunction' being used by people with PHP to describe their condition. Cotchett et al. (2020) also reported that a participant stated they believed their "imaging findings [were] linked to [their] symptoms" (suppl. file, p. 6), while another perceived their pain as "a message to [them] from [their] body that something's not right" (suppl. file, p. 7). Focusing mainly on biological and biomechanical factors may reinforce the unhelpful cognitions, such as the belief that pain is an accurate measure of tissue damage (Moseley & Butler, 2017). Furthermore, viewing biological and biomechanical findings as a causal mechanism of PHP is problematic, as many radiographic findings, such as plantar calcaneal spurs, are often found in people without PHP (Ehrmann et al., 2014; Hall et al., 2015). Ehrmann et al. found that 21% of the asymptomatic participants (n = 77) had increased signal intensity changes in the plantar fascia. Ehrmann et al. also reported that 21% had soft-tissue oedema superficial to the plantar fascia. Similarly, Hall et al. (2015) found potentially abnormal sonographic findings in all 39 runners they examined. These 39 runners were asymptomatic and did not have a history of PHP (Hall et al., 2015). While the number of participants in the studies conducted by Ehrmann et al. and Hall et al. was relatively small, the tenuous relationship between radiographic findings and pain is also seen in other studies of the foot and ankle. For example, plantar plate tears, intermetatarsal neuroma, and osteochondral lesions of the talus are relatively common radiographic findings in asymptomatic individuals (Galli et al., 2014; Gregg et al., 2006; Owens et al., 2011). The presence of 'abnormal' findings on diagnostic imaging in asymptomatic individuals supports the theory that pain is an unreliable indicator of tissue pathology.

ABNORMAL NARRATIVES

In addition to the terms and metaphors used by clinicians, the narratives used to justify interventions may also convey messages of bodily threat, fragility, deficiency, and abnormality.

Clinicians tend to be very interested in defining, understanding, and restoring 'normal' function (Harradine & Bevan, 2009; Murley et al., 2009; Setchell & Abaraogu, 2018). For example, the 1000 Norms Project (McKay et al., 2016) is an initiative intended to define 'normal' human movement and function. Similarly, biomechanical theories of foot function, such as sagittal plane facilitation theory, tissue stress theory, and foot morphology (Root) theory, are based on normalising foot function or reducing abnormal forces on injured structures (Harradine & Bevan, 2009). An example of a potentially threat-invoking narrative for the 'cause' of PHP can be found in an article by Muth (2017), who stated that "plantar fasciitis occurs when the plantar fascia is injured from too much pressure or activity" and that "people who are overweight and people who have … high-arched feet, or flat feet are at risk of plantar fasciitis" (p. 400). Conceptualising foot function and posture in terms of the dichotomy of normal and abnormal may lead to: (1) patients feeling fragile and vulnerable, and (2) management that is focused on normalising deviances, such as surgery for heel spurs and orthoses for people whose subtalar joint deviates too far from neutral.

An example of a potentially threat-invoking justification of an intervention for PHP can be found in a review by Luffy et al. (2018). Luffy et al. stated that orthoses "are believed to effectively treat the underlying biomechanics of plantar fasciitis, such as foot pronation, flat feet, and high arches" (p. 22). Similarly, two clinicians participating in a qualitative study conducted by Bridgen (2017) spoke about how they correct 'abnormal' foot function to unload damaged tissues in people with foot pain.

> I use the **stress free theory** (tissue stress theory) more than anything … [I take] them out of, the **extreme** range that their foot's in, that's **causing** the problem … If the foot is **out of posture** then I will **correct** it a little bit and see if that's enough to get it **right** (Clinician interviewed by Bridgen, 2017, p. 194; emphasis added).
>
> I relate to **tissue stress**, it's all about **resting damaged tissues** to … allow 'em time to **repair**, so **adding support** to the foot **stops the foot from collapsing and overstressing** (Clinician interviewed by Bridgen, 2017, p. 198; emphasis added).

Explaining PHP and justifying interventions using purely biomechanical narratives is inaccurate, with Landorf et al. (2021) having found no difference in foot posture between people with and without PHP after controlling for age, sex, and body mass index. Similarly, Rogers et al. (2021) found that persistent PHP and clinical measures of foot function were not associated. Perhaps, some of the benefits of normalising interventions for non-traumatic musculoskeletal pain may be attributed to other factors that reduce the perception of threat.

While the 1000 Norms Project and the contemporary biomechanical theories of foot function are based on sound scientific research, it is essential to consider how narratives around normality and abnormality may impact patients. Morrissey et al. (2021) identified that some people with PHP believed that their condition was caused by "foot arch height", "limb length asymmetry", "altered gait", and "altered movement" (p. 10), suggesting that these people may have been attributing their condition to pre-existing biomechanical 'abnormalities'. Explaining PHP by identifying other abnormalities such as overpronation, weak muscles, abnormal foot type, and/or a leg length discrepancy, may further reinforce patient perceptions of being abnormal, broken, or deficient in some way. While these biomechanical beliefs may have been held by the participants in the study by Morrissey et al. (2021) prior to seeing a clinician, it is also possible that these beliefs had been instilled or reinforced by clinicians either implicitly or explicitly. Palsson et al. (2019) expressed similar concerns about the narratives used by clinicians in the management of sacroiliac joint pain. According to Palsson et al., "pathoanatomical explanations and labels suggesting structural weakness, abnormality or instability [as the cause of sacroiliac joint pain] … could [explicitly] drive perceived threat and distress" (p. 1515), while pathoanatomical treatment rationales may implicitly contribute to perceived threat and distress. Although there is a paucity of research investigating issues of normalcy in pain and musculoskeletal practice, there are concerns in the mental health field that being labelled as abnormal or disordered "[suggests] that something is wrong internally" (Wakefield, 2007, p. 153) and may reinforce feelings of fear, self-blame, deficit, and hopelessness about the likelihood of recovery (Read & Harper, 2020). Perhaps, in people with persistent PHP who do not respond well to normalising interventions, the narratives used to justify the interventions have created health issues where none had previously existed, or at least reinforced incomplete or inaccurate biological and biomechanical explanations for the cause of their pain.

SUGGESTIONS FOR PRACTICE

Frame PHP as a multifactorial biopsychosocial phenomenon

In cases where PHP is suspected and no other signs of serious pathology (i.e., malignancy) are present, clinicians may consider using the non-specific regional label of PHP as opposed to tissue-based labels such as plantar fasciitis. Friedman et al. (2021) cautioned the use of specific diagnostic labels as they may imply that the "clinician knows the specific tissue pathology that is causing pain or dysfunction" (p. 3). Friedman et al. suggest that when signs of serious pathology have been excluded and the injury is not acute, clinicians should consider using a non-specific regional label that reflects that musculoskeletal pain is multifactorial. Clinicians may consider explaining to a person with PHP what structures are potentially involved; however, it should also be made clear that pain is multifactorial as there are many factors that may be involved in PHP including waist girth, ankle plantar flexor strength, pain catastrophising, and psychological distress (Cotchett et al., 2017; Cotchett et al., 2016; Cotchett et al., 2015; Rogers et al., 2021). Mentioning these other factors challenges the misconception that pain is an accurate measure of tissue damage and provides the groundwork so that interventions can be justified through a biopsychosocial lens.

When talking to a patient about the potential tissues that may be involved in a patient's experience of PHP, we suggest that clinicians avoid terms, phrases, metaphors, and medical jargon that may increase the level of threat (Moseley & Butler, 2017;

Stewart & Loftus, 2018). For example, telling a patient that their plantar fascia is inflamed or torn may lead to the patient believing that rest is needed for optimal healing. Terms such as ‘irritation’ and ‘sensitisation’ are less likely to invoke threat and are more consistent with findings of research in musculoskeletal pain and PHP. However, not all patients will interpret and react to these terms in the same way. For example, Schneider (2004) posits that personality trait of neuroticism “constitutes a psychological readiness to perceive threat” (p. 801). Thus, people high in neuroticism may be more reactive to messages that suggest bodily threat than people low in neuroticism. We argue that, as a general principle, avoiding potentially threat-invoking language is good practice. Therefore, when explaining PHP to a patient, clinicians could consider using a variation of the following:

> Based on my assessment, it seems that the structures around your heel are sensitive. PHP is a very common condition that can be quite painful; however, there is a lot we can do to help you manage it. There are other things that may also contribute to pain, which may be relevant to your experience. Do you mind me asking a few more questions?

Dispel problematic pre-existing narratives

It may be necessary to support patients to reconceptualise their beliefs who have strong, unhelpful biomedical beliefs about their pain that have been picked up from other health professionals, friends, family, or the internet (Louw et al., 2016). In the context of PHP, clinicians may consider asking the patient who attributes their pain to their foot type (i.e., pes planus/flat feet) when their pain first started. Doing so allows the clinician to gently challenge the beliefs about the causative link between foot type and PHP, as the patient likely had the same foot type and no pain for many years prior to this episode of PHP. The approach also allows the clinician to reassure the patient that they can, once again, be pain free even if they have a less common anatomical variant of the foot because research, and their own experience, challenges that theory that there is a causative link between foot type and PHP.

Consider how interventions for PHP are justified

Erwin et al. (2020) found that patients wanted clinicians to explain and discuss treatment options with them. Therefore, it is important to consider the consequences of how treatments for PHP are explained and justified. Telling a patient that their arch has collapsed or that their foot is unstable may lead to the patient believing that the only solution to their problem would be to fix these biomechanical abnormalities. Furthermore, emphasising only the biomechanical dimension of PHP may implicitly devalue other potential biopsychosocial contributors and management options. If a clinician explains to a patient that orthoses may help their pain by treating the underlying biomechanical issues and the treatment then fails to provide adequate relief, this may leave the patient feeling confused, abnormal, and possibly hopeless about their prognosis. Instead, when justifying the use of orthoses consider using a variation of the following explanation.

> I am prescribing orthoses to temporarily change the load on your feet, because even just a little bit of change may help you with your symptoms while your foot is sensitive. My hope is that by reducing your pain it will help you continue to work, keep active, and return to activities that you enjoy.

CONCLUSION

Given the historical dominance of research investigating biological and biomechanical factors of pain, it is unsurprising to see patient education material continuing to describe PHP in terms of tissue damage and interventions designed to heal tissues and reduce biomechanical abnormalities. We ask clinicians to consider the limitations and potential impact of threatening tissue-based language and biomedical interventions when managing people with PHP. We ask clinicians to instead emphasise that PHP is a multifactorial biopsychosocial phenomenon. We recommend that clinicians consider using terms such as sensitisation and irritation and consider using non-specific regional labels (such as PHP) to avoid the negative effects of threatening tissue-based diagnoses. We also recommend that clinicians consider the potential impact of the narratives they use to justify biological and biomechanical interventions as these may reinforce unifactorial biomedical explanations of the cause of PHP.

KEY POINTS

1. Existing clinical guidelines and reviews on the management of plantar heel pain (PHP) have focused predominantly on biological and biomechanical interventions, despite the growing body of literature highlighting that pain is a complex multifactorial experience that is not solely determined by the status of the tissues.
2. Pain and musculoskeletal research suggests that the language and narratives used by clinicians to describe musculoskeletal-related pain and to justify interventions may influence the way people perceive their body and their pain experience.
3. Clinicians should consider the potential impact of the language and narratives that they use with people experiencing PHP, particularly language and narratives that may reinforce the notion that their foot is ‘damaged’ or ‘abnormal’.
4. While this viewpoint draws on the established pain and musculoskeletal research literature, there is a paucity of research on psychological and social dimensions of PHP.

DISCLOSURES

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PERMISSIONS

None required.

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Mapping the Current Landscape of Osteoarthritis Patient Educational Resources: A Scoping Review of Osteoarthritis Guidebooks

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ABSTRACT

The National Institute of Care and Excellence (NICE) guidelines (2015) recommend that patients receive accurate written and verbal information to enhance self-management. Currently, in Aotearoa New Zealand, there is no accepted osteoarthritis (OA) patient-educational guidebook that fits this recommendation. This scoping review aimed to identify published OA patient-educational resources and synthesise the content contained within the resources, to inform the development of an Aotearoa New Zealand OA guidebook. A scoping review was conducted to identify national organisations with stand-alone OA patient-educational resources. We identified six guidebooks and 68 additional stand-alone resources. Relevant data were extracted and categorised in relation to six key NICE (2015) guideline components (*first-line treatment*, *second-line treatment*, *third-line treatment*, *interprofessional team*, *self-management*, and *other*). Additional data were grouped to construct one additional component (*design features*). Much of the identified content had a biomedical approach to the delivery of OA patient education and treatment, and the material lacked consideration of patient experience. The developers of future guidebooks or other patient-education resources should consider utilising a balance of lay and biomedical information that is socially and culturally relevant to enhance the translation of OA knowledge and may improve engagement with management.

Metcalfe, L., O'Brien, D. W., & Ellis, R. (2022). Mapping the current landscape of osteoarthritis patient educational resources: A scoping review of osteoarthritis guidebooks. *New Zealand Journal of Physiotherapy*, *50*(2), 64–71. https://doi.org/10.15619/NZJP/50.2.03.

Key Words: Aotearoa New Zealand, Guidebook, Osteoarthritis, Patient Education

INTRODUCTION

Osteoarthritis (OA) is the leading cause of musculoskeletal pain and disability worldwide and one of Aotearoa New Zealand's most prevalent chronic health conditions (Deloitte Access Economics, 2018; Woolf & Pfleger, 2003). In 2019, it was estimated that 10.2% of adult New Zealanders were living with OA (Ministry of Health, 2019). Furthermore, arthritis places a substantial financial burden on Aotearoa New Zealand's health system; the economic impact of arthritis in 2018 was estimated at $12.2 billion, with $993 million attributed to direct healthcare costs (Deloitte Access Economics, 2018). Worldwide concern exists surrounding the financial burden of OA, considering the current prevalence coupled with expected increases in modifiable (i.e., obesity, joint injury, and sedentary behaviours) and non-modifiable (i.e., age and gender) risk factors (Cross et al., 2014; Leifer et al., 2021; Palazzo et al., 2016).

Management guidelines for OA typically state that primary care treatments (e.g., education, exercise, and weight loss [if required]) should be fully considered before secondary (e.g., pharmaceutical and complementary therapies) or tertiary interventions (e.g., surgical) are considered (Bannuru et al., 2019; NICE, 2015). However, research suggests that OA first-line care delivery does not match guideline-informed recommendations (Basedow & Esterman, 2015; Runciman et al., 2012) and patients often feel poorly informed about conservative management (Jolly et al., 2017; Smith et al., 2014).

Written information about a health condition is an effective tool for facilitating patient-centred decision making and encouraging patient self-management (Dziedzic et al., 2015; Kennedy et al., 1999; Kennedy & Rogers, 2002). Incorporating educational material into a guidebook format is a practical method of supporting OA knowledge translation (Morden et al., 2011).

Moreover, Morden et al. (2011) found that an OA guidebook including both lay and medical information was an effective patient-education tool when used as part of usual OA care. NICE (2015) guidelines recommend that healthcare professionals provide patients with accurate written and verbal information to enhance self-management and understanding of OA pathophysiology. However, research shows a vast inconsistency in OA information, particularly online content, making it difficult to consistently access high-quality information (Barrow et al., 2018).

Understanding the content and design of existing OA educational guidebooks and resources provides a basis for developing a bespoke OA guidebook for Aotearoa New Zealand. Further to the value of written information providing an effective tool for patient self-management, design and the design process (including testing potential layout, supporting figures, colours, fonts, etc.) is known to influence acceptability and engagement (Groeneveld et al., 2018). Moreover, Reay et al. (2017) highlight the value of collaboration between designers and healthcare professionals when developing resources for healthcare delivery and knowledge translation.

Despite considerable support for the use of OA education resources and the plethora of resources currently available to people via websites, blogs, and other less reputable platforms, there is limited research about the development, design, and acceptability of patient OA education resources. Two notable studies explored the development or implementation of an OA guidebook related to the Management of Osteoarthritis in Consultations Study (MOSAICS) based in the United Kingdom (UK) (Dziedzic et al., 2014; Jordan et al., 2017). Jordan et al. (2017) believed that including an OA guidebook in the programme led to an increase in the provision of written advice, exercise, and weight management to patients. However, it is unclear how much of this change can be attributed to the guidebook specifically, as it was part of a multifaceted clinical intervention (Jordan et al., 2017).

Some aspects of OA patient education, such as the value of exercise or joint replacement surgery, are transferable across cultures or health systems. However, other elements are not simply translated, such as the health service funding or interpretations of health and wellbeing. For example, Aotearoa New Zealand has a unique health funding structure, with the Accident Compensation Corporation positioned between publicly and privately funded services (Accident Compensation Corporation, 2020). Furthermore, Te Tiriti O Waitangi entitles a partnership between Māori and the British Crown that governs many aspects of social policy, including health (Came et al., 2018).

Aotearoa New Zealand presently has no nationally accepted OA patient-educational guidebook responsive to our unique context. The current educational materials available consist of stand-alone, ad hoc resources found online or via pamphlets from musculoskeletal health providers and District Health Boards. An example is a pamphlet entitled *Osteoarthritis* (Arthritis New Zealand, 2017), available through Arthritis New Zealand. However, this resource does not directly link to evidence-based OA self-management guidelines. More recently, Darlow et al. (2020) developed an evidence-informed resource for people with chronic knee pain in Aotearoa New Zealand, titled *Free from Knee Pain*. The booklet includes information to help people understand and live with OA and where to look for support. It employs plain language, infographics, and patient quotes to express the messages. However, the booklet only focuses on the knee joint.

Therefore, it is timely to investigate existing OA patient-educational guidebooks and resources to inform the development of an Aotearoa New Zealand OA guidebook. A scoping review was chosen, which aimed to identify published OA patient-educational resources available online and synthesise the content contained within the resources, to inform future guidebook developments.

METHODS

This scoping review was informed by the structured five-step approach developed by Arksey and O'Malley (2005) and refined by Levac et al. (2010): 1) identify the research questions, 2) identify relevant resources, 3) selection, 4) charting the data, and 5) collating, summarising, and reporting the results. This review followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) outline (Tricco et al., 2018).

1. Identify the research questions

We developed four research questions to frame the search strategy. Although broad (to allow a wider 'scoping' of the evidence), these questions allowed the search to be conceptually defined and targeted (Levac et al., 2010). The four research questions identified were:

- What OA patient-educational guidebooks or resources are available online, published by national arthritis organisations in English?
- What are the similarities and differences in content between the identified OA patient-educational guidebooks or resources?
- How does the content of these identified guidebooks and resources match the NICE (2015) guideline recommendations?
- What design features do the guidebooks and resources use when presenting patient-educational material?

2. Identify relevant resources

A decision was made to search for OA educational guidebooks and resources of national arthritis organisations. This choice was pragmatic because of the resource constraints, the purpose of the project and the related research questions, our belief that these organisations were likely to have credible resources, and the vast amount of information on the Internet. Levac et al. (2010) argue that the search should be broad and feasible. The search was undertaken using Google (California, USA) and included the following key words: guidebook, osteoarthritis, patient education.

3. Selection

Resource selection during a scoping review is often an iterative process (Arksey & O'Malley, 2005; Levac et al., 2010). First author (LM) conducted the initial search with supervision from co-authors (DOB and RE). The team discussed the final inclusion and exclusion of resources in the context of the research questions (Levac et al., 2010). Resources eligible for inclusion were OA patient-educational resources that reflected a summary of OA education and conservative self-management treatments. Furthermore, resources were eligible for inclusion when written in the English language, were freely available (i.e., no cost to obtain, aimed at the public, and wholly downloadable offline information; pdf or Word document). Information was excluded that was published as online webpage resources (e.g., webpage text or articles), delivered as an application, podcast, or online module, or solely reported as a snapshot of information (e.g., fact sheets or OA summary).

4. Charting the data

The characteristics of the included resources were charted using Excel spreadsheets to provide a descriptive summary of the resources. Initially, this process included extraction of information about the arthritis organisation and country of origin, publication title, total page number, chapter contents, and whether the information was evidence-based (including relevant citations).

Next, LM re-read each resource in full, systematically extracting and charting characteristics and comparing these findings against seven key components related to the research questions and the NICE (2015) guidelines. Checked aspects of the charted information were independently checked by DOB and RE. Six key components were synthesised from the NICE (2015) guidelines, recognised as detailing current best practices for OA management, including 1) first-line treatment (education [e.g., pathophysiology, risk factors, signs and symptoms], exercise, and diet), 2) second-line treatment (complementary therapies, supplements, and pharmacological advice), 3) third-line treatment (surgical intervention), 4) interprofessional team, 5) self-management (strategies, coping strategies, mindfulness and relaxation), and 6) other (e.g. pain education, sleep hygiene, and OA misconceptions [myths]). The seventh key component (design features) was added and related to the review's purpose and included guidebook characteristics such as patient stories, contextual features, and visual design features (i.e., diagrams or linked images, spaces for user notes).

5. Collating, summarising, and reporting the results

This step involved synthesising all extracted information to create meaning to guide recommendations (Arksey & O'Malley, 2005; Levac et al., 2010). Again, this process was iterative; LM synthesised the findings and drafted the summary and recommendations with supervision from DOB and RE.

RESULTS

The search was undertaken during December 2019 and January 2020. In total, 74 resources were identified. However, 68 were discarded because they did not meet the inclusion criteria. Most identified resources were excluded because they were web pages (n = 37), short fact sheets (n = 17) or a part of an online module or application (n = 8). The remaining six resources were discarded for a combination of other reasons. Hence, six OA guidebook resources (Table 1) were found that matched the eligibility criteria (Arthritis Australia, 2016; Arthritis Foundation of South Africa, 2006; Arthritis Ireland, n.d.; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018; Versus Arthritis, 2019). The length and detail of the guidebooks were diverse, ranging from eight (Arthritis Foundation of South Africa, 2006) to 38 (Arthritis Ireland, n.d.) pages. Versus Arthritis (2019) (UK) was the only resource to cite research evidence. The chapter content varied between resources, but most started with an introduction to OA and first-line treatment. Characteristics of the included guidebooks are presented using a framework informed by the NICE (2015) guidelines.

Charting the data

Relevant data were extracted and categorised in relation to six key NICE (2015) guideline components (*first-line treatment*, *second-line treatment*, *third-line treatment*, *interprofessional team*, *self-management*, and *other*). Additional data were grouped to construct one additional component (*design features*).

1. First-line treatment: Education, exercise, and diet

1.1. Education

All resources acknowledged that the specific cause of OA is unknown and explained there is no cure. Hip and knee joint OA featured in all resources, but reference to other affected joints (i.e., spine, foot, or hand) were sporadic. OA education primarily comprised information related to joint pathology, including articular cartilage breakdown, reduced ligament/tendon stability, and muscle atrophy. Further detail was offered in four resources (Arthritis Australia, 2016; Arthritis Foundation of South Africa, 2006; Arthritis Ireland, n.d.; Versus Arthritis, 2019) related to bony spurs, osteophytes, synovium swelling, and extra synovial fluid in the joint space. Two resources (Arthritis Foundation of South Africa, 2006; Versus Arthritis, 2019) explained the workings of a typical joint before explaining the pathophysiology of OA, while two resources (Arthritis Society Canada, 2018; Versus Arthritis, 2019) utilised the concept of joint 'wear and repair'. Aside from one (Arthritis Australia, 2016), all resources explained the weak correlation between the degree of pathology, x-ray findings, and symptom severity, while several resources explained that the pathophysiology of OA and associated symptoms were not necessarily linked (Arthritis Australia, 2016; Arthritis Society Canada, 2018).

1.2. Exercise

All resources explained that conservative treatments (exercise and diet) could alleviate symptoms, improve joint and general health, and reduce complications of a sedentary lifestyle. Three modes of exercise were identified (range of motion/flexibility, aerobic [walking, swimming, cycling], and resistance/strength). Physical activity recommendations were referenced in three resources (Arthritis Australia, 2016; Arthritis Ireland, n.d.; Arthritis Society Canada, 2018). The concept of pain and exercise was identified in one resource (Arthritis Australia, 2016) to educate individuals that it is reasonable to feel pain and stiffness with exercise, with additional caveats to change activity if symptoms last longer than 2 hr (Arthritis Australia, 2016). Other exercise interventions of Tai Chi (Arthritis Ireland, n.d.; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018), yoga (Arthritis Society Canada, 2018), and hydrotherapy (Arthritis Ireland, n.d.; Arthritis New Zealand, n.d.; Versus Arthritis, 2019) were recommended.

Table 1

Summary of Patient-Educational Resources

Arthritis organisation	Publication title	Total pages	Chapter contents
Arthritis Australia	Taking control of your osteoarthritis	32	(i) Understanding osteoarthritis, (ii) Who can help, (iii) Working with your GP, (iv) Seeing a rheumatologist, (v) Other health professionals, (vi) Healthy moves for your joints, (vii) Making the most of medicines, (viii) What other treatments can help? (ix) Seeking support, (x) Glossary of terms, (xi) Useful resources
Arthritis Ireland	Living with osteoarthritis	38	(i) Introducing OA, (ii) Getting a diagnosis, (iii) Communicating with health professionals, (iv) Looking after your joints, (v) Practicalities, (vi) Caring for yourself
Arthritis New Zealand	Osteoarthritis	12	(i) What are the warning signs of OA? (ii) What is OA? (iii) What causes OA? (iv) How is OA diagnosed? (v) How can I manage my OA?
Arthritis Society Canada	Osteoarthritis: Causes, symptoms and treatments	16	(i) What is OA? (ii) What are the early signs of OA? (iii) Self-management, (iv) Treatments, (v) What now? Each chapter included sub-headings of other topics.
Arthritis Foundation of South Africa	Osteoarthritis	8	Individual chapter contents not provided
Versus Arthritis [a]	Osteoarthritis	27	(i) Mel's story, (ii) What is OA? (iii) Symptoms, (iv) Causes, (v) Which joints are affected? (vi) Diagnosis, (vii) How will OA affect me? (viii) Possible complications, (ix) Managing your OA, (x) Supplements and complementary therapies, (xi) Practical matters, (xii) Caring for yourself, (xiii) Research and new developments, (xiv) Glossary, (xv) Exercise for OA, (xv) Useful addresses, (xvi) Where can I find out more?

Note. GP = general practitioner; NICE = National Institute of Care and Excellence; OA = osteoarthritis; UK = United Kingdom.

[a] Evidence cited in this paper was from the NICE (2015) guidelines.

1.3. Diet and weight loss

Diet and weight-loss advice were the least referenced first-line treatment interventions. The main topic included the correlation between being overweight/obese and OA development, emphasising the importance of maintaining a healthy diet to avoid co-morbidities related to poor nutrition (Arthritis Australia, 2016; Arthritis Foundation of South Africa, 2006; Arthritis Society Canada, 2018). All resources referred to the inadequate scientific evidence for specific food groups and their effects on OA symptoms.

2. Second-line treatment: Pharmacological and supplements

All resources included some reference to pharmaceutical management. Analgesics (paracetamol and paracetamol-codeine combination), non-steroid anti-inflammatory drugs (NSAID) (oral and topical), and COXS-2 were the three main medications referenced and were included in all the resources. Injection therapies included corticosteroid injections as an option for short-term pain relief (Arthritis Australia, 2016; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018; Versus Arthritis, 2019), and hyaluronic acid (Arthritis Society Canada, 2018; Versus Arthritis, 2019). All resources referenced the food supplements glucosamine and chondroitin due to their popularity with people with OA treatment. However, the information explained the limited efficacy of these supplements.

3. Third-line treatment: Surgical intervention

All resources included some reference to surgical interventions, such as keyhole surgery (arthroscopy), joint replacement, and joint fusion. Furthermore, all explained that surgery was not required for long-term management but may be considered when conservative treatment options were exhausted. The Arthritis Australia (2016) resource identified criteria for surgery may include severe, constant joint pain that does not improve with conservative treatments; night pain affecting sleep; significant limitations on walking and other daily activities; and a reduced ability to work.

4. Interprofessional team

All resources provided information about engaging with a general practitioner (GP) or primary care physician. The most referenced practitioner was GP, with a large emphasis on consultation before altering OA treatments. The resources described the value of including other health care practitioners. For example, including a pharmacist to support medications, a physiotherapist to prescribe exercise, or an occupational therapist to aid with home/work environment modification.

5. Self-management: Strategies, mindfulness, and coping

Self-management was linked to OA education, exercise, diet, medications/supplements, and complementary therapies. Self-management techniques included using aids to avoid excessive joint loading, heat and cold therapy, and advice to reduce load linked to physical activity.

Anxiety and depression were linked to OA in three resources (Arthritis Australia, 2016; Arthritis Foundation of South Africa, 2006; Arthritis New Zealand, 2017), while all resources referenced mindfulness and relaxation as self-management strategies. Other methods suggested to improve psychological health include cognitive behavioural therapy, interpersonal therapy, exercise, meditation, deep breathing, visualisation, yoga, and distraction (Arthritis Australia, 2016; Arthritis Society Canada, 2018; Versus Arthritis, 2019).

6. Other: Pain education, sleep hygiene, and OA misconceptions/myths

The specific topics related to pain education varied between resources. The Arthritis Australia (2016) resource identified pain education strategies such as taking medications wisely, exercise, heat and cold therapy, joint protection, energy expenditure monitoring, relaxation, mindfulness, and stress reduction. The Arthritis New Zealand (2017) resource looked at pain through a biopsychosocial understanding of pain (i.e., acute versus chronic pain) and adjuncts to help treat pain symptoms.

Poor sleep is a common symptom of OA (Hawker et al., 2010), yet information concerning sleep health was sparse. Three resources (Arthritis Australia, 2016; Arthritis New Zealand, 2017; Versus Arthritis, 2019) provided information and strategies to help people improve sleep health, such as a routine wake and sleep cycle and caffeine reduction, and to keep a sleep diary.

Common questions regarding misconceptions (or myths) associated with OA were identified in two resources (Arthritis Foundation of South Africa, 2006; Arthritis Ireland, n.d.); including topics related to the influence of weather, diet as a cure, OA as a degenerative condition, and OA worsened by exercise.

7. Design features: Patient experience, context, and utilised design features

First-hand patient stories (Versus Arthritis, 2019), patient experiences (Arthritis Ireland, n.d.), or quotes (Arthritis Ireland, n.d.) were used to describe a lived experience of OA. The Arthritis New Zealand (2017) resource was the only one to provide a specific context, describing a Māori model of health (Te Whare Tapa Whā) to explain important factors that can affect health and wellbeing.

A rhetorical question began each chapter in all resources to engage the reader, for example, *What is OA?*. Aside from one (Arthritis Foundation of South Africa, 2006), all resources provided real-life photographs of individuals with OA engaged with activity or interprofessional team members. The New Zealand (Arthritis New Zealand, 2017) and Australian (Arthritis Australia, 2016) resources summarised essential information using ‘take-home messages’.

Another common design feature was the use of diagrams or pictures of a ‘normal healthy’ joint, most commonly the knee (Arthritis Foundation of South Africa, 2006; Arthritis Ireland, n.d.; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018; Versus Arthritis, 2019), including anatomical references and comparing it to ‘mild or moderate’ pathology. Several resources (Arthritis Australia, 2016; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018; Versus Arthritis, 2019) displayed OA lesion location (hip, ankle, spine, big toe, lumbar spine) via a skeleton diagram.

Providing opportunities for patient interaction and comment/reflections was another common design feature. Examples included a ‘notes/record section’ (Arthritis Australia, 2016; Jordan et al., 2017), a place for medication tracking, and important contact details for interprofessional team members (Arthritis Australia, 2016) or the relevant regional support groups (Arthritis Australia, 2016; Arthritis Ireland, n.d.; Arthritis New Zealand, 2017; Arthritis Society Canada, 2018; Versus Arthritis, 2019) The Versus Arthritis (2019) resource supplied a list of exercises (including a diagram and description) for readers to perform at home.

DISCUSSION

Although education is included as one of the core primary-care interventions for OA (NICE, 2015), there is limited information on the content, design features, and efficacy of OA patient-educational resources. Our scoping review has identified several OA patient-educational resources that have been created and made available through relevant national arthritis organisations on an ad hoc and bespoke basis. Below we discuss the findings of this scoping review in the context of the four research questions.

What OA patient-educational guidebooks or resources are available online, published by national arthritis organisations in English?

This review included the OA patient-educational resources of six different countries – Aotearoa New Zealand, Australia, South Africa, Canada, Ireland, and the UK. We had expected to find a larger number of guidebooks from the dozens of English-speaking countries worldwide. This finding may reflect limitations of the search or the strict inclusion criteria, but it also may represent the significant amount of research needed to create an OA guidebook.

What were the similarities and differences in content between the identified OA patient-educational guidebooks or resources?

The detail and content of these resources were wide and varied, leading to a lack of consistency in patient information concerning OA. These resources consistently explained OA pathophysiology, lesion location, and exercise benefits. However, additional topics such as pain education, sleep health, and misconceptions/myths of OA were inconsistently covered.

Considering that current OA guideline-informed treatments mainly focus on the biomedical and biomechanical factors that influence pain, rather than addressing other potential pain contributors, the inclusion of information regarding pain neuroscience education, sleep health, and misconceptions/myths of OA would be of great benefit (Mills et al., 2018). This addition would encourage a greater understanding of pain, and psychological and sleep interventions, and reconceptualise misunderstood OA topics to promote increased active self-management, improving the consistency of available information for people living with OA (Mills et al., 2018).

How does the content of these identified guidebooks and resources match key NICE (2015) guideline recommendations?

All identified resources explained first-line care (education, exercise [aerobic and resistance], and diet), complementary therapies, supplements, pharmacological management, and surgical intervention, as detailed in the NICE (2015) guidelines. Furthermore, the guideline recommendations missing from the identified resources included information related to a holistic OA assessment and treatment approach. Mills et al. (2018) determined that a holistic approach to OA assessment is central to establishing appropriate patient-tailored management strategies. This review found that OA content pertinent to patient experience and acknowledgement of social participation was underutilised or indeed absent in the identified patient-educational material. Of concern, all included resources failed to incorporate OA education contextualised to an individual's life, such as identifying activity and participation restrictions due to OA. This created a predominantly biomedical lens of information that patients were provided in the patient-educational resources. To encourage uptake and utilisation of self-management recommendations and education, it is clear that OA patient-educational resources must offer more than biomedical information to support individuals to live with OA (Grime & Ong, 2007; Mills et al., 2018). Therefore, it is important that activity and participation restrictions are identified using a holistic approach, and that tools and education are provided to improve the self-management of OA.

Despite best-practice guidelines advocating for dietary changes in OA (NICE, 2015), few resources incorporated strategies that would lead to significant behavioural change. Ideally, OA patient-educational resources should include information regarding healthy eating guidelines and recommendations (Ministry of Health, 2020; NICE, 2006; World Health Organization, 2020), clinical implications of weight loss (if required) for OA, effective weight management and incorporation of exercise, evidence specific to diet and OA (Thomas et al., 2018), behaviour-change strategies (Khandelwal, 2020), and how to incorporate an individual's family into utilising these recommendations (McGruer et al., 2019).

What design features do the guidebooks and resources use when presenting patient-educational material?

Several useful design features were common among the different resources, such as clear diagrams to show joint changes, lay language to improve relatability, or the inclusion of people engaging in physical activity (i.e., exercise or socialising). However, most patient-educational resources did not reference specific cultures relative to their country or reflect on cultural diversity within their communities. Attention to specific cultural aspects could enhance OA patient self-management information, particularly for national organisations that serve countries with Indigenous populations and/or diverse and multicultural populations (Dixon et al., 2021; McGruer et al., 2019; O'Brien et al., 2021). For example, McGruer et al. (2019) found that OA places a substantial burden on the physical, mental, spiritual, and family (whānau) wellbeing of Māori women (wāhine). Dixon et al. (2021) wrote about the impact that living with OA could have on a man's (tāne's) sense of mana. Therefore, when providing care for this population, practitioners must provide culturally sensitive OA education for Māori and their whānau to improve both patient access and outcomes (McGruer et al., 2019). Furthermore, the use of bilingual text (including kupu Māori. e.g., *Free from Knee Pain* as discussed in Darlow et al. (2020)) may facilitate greater engagement.

Implications for the development of an Aotearoa New Zealand OA guidebook and future research

Based on the findings of this scoping review, we have made five recommendations about developing an OA Guidebook or related resource for Aotearoa New Zealand. First, the patient experience should be reflected within an OA guidebook. Patient experience should reflect both positive and negative experiences of 'living with OA' and treatment options to promote knowledge mobilisation and a sense of patient identification with the treatment recommendations. Second, patient education must represent a holistic, person-centred approach to explain the effects OA can have on an individual's participation and contribution in functional and social activities, and acknowledge the core principles of Mātauranga Māori (if produced for use in an Aotearoa New Zealand context). Third, OA patient education should reflect lay and biomedical terms to allow a complete understanding of the OA pathophysiology. For example, the basics of a working synovial joint (with anatomical terms) should be explained initially, before the complexity of OA pathophysiology is described, to ensure a complete understanding of a 'normal' and 'OA' joint is reached. Fourth, OA patient education requires information concerning all common OA locations (e.g., knee, hip, lower back, hand, and big toe) with anatomical diagrams and pictures (with structural landmarks) rather than just the knee joint, which is found in all resources. This ensures that all individuals reading the guidebook can resonate and understand OA pathophysiology with their OA location and experience. Fifth, all resources or guidebooks should be evidence-informed and link to existing accepted best-practice OA management guidelines.

Due to the scarcity of published research that refers explicitly to OA patient-education resources, there is scope to encourage researchers to publish not only their developed protocols, methods, and results but also the OA patient-educational resources themselves to allow a more comprehensive critique of the design, information, process, and cited scientific evidence.

Strengths and limitations of this review

The strength of this review is the guidance of the structured five-step approach developed by Arksey and O'Malley (2005) and Levac et al. (2010). This approach allowed a broad search of online resources, which was necessary to capture a wide range of information and facilitate greater comparison. The main limitation was excluding educational resources and literature not published in English or provided by other platforms such as smartphone applications or online modules. However, this was a pragmatic decision based on the purpose and constraints of the project. Our study provided limited insight into the potential cultural and contextual factors that should be incorporated; these factors merit further research.

CONCLUSION

The identified patient-educational resources in this scoping review utilised a predominantly biomedical approach to deliver OA education and treatment interventions. Given the limited consideration of the patient experience, OA patient-educational resources developed in the future should incorporate both positive and negative experiences of 'living with OA' to encapsulate readers and contextualise and understand the long-term course of OA. Developers of a guidebook for people living with OA should consider the above recommendations to ensure that patient-educational material is delivered from a holistic, culturally responsive, biopsychosocial viewpoint.

KEY POINTS

1. To the best of our knowledge, this is the first scoping review to identify published osteoarthritis (OA) patient-educational guidebook resources and synthesise the content contained within the resources.
2. While many OA patient-educational resources exist, there are limited studies that describe the development and testing of these resources.
3. Much of the identified content within OA patient-education guidebook resources has a biomedical approach to the delivery of education and treatment, and some of the material lacks consideration of the patient experience.
4. Those developing patient education resources about OA should consider utilising a balance of lay and biomedical information to ensure that readers can contextualise and understand the course of the condition.

DISCLOSURES

There are no conflicts of interest that may be perceived to interfere with or bias this study.

PERMISSIONS

None.

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Perceptions of Pasifika Caregivers on a Pacific Community Playgroup and Implications for Paediatric Physiotherapists

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ABSTRACT

Inadequate cultural consideration in healthcare access and provision is one factor that contributes to health inequities for Pasifika in Aotearoa New Zealand. Creating a culturally responsive environment for Pasifika is a key consideration for physiotherapists as required by the Physiotherapy Board of New Zealand cultural competence standards. Cultural community groups, supported by healthcare professionals, may foster the relationship between health providers and Pasifika by creating safe, mana enhancing accessible/alternative health spaces. However, there is limited evidence exploring Pasifika's perceptions of what is culturally important in healthcare supported community groups in Aotearoa New Zealand. Semi-structured interviews using Talanoa dialogue were conducted in a health professional supported Pacific community playgroup in the Otago region, Aotearoa New Zealand, and data were analysed using a General Inductive Approach. One overarching theme of a 'sense of belonging' and of feeling connected to the Pasifika culture was determined. The community playgroup provides a safe environment where members of the Pacific Trust Otago can come together in a culturally meaningful way. Talanoa communication facilitates collaboration and co-design of a culturally responsive community group and is made possible through built relationships. This information may be used to foster the co-design of other healthcare supported community environments, strengthening trust and communication between Pasifika and healthcare providers.

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Key Words: Cultural Responsiveness, Pacific Communities, Paediatrics, Pasifika, Playgroups, Talanoa

INTRODUCTION

Pasifika are Pacific peoples who call Aotearoa New Zealand home but have heritage and cultural connections to the Pacific Island nations (Ministry of Education, n.d.b). Pasifika are a growing population in Aotearoa New Zealand and other western countries, representing 8.1% of Aotearoa New Zealand's 2018 population (Stats NZ, 2020), with the highest proportion of children (35.7%, 0–14 years) of Aotearoa New Zealand's major ethnic groups (Stats NZ, 2018). However, Pasifika still see health disparities with significant health inequities and disproportionate rates of risk factors, including obesity and physical inactivity, giving rise to an overall decreased life expectancy (Ministry of Health, 2020). Although the primary healthcare system provides levels of care that considers practical, scientific, cultural, social, and societal aspects, this current system is not fully adequate to suit the needs of Pasifika (Walsh & Grey, 2019). It is noted that the health needs of Pasifika are not being met in Aotearoa New Zealand (Tiatia, 2008) and it has been suggested that implementation of cultural competence and exploration of Pasifika's perspectives may help to improve responsiveness and quality of care (Southwick et al., 2013). Despite this recommendation, the New Zealand Health and Disability System Review (2020) continued to report long-standing inequities in health outcomes between Pacific and non-Māori, non-Pacific peoples. These disparities reflect how inequities in the distribution of social determinants of health have negative effects on health and illustrate how a person's environment (where they are born, age, live, work, and learn) can influence their health and wellbeing (Centers for Disease Control and Prevention, 2021). Pasifika are disproportionately affected by intergenerational poverty, are more likely to reside in high deprivation areas, live in crowded households, be unemployed, and have a lower median income than non-Māori and non-Pacific peoples (New Zealand Health and Disability System Review, 2020) – all of which are examples of social determinants of health that can increase health risks and influence health outcomes.

Inadequate cultural consideration in healthcare provision, including mismatched health beliefs and a clash in cultural worldviews, contributes to greater health inequities for Pasifika (New Zealand Health and Disability System Review, 2020; Ryan et al., 2019). Pacific health models conceptualise the health values and beliefs of Pasifika, with particular reference to specific Pacific cultures. For example, the Fonua model of health is a framework relating specifically to Tongan culture, whereas the Fonofale model of health is a framework that incorporates Tongan as well as Samoan, Cook Island, Niuean, Tokelauan, and Fijian peoples (Action Point, 2018). The two models are similar in their holistic approach, which reflects the fundamental orientation of a Pasifika point of view (Pasifika worldview), and encompasses spiritual, cultural, and environmental factors on health (Sopoaga, 2011). The Fonofale model is depicted as a traditional house (fale) with family as the foundation and culture as the roof. Four pillars hold up the fale, which represent physical, mental, spiritual, and other factors. Encasing the Fonofale are three interlinked concepts of time, environment, and context all of which influence the elements of health.

The cultural views and beliefs that Pasifika hold regarding their health influence their perceptions, access, and use of health services in Aotearoa New Zealand (Southwick et al., 2013). Mauriora Associates (2022), defines cultural competence as:

> Individual values, beliefs and behaviours about health and wellbeing [that] are shaped by various factors such as race, ethnicity, nationality, language, gender, socioeconomic status, physical and mental ability, sexual orientation and occupation. Cultural competence in healthcare is broadly defined as the ability of health practitioners to understand and integrate these factors into the delivery of healthcare practice.

To provide culturally responsive healthcare, it is necessary for health professionals to understand the people they are working with and to choose the appropriate Pacific health model. Le Va (2022) advises that health services that connect culture and care for Pasifika people would lead to improved access, attendance, and satisfaction with services, leading to better health outcomes. Bula Satu, released in 2021 by the Health and Safety Commission of New Zealand, also recommends authentic engagement and partnership with Pacific communities to improve Pacific health (Health Quality & Safety Commission, 2021).

Culturally responsive healthcare seeks to meet the cultural needs of the person and acknowledges that they are the expert of their own life and their own needs (Minnican & O'Toole, 2020; Zwi et al., 2017). To gain this information, the New Zealand Ministry of Health reports that community assessments and mechanisms for community and patient feedback are crucial and may help to achieve systematic cultural competence (Tiatia, 2008); however, it has been found that Pasifika prefer discussion over written feedback (Southwick et al., 2013). Health professional collaboration with community-based organisations has been suggested as a vehicle for health care service provision to ethnic minority groups (Vu, 2008). One novel example of physiotherapy service delivery is illustrated by the partnership between the Pacific Trust Otago (PTO) and the School of Physiotherapy at the University of Otago. The PTO is a charitable community organisation supporting the provision of health, education, and social services to Pasifika (Pacific Trust Otago, n.d.), including community-based services such as a seniors' wellness group, and an early childhood playgroup, both of which are frequently supported by physiotherapy students. The physiotherapy-supported PTO playgroup provides an opportunity to offer paediatric physiotherapy-related support and education to caregivers, such as identifying children at risk of developmental delay and providing early intervention referrals. Early identification of children who could benefit from paediatric support is an important consideration for Pasifika children who have disproportionately more exposure to risk factors for disease and illness. Pasifika children have a higher incidence of a range of conditions including, asthma, dental problems, and ear and skin infections, all of which may impact their health and development (Ministry of Heath, 2020). Bula Satu also reports that only 59% of Pacific families of infants in their first year of life received all their Well Child/Tamariki Ora core contacts. This is in comparison with 81% of non-Māori, non-Pacific families, which indicates the need for greater paediatric support and screening (Health Quality & Safety Commission, 2021).

A study was undertaken in December 2020 to explore Pasifika caregivers' perceptions of the PTO playgroup. The research question asked, what do Pasifika consider to be meaningful and important in a community playgroup? The research aims were to: 1) gather information to enable the culturally meaningful aspects of the Pasifika playgroup to be re-created in other healthcare environments and, 2) gather information to enable physiotherapists to enter community settings in a culturally safe manner to deliver health services. This study highlights the importance of culturally safe environments for wellbeing and illustrates that health service delivery is occurring in a setting that may not have been previously considered. The purpose of this paper is to illustrate a novel approach to meet cultural competence guidelines to help physiotherapists invite Pacific families to co-design services through their articulation of what is important to them and to shape more effective physiotherapy service delivery.

METHODS

The study received ethical approval from the University of Otago Ethics Committee (reference number D20/340), following consultation with the Ngāi Tahu Research Consultation Committee.

Research team

The research team consisted of five members with a variety of expertise. The primary (novice) researcher (DD) was of Papua New Guinea descent and undertaking a summer studentship research project focused on Pasifika health. He was supported by an experienced primary health physiotherapist and qualitative researcher (MP), and three emerging qualitative researchers: a Samoan physiotherapist and Pacific community leader (OS) and experienced paediatric physiotherapists (LC & DS).

Study design

This study involved thematic analysis of semi-structured interviews using a General Inductive Approach (Thomas, 2006). Semi-structured interviews followed a Pacific Island form of dialogue known as Talanoa, which is based around sharing knowledge and using storytelling to build connections between the participants (Vaioleti, 2006). Talanoa is steeped in the traditional decision-making processes of many Pacific Island cultures and provides contextual solutions to issues faced by Pacific Island communities (Vaioleti, 2006). The Talanoa model incorporates four aspects that influence conversation: *ofa* (love), *mafana* (warmth), *malie* (humour), and *faka'apa'apa* (respect) (Vaioleti, 2006). These were woven into the interview process. The General Inductive Approach analytic strategy provides an easy-to-use systematic set of steps to analyse qualitative data (Thomas, 2006) and was chosen to provide a straightforward analysis procedure for the primary (novice) researcher.

The Fonofale model of health informed the research question and research including recruitment, interpretation of the data during analysis, and dissemination. The Fonofale model was chosen because it encompasses a wide variety of Pacific cultures. Two researchers were of Pacific Island heritage; their perspectives added to the Pasifika interpretive lens to shape the research process. An intuitive epistemological constructionist approach, which assumes that an individual's understanding is based on their experience and background knowledge (Ültanir, 2012), was used to explore the opinions of the participants. This epistemological approach complimented the Talanoa dialogue of the semi-structured interviews and the General Inductive Approach.

Participant recruitment

Information sheets outlining the study, and examples of interview questions were presented to attendees of the PTO playgroups. The PTO staff playgroup coordinator distributed the information sheets in person to ensure playgroup members felt no coercion to participate by the researchers. Information was provided in English only, as different language options were not required. Volunteers who indicated their interest were subsequently contacted via telephone by the primary researcher. Those who met the inclusion criteria of male or female caregivers who had attended the PTO playgroup two or more times over any period of time, identified as Pasifika, and were conversant in any language were invited to participate in the study. Paid caregivers not responsible for making guardian decisions were not eligible for inclusion. Signed consent was obtained from all those interviewed. Participants were given the opportunity to bring a support person to their interview and/or to have a member of the PTO available during their interview for support or interpreter assistance.

Data collection

The semi-structured interviews were conducted face to face at the PTO in November 2020 with only the interviewee and researcher(s) present. Interpreters were not requested or required, and the interviews were conducted in English. To facilitate the Talanoa dialogue within the semi-structured interviews, a member of the PTO ensured a formal introduction prior to the interview and the primary researcher shared their reasons for conducting the research project. Interviews began with preliminary conversation to facilitate *ofa* through a sense of the participant and researcher acknowledging and knowing each other. Talanoa was further facilitated through open-ended questions which promoted *mafana* through storytelling and opportunities for *malie*. The objectives of the interview schedule were guided by the research question, aims of the research, and the playgroup setting (see Table 1). *Faka'apa'apa* was woven throughout the interview process and reflected by the inductive nature of the interview, which acknowledged the expertise of the participant. All interviews were led by DD with DS or LC in attendance to provide support and guidance (but not required to contribute to the interview conversations).

Table 1

Key Objectives of the Interview Schedule

	Interview schedule key objectives
1.	Preliminary conversation and demographic questions
2.	Playgroup experiences and perceptions
3.	Culturally meaningful aspects of the playgroup
4.	Perceptions of the importance of play
5.	Co-development of the playgroup

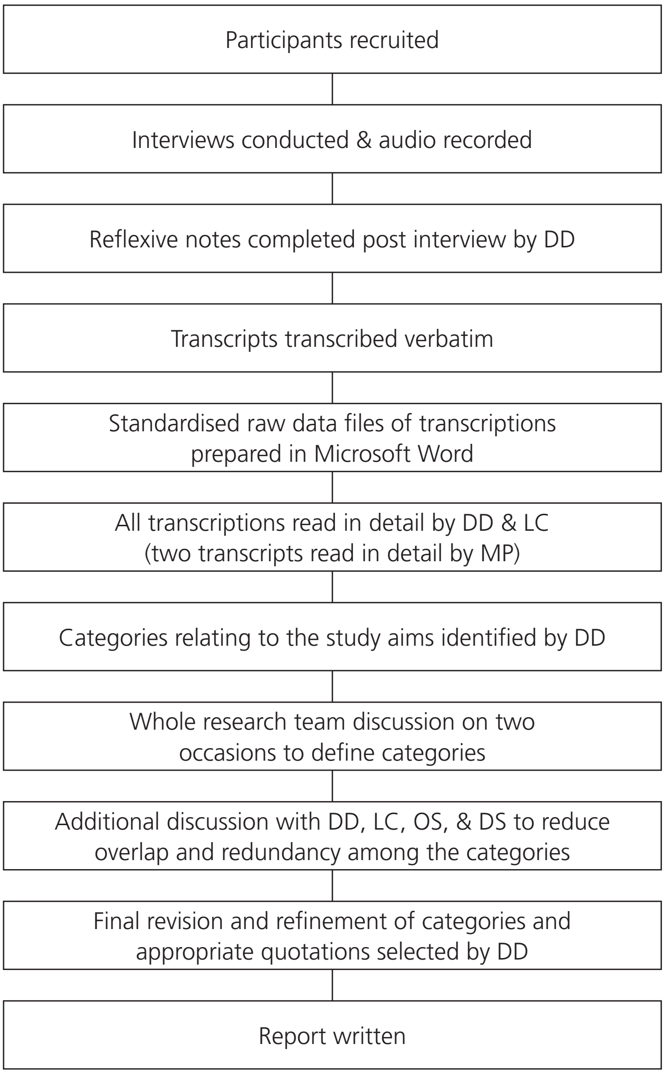
Demographic variables of caregiver ethnicity, age, number of children, and ethnicity of children were gathered to provide context for the data. Interviews were between 31–62 min duration and were audio recorded. Reflective notes were written by the primary researcher following each interview to aid in the interpretation of the data. Although not integral to the methodology, these reflections helped the primary researcher explore their own perspective and understanding of how concepts changed throughout the research process. The audio files were stored securely on the primary researcher's computer and only accessed by members of the research team via Microsoft Teams with password protection. The audio recordings were transcribed verbatim by DD and anonymised.

Data analysis

The General Inductive Approach (Thomas, 2006) was followed for data analysis and is outlined in Figure 1. The constructionist lens of the Fonofale model of health underpinned a semantic General Inductive Approach for reading and coding interview transcripts. DD read and coded all transcripts using the Fonofale model to guide the semantic analysis. Qualitative data analysis tables were used in Microsoft Word to record initial categories and then themes alongside participant quotes. Exemplar quotes were chosen to demonstrate the richness of the data collected. In addition, LC and MP independently coded all transcripts and DD and LC read all transcripts prior to iterative discussion with the whole research team. Whole research team discussion occurred on two occasions at which time consensus was reached.

Figure 1

Outline of Data Collection and Analysis Methods Following the General Inductive Approach (Thomas, 2006)



Note. DD = Duncan Drysdale; DS = Donna Smith; LC = Lizz Carrington; MP = Meredith Perry; OS = Oka Sanerivi.

RESULTS

Participant characteristics

Five caregivers (all mothers) who had attended the PTO with their child(ren) were included in the study, which allowed for in-depth qualitative interviews to be conducted in a timely manner. Participants were of Pacific Island heritage (Cook Island, *n* = 4; Tongan, *n* = 1), aged 24 to 41 years. Each mother had between one to nine children. Participants were either currently attending the playgroup with their child(ren) (*n* = 3) or had previously been members of the playgroup and still contributed indirectly to the PTO playgroup by liaising with the playgroup organisers to provide advice regarding services and health and safety (*n* = 2). The children's ethinicities were reported as Cook Island and New Zealand European (*n* = 5), Cook Island and Irish (*n* = 1), Cook Island and Māori (*n* = 7), Tongan and Samoan (*n* = 3), and Cook Island and Tongan (*n* = 1). Of the 17 children reported by the participants, seven were currently attending the playgroup (parental work-related barrier, *n* = 2; children now at school, *n* = 8).

Thematic analysis: Sense of belonging

The overarching theme derived from the data was the importance of a *sense of belonging*. Within this main theme were three subthemes consisting of: 1) *Cultural identity*, 2) *Connections and support*, and 3) *Playgroup social cohesion* (see Figure 2). These themes were interrelated and directly related to the overall research aims; sub-themes were further explored. Supplementary exemplar quotes are provided in Table 2.

Cultural identity

Cultural identity contributed to a *sense of belonging* and consisted of five elements: a sense of personal identity, the importance of native language, storytelling, significance of names, and family (see Figure 2).

Personal identity

Personal identity was strengthened through exposure to Pacific heritage. Participants felt their experiences of Pacific culture at the PTO fostered a strong sense of cultural identity in their children and helped to create a sense of pride in themselves and their ancestors. The playgroup was considered a safe environment in which the children could be immersed in their Pacific culture and the participants felt this helped negate the

Figure 2

Overarching Theme of Sense of Belonging with Subthemes Described Below

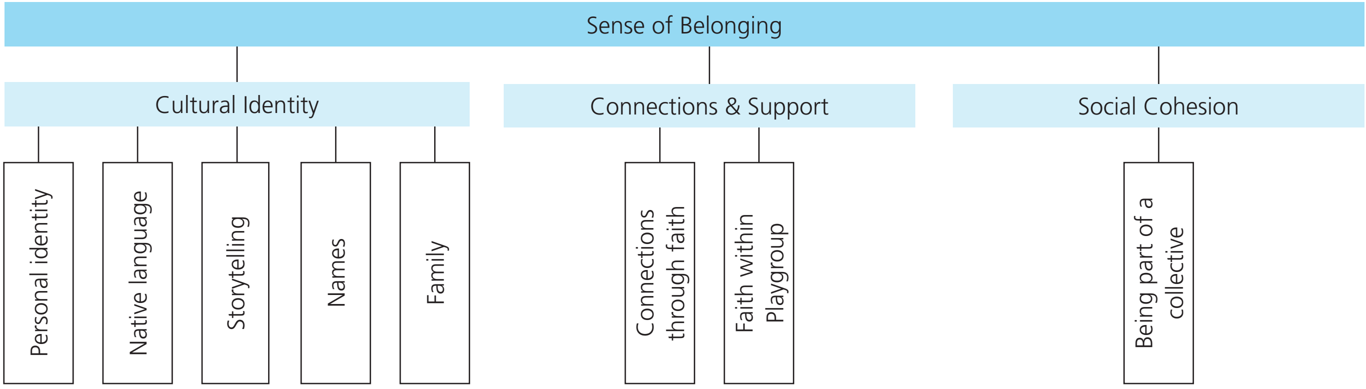


Table 2

Supplementary Exemplar Quotes from Participants

Cultural identity	Example quote
Personal identity	P1: I would like to teach my children certainly my 18-year-old to you know, own who you are, be free and don't let others you know try and shape you or mould to something different, and I think coming here on a Monday and being part of the Pacific playgroup that is just the norm. P3: Yeah, I just think, like I've grown up knowing a little bit of culture like, a little bit of culture and I think it's good that [daughter] is starting that. Um, I think it is a good thing to say that I'm Cook Island and I know my culture basically. P5: I just felt welcomed you know, and I felt like I could be myself and that I didn't have to try and put on an act.
The importance of native language	P1: Oh for us language, so um, you know language is so rich and being able to speak in our language and it just totally be normal and accepted … and treasured and acknowledged and … um celebrated is a big … is a big deal for me. P2: So they can learn a bit more and, cause usually when there is a Samoan or a Tongan family and they speak their language, my ones usually just sit there and stare at them like, wow, I wish mum could do that, and I'm like I can't do that … I wish but I can't sorry, cause usually they ask what are they talking about? And I'm like I don't know sorry, I don't know what they are talking about, but you can go ask them though. P2: … just listening to them talk in our language, it is quite overwhelming and it's like I wish I knew what they were saying but, I can't. It, it … inside me just feels quite, quite warming and it just quite calming just to even hear all the mamas and the papas talk in that language even though I don't really know what they were saying. P3: Yeah, I think so. Um, yeah I mean it would be nice if maybe, could speak to her but in Cook Islands, but I can't so. P5: That's what I liked about it, they offered Cook Island songs and Samoan and Tongan.
Storytelling	P2: Of the past history of my culture, I would pass it on, but um, my mum hasn't really shared much stories, it was usually my grandparents but my grandparents aren't here anymore … if my grandparents were here I'd love to learn more and share it with my children of the values of being a Cook Islander. P4: And names over the years just kind of get built on and there becomes more stories to tell of the name.
Significance of names	P1: We are often named after a place or an event, or something you know, that has gone down in history so it, it deserves to, … let's try. P4: It's actually quite interesting actually people's names. He's named after my Dad … I remember that I fought with my brother, my older brother because he was the first one out of all of us to have kids. And I'm gonna name this one that, and I'm like no you are not, that is my name.
Family	P2: Yup, she [Grandmother] teaches them new songs, and sometimes reads parts of the Bible to them or if, there is a Cook Island book at home and she's come over they will ask if she could read it to them, and she'll happily reads it to them and then they will try their best to read it back. P3: So my Dad is um, full Cook Island and was born in the islands and come here when he was young, when he was a kid … but yeah he's got all of his family here and his sisters and his parents here before they passed on. So yeah he sees quite a lot of them sometimes, um we see quite a lot of them … he [Dad], he's still fluent in Cook islands and so he teachers my daughter words and songs which is quite good cause I never got taught that so it's nice to see him teaching her that. P4: He's [Grandfather] trying to teach him into that and that's really cool. But he's trying to pass on what he knows from the from the, from growing up in the islands and just you know, how to live on [the] land. P5: We were all very close when my Dad was here, and yeah the oldies slowly started passing away and we don't hang out like we used to.

Connections and support	Example quote
Connections through faith	P1: Obviously prayer is well you know … the being together the unity and … yeah, it’s a pretty special place … yeah … no one is really afraid to just be themselves if that makes sense. P1: … so straight away you know their connection … we need to find our people, and that is wherever the church is. P4: Like, I just feel even if they grow up and it’s not for them. I feel like, the church, like through faith and through church I've grown my community that way. P4: And that’s what I like about our religion but it’s like, yeah, regardless what we are doing at church and stuff we still try to incorporate our um, our culture and our language.
Faith within playgroup	P1: They do say prayer and, in Samoan and Cook Island, um that’s good and I guess she’s [daughter] listening to that and is taking that all in. P2: Probably [what is valued the most in the playgroup is] learning like some of the prayers cause sometimes the prayers in the morning and when we finish are different, and it, it just amazes me as it’s like … wow there are different kind of prayers that they do, that they share with us, and … I try and remember some of the words … or try and incorporate what they are saying and … put it in a way that I would be able to link it back to my children. P4: I think it’s the prayers really [that is the most valued aspect of the playgroup]. The prayer at the start, the prayer before eating and the prayer at the end.
Social cohesion	
Playgroup social cohesion with the Pasifika community (being part of a larger collective)	P1: And we interact with the wider Pacific community as well … P1: I still think the Dunedin Pacific community is still very divided … the playgroup is probably one of the very few places where it's not … and so for our family we, we love that. P2: I probably wouldn't actually attend another playgroup, even if there was one, even if it was just Pākehā. I’d probably only go to some of them but not as … many as what I would come to as a Pacific one. P2: … and actually learning from them [the elders at the PTO] … what they’ve learnt, and what they can actually teach the younger ones. P3: I mean we don’t really … have too much to do with the Pasifika community here in Dunedin, so it is nice, and … she’s [daughter] met other kids now that she’s quite familiar with and quite comfortable with now … so yeah it’s good in that aspect like, definitely connecting with other Pacific Islanders. P5: From me what I took away from it was a sense of belonging, a sense of [feeling] welcomed, no judgement from other mothers and friendship.
Playgroup development	
Suggestions for playgroup development	P1: It would be good to … do more reading … but I know, I know that … we are more oral, like we do more storytelling and, and such, but it would be great, national libraries are a huge resource, they got thousands of books in Pacific languages sitting around collecting dust, they have those big ones to do some actual physical reading with a book … so if they could get some of that here even in … in their own language that would be really really cool. P2: I think … maybe if they had some books here. P4: … maybe have little wee posters saying chair, or, and you can have it in different languages …

Note. P = participant.

feeling of prejudice that their children were exposed to in other parts of their life. The diversity of ethnic heritage exposed the participants to a variety of Pacific influences and created a diverse and inclusive environment that valued each Pacific culture.

> For my babies to be able to look around the room and see themselves … So be around other brown children and brown people … and just a whole range of different people right … on an everyday basis, you know in terms of diversity, where they go … the majority is … pākehā, Pālangi and … coming here they just … it just feels like home. (Participant 1)

Native language

Native language contributed to cultural identity. All participants indicated they would like their child(ren) to know their native language and felt this knowledge would strengthen their child’s personal cultural identity. The participants of the playgroup were exposed to diverse languages, predominantly Samoan, Tongan, te reo Māori, Cook Island, and English. Participants with limited ability to speak their own native language ($n = 2$) expressed concern that their children may not have the opportunity to learn their language. For example, Participant 5 reflected:

> … now it's quite sad cause I can understand it but I can't speak it. So it's lost to my generation and my children will probably never learn unless they learn it themselves or if something becomes available in the community.

Participants also had insight into the importance of language and described reliance on other resources including the playgroup as a space to expand both their own and their child's native language knowledge. For example, Participant 2 stated that:

> … probably [one] reason why I … come to the playgroup is just to learn more about my culture, because I actually don't know how to speak the language anymore, and I would like my children to … learn the language as well.

Storytelling

Storytelling added to cultural identity by educating younger generations about traditions and values connected to the participants' homelands. The participants felt that storytelling, often by grandparents and elders, provided a platform for communication and helped to shape the worldview and cultural attitudes of their children. Furthermore, storytelling helped them to maintain their traditions and other teachings, as written text is often not passed down, compared to song, dance, and stories. This was illustrated through quotes such as "telling stories and teaching them about where we come from, what were the people like, who we come from, um cause where and who are, [are] sometimes the same thing and can sometimes be quite different as well" (Participant 1).

Pasifika names

Pasifika names were significant and linked to cultural identity as they often connected family lineage. One participant recalled her experience at a non-Pacific playgroup where most people struggled with the pronunciation of her children's names. She expressed appreciation that this did not arise at the Pacific playgroup. Correct pronunciation reinforced the value and significance of the name and added to a sense of belonging. For example, Participant 1 stated, "we were named after … someone who was this person and carried this [mana], and this is what it means to our family and it's important that you try and pronounce our names correctly".

Family

Family connections strengthened cultural identity by fostering Pacific heritage knowledge. Grandparents and elders in families and communities were noted as being particularly significant in imparting knowledge and were reported to share native language and cultural traditions.

> I'd like them to learn like the value of respecting our, the older people and our culture and yeah and actually being respectful to the older … generations and actually learning from them as well, what, what they've learnt, and what they can actually teach the younger ones. (Participant 2)

Connections and support

Connections and support emerged as the second subtheme of the overarching theme of 'sense of belonging'. Connections established relationships within the community, which in turn provided support to the individuals. For example, Participant 5 stated, "…what I took away from it was a sense of belonging, a sense of [feeling] welcomed, no judgement from other mothers and friendship".

The most important connections for playgroup members were identified as those stemming from shared cultural and religious *faith*. Ideals around faith varied but all participants agreed that faith was a fundamental aspect of Pacific culture. All participants felt that faith created connections with others, either at church or in the wider community, and led to provision of help and support. For example, two of the five mothers were introduced to the playgroup by members of their church. Participants felt the cultural immersion at church was beneficial for their child(ren) because their church incorporated native language, singing, and other traditions, as well as enabling them to be around their immediate and extended community 'family'. For example, Participant 1 commented that "it is a huge connector, it is massive, um for a lot, for Pasifika in general, God is the foundation of everything".

Faith was integrated into the playgroup through prayer at the beginning and end of each session and prior to kai time (morning tea). When asked what they appreciated most about the playgroup, three mothers responded that it was the incorporation of faith and prayers in the playgroup and felt this integration of faith was a powerful way of bringing people together and making deeper connections with God and others.

> I think [the most valuable part of playgroup is] the prayers really. The prayer at the start, the prayer before eating and the prayer at the end. … Even if they grow up and it's not for them … I feel like through faith and through church, I've grown my community [connections] that way. (Participant 4)

Playgroup social cohesion

Social cohesion between the playgroup and wider Pasifika community added to the participants' sense of belonging. Participants felt the playgroup extended further than being simply a place to facilitate play and learning. Participants referred to the variety of services for Pasifika provided by the PTO, including food care packages, exercise classes for the community, senior sessions, and the PTO van that provided free transportation to improve access to these services. Participants valued the opportunity the playgroup provided to access the wider Pasifika community in Dunedin, such as the occasional integration of Pacific elders to the playgroup. Participants felt welcomed and encouraged to attend other events at the PTO and thus felt valued as part of a larger collective. Some participants also felt empowered to support other families at the PTO, giving them a sense of fulfilment and contribution to their community. For example, Participant 1 reported, "I think when I come to playgroup, it's definitely for my babies, but … my contribution would be to take a little bit of the burden off some of the people, and I am able to do that".

Playgroup development

Discussion regarding participants' needs and wants for the development of the playgroup revealed a common theme of expanding the playgroup resources, particularly those relating to language and cultural development. Language resources were particularly important to those participants not fluent in their native tongue, and they considered such resources beneficial for both themselves and their children. Books written in different Pacific languages were specifically requested.

DISCUSSION

This study aimed to explore ways in which a physiotherapy-supported Pacific-focused playgroup was perceived as culturally meaningful and to use these findings to improve physiotherapists' cultural responsiveness when supporting co-design of community-based accessible/alternative healthcare services. The findings revealed that participants valued the sense of belonging the playgroup provided, which was evident through their perceptions of cultural identity, connections, and support, and playgroup social cohesion with the Pasifika community. These culturally meaningful aspects of the playgroup experience were interwoven and, when related to the Fonofale model of health, revealed holistic health benefits occurring within this community group.

As depicted in the Fonofale model of health, family is the foundation for Pacific culture (Manuela & Sibley, 2013) and is encapsulated by the environment. Family is a core construct founded on relationships for Pasifika and is therefore not limited to blood kin. The playgroup's physical environment facilitated the participants' cultural identity through photos of PTO activities and traditional decorations on the walls, as well as the use of tapa cloths during kai time. The environment was made accessible by the free van transportation provided by the PTO and by the nominal gold coin donation suggested for attendance. The culturally safe playgroup environment assisted with the New Zealand Ministry of Social Development's (2016) concept of social connectedness by increasing 'trust in others'. Participants felt their children could safely 'be themselves' without fear of being marginalised or misunderstood, which enabled them to build strong relationships leading to kinship and ultimately a sense of family connection.

The Fonofale core construct of 'family' relates not only to immediate and extended family but also to kinship and partnership (Mana Services, n.d.). It is acknowledged that building a wider 'family' is critical to sharing language and cultural teachings (Pulotu-Endemann, 2001) and is a priority for Pacific people (Salesa, 2017). Family kinship was also created through participants' shared faith, which was a valued feature of the playgroup and an element of the spirituality pillar of the Fonofale model of health. The church setting has been considered by some to be a village away from the islands (Macpherson, 1996) and the playgroup may work in a similar way by providing social connections, support, and culture. Faith and spirituality are often interlinked, expressed in day-to-day living (Manuela & Sibley, 2013) and influence health and wellbeing in the Fonofale model, and as such are important considerations for healthcare services for Pasifika.

The participants' sense of belonging was further underpinned by identification with their Pacific culture, another important aspect of the Fonofale model of health. Identity and wellbeing are strongly linked (Yip & Fuligni, 2002), which was apparent in the participants' perceptions of the playgroup facilitating their children's cultural connections, thereby strengthening their cultural identity and influencing wellbeing. Language also contributes to Pacific identities (Mila-Schaaf 2010; Tiatia & Deverell, 1998) and exposure to native languages within the playgroup was valued. Similarly, fluency with Pacific names by members of the playgroup supported cultural identity and genealogical connections, with names often representing stories, history, and family heritage. In the Fonofale model of health, culture is represented as the roof of the fale, covering all other key elements. Identification with one's culture can provide the opportunity to feel part of a larger collective, which may be of particular importance as participants expressed a feeling of dislocation from their 'homelands'. Such a disconnect has the potential to undermine health and wellbeing and may account for some of the poor health outcomes for Pasifika reported in the literature (Statistics New Zealand and Ministry of Pacific Island Affairs, 2011). Cultural support and connections may have been further facilitated through the inherent cultural values in the playgroup and subsequent diminishment of potential barriers to social connectedness including language differences, high levels of inequality, and tensions between ethnic groups (Ministry of Social Development, 2016). The playgroup also provided a place of reciprocity, of gaining knowledge and support, and then giving back, to keep growing the community and strengthening connections. Participants were empowered to work together to build and facilitate the playgroup and add their own culture.

Strengths and limitations

This study explores cultural competancy for physiotherapists working in a novel environment in Aotearoa New Zealand. A limitation of this study was the restricted timeframe and sample size due to the nature of the summer student scholarship. Exploration of the participants' experience of physiotherapy within the PTO playgroup and discussion would have been valuable to gain insight on how current and past attendence may have impacted perceptions. However, despite the study limitations, a strong cultural connection was formed between the Pacific researcher and the participants, allowing for meaningful conversations, which was a strength of this study. Pacific members of the research team were also able to provide a critical cultural lens through which to analyse the data and to consider the implications.

Physiotherapy recommendations and implications for practice

Physiotherapists in Aotearoa New Zealand are required by the Board of Physiotherapy New Zealand to be culturally competent in their practice with the understanding that this will contribute to improved and equitable outcomes for health consumers (Physiotherapy Board New Zealand, 2018). The findings from this study may be used by physiotherapists to improve engagement with Pasifika, better understand their needs, foster co-design of services, and help physiotherapists demonstrate the Physiotherapy New Zealand core competencies of cultural awareness and knowledge, attitudes, and skills (Physiotherapy Board New Zealand, 2018).

To demonstrate awareness and knowledge of culture, it is necessary to understand other cultures' definitions of health (Physiotherapy Board New Zealand, 2018). Therefore, physiotherapists in Aotearoa New Zealand working with Pasifika communities must be aware that there are a variety of Pacific models of health and work to apply the relevant model. With the understanding that each Pacific culture has its own unique set of health influences and priorities, the physiotherapist needs to build relationships to understand their patients' culture and holistic influences to apply the appropriate model of health. In this study, the participants' definition of health extended beyond simply physical status, with family, culture, and spiritual elements of the Fonofale model strengthening the participants' sense of belonging. Fostering relationships helps to ensure collaborative/shared decision-making and the delivery of person-centred care.

Relationships help to build trust and engagement and allow for the culturally safe practice of a two-way dialogue where knowledge is shared (Martin, 2014). As seen in this study, a two-way conversation between the research team and members of the Pacific playgroup community occurred through the process of Talanoa. Vaioleti (2006) describes the Talanoa process of communication as "a personal encounter where people story their issues, their realities and aspirations" (p. 21). Talanoa enables physiotherapists to establish a rapport and has been noted to build and strengthen relationships with stakeholders and communities (Ministry of Education, n.d.a). Talanoa provides a powerful method of enquiry, which is encouraged for physiotherapists working in Pacific community groups. Taking time to build relationships allows for the subsequent exploration of stakeholders' thoughts and perceptions and demonstrates the physiotherapist's commitment to developing cultural awareness and a culturally competent attitude. Cultural safety requires partnership between parties and an acknowledgment of the patient's cultural knowledge, their values, and an understanding of their cultural practices (Kearns & Dyck, 2015). Through relationships fostered within safe environments and open conversations, co-design may be accomplished and feedback may be gathered from those using the service, which allows for reflexive changes as required, thereby adding to cultural competency skills of the physiotherapist.

Cornerstones of Pasifika cultural identity, as seen in this study, are native languages, shared heritage, and shared experiences. Physiotherapists should seek guidance to understand these elements in the communities they are working with to improve their contextual cultural awareness, their cultural sensitivity, and ultimately their cultural safety (Martin, 2014). Language has been identified as a critical part of Pacific people's identity and sense of belonging in the world and a crucial marker for their long-term wellbeing (Samu et al., 2019). Physiotherapists should promote native language in their interactions with Pasifika communities. Examples may include the normalisation of Pacific greetings, common phrases and instructions, and, as seen in this study, the correct pronunciation of names. In contexts such as community group classes, physiotherapists may ask members of the group to share prayers in their native language, which also respects the importance of faith for Pasifika. Language acquisition may be further encouraged through inclusion of the wider community, a cultural competency skill of Physiotherapy New Zealand. In this study, the inclusion of elders was highly valued by the participants and was seen to strengthen social cohesion. Interactions with elders provided a platform for sharing oral heritage via storytelling, which may be of particular importance as exposure to language at an early age is critical (Samu et al., 2019). Benefits may also prevail for both the younger and older generations through influences on mental, spiritual, cultural, and family areas of the Fonofale model of health and wellbeing.

While every community group context might be different, physiotherapists working in early childhood environments may consider inclusion of traditional songs and music and deliberate inclusion of language and prayers as elements of importance. The findings from this study may also translate to other community settings and ethnic groups and guide culturally competent healthcare.

KEY POINTS

1. A healthcare-supported Pacific-focused community group provided holistic benefits for its members through creation of a sense of belonging. This fostered cultural identity, connections and support, and social cohesion with the wider Pacific community.
2. Talanoa communication provides an opportunity for physiotherapists to engage with Pasifika through storytelling and the sharing of knowledge, and supports a culturally safe environment.
3. Understanding the meaningful aspects of a culturally safe environment for Pasifika will allow physiotherapists to *enter these environments* to build and maintain relationships or to *re-create culturally safe settings* in which to deliver healthcare services.
4. Physiotherapists working in Pacific community groups must take the time to understand the appropriate Pacific model of health and holistic values of the people they are working with and appreciate that a mismatch of ideas or priorities can undermine the therapeutic alliance if not respected or carefully considered.

DISCLOSURES

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PERMISSIONS

This study was approved by the University of Otago Ethics Committee (reference number D20/340).

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Rotator Cuff Related Shoulder Pain: An Update of Potential Pathoaetiological Factors

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ABSTRACT

Rotator cuff related shoulder pain (RCRSP) was a term proposed to replace scientifically outdated and potentially flawed diagnoses such as subacromial impingement syndrome, as well as uncertain pathoanatomical diagnoses such as rotator cuff tendinitis/tendinosis, and partial thickness and full thickness rotator cuff tears. RCRSP refers to the muscles, tendons, and surrounding structures, such as bursa, bone, ligament, capsule, nerve, and vascular tissue related to the entirety of the rotator cuff of the shoulder. It also recognises the complexity of evolving pain science. The term RCRSP acknowledges that the basis for presenting symptoms is mostly indeterminable and is used when a collection of clinical symptoms is present. RCRSP is probably the most common musculoskeletal shoulder condition and manifests as shoulder pain and weakness, most commonly during shoulder elevation and external rotation. Another important feature suggestive of RCRSP is a history of increased physiological load preceding the onset of symptoms, or a decreased ability to deal with physiological load due to lifestyle factors such as poor sleep, stress, reduced physical activity, uptake in or increased smoking, and poor nutrition. The aim of this narrative review is to discuss possible intrinsic (internal), extrinsic (external), and combined (intrinsic and extrinsic) mechanisms that may contribute to RCRSP. Our synthesis does not find definitive evidence for an extrinsic or combined extrinsic and intrinsic mechanism(s) that results in or is associated with RCRSP. We acknowledge that the narrative nature of this scholarly paper may have influenced our conclusions.

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Key Words: Rotator Cuff Related Shoulder Pain, Combined, Extrinsic, Intrinsic, Pathoaetiology

INTRODUCTION

The term RCRSP was proposed to avoid uncertainties associated with scientifically outdated diagnoses such as subacromial impingement syndrome (SIS), and myriad pathoanatomical and potentially flawed clinical diagnoses such as bursitis and rotator cuff tears, and to help the patient make sense of their experience of shoulder pain and weakness (Lewis, 2016). A definitive diagnosis of RCRSP is not possible and it remains at best a clinical hypothesis. As such, following the physical assessment clinicians should inform patients that based on the interview and assessment it is likely that they have RCRSP, what this means, and what the management options are.

Another term that has emerged to replace SIS is subacromial pain syndrome (SPS). The use of this term is problematic as online searches (Google™, Google Scholar™) that may be conducted by patients and other interested people continue to associate this term with the outdated term SIS. SPS refers to an anatomical location that is not readily understood, and by definition excludes the acromion and the coracoacromial ligament (CAL) which may be directly related to symptoms (see below). In addition, the term subacromial has no appreciable lower border and is confusing and imprecise.

Diagnostic reductionists may argue that the term (non-specific) shoulder pain/strain is more appropriate than both RCRSP and SPS, analogous to use of the term 'non-specific low back pain' for symptoms experienced by people with lumbopelvic region pain. While there may be merit in this argument, we contend that it lacks utility both in clinical practice and for research purposes. Most people who seek care for musculoskeletal shoulder conditions present with varying combinations of shoulder pain, weakness, and loss of movement. It is the role of the clinician employing clinical reasoning skills (Jones et al., 2022) and working metaphorically as a clinical detective to make sense of the combination of symptoms. Although it is arguable that it would be clinically expedient to lump all presentations under the umbrella of (non-specific) shoulder pain, we contend this would be a retrograde step. For example, a clinician might categorise the following case presentations as non-specific shoulder pain.

- A 50-year-old woman presenting with Type 1 diabetes together with severe shoulder pain, a normal radiograph, painful shoulder weakness, and concomitant substantial loss of active and passive shoulder external range of movement.

- An 18-year-old gymnast whose current main complaint is shoulder pain, with minimal loss of movement and weakness, following multiple episodes of non-traumatic shoulder dislocations.

However, we suggest that it is clinically achievable and meaningful to subcategorise these different presentations. We hypothesise that the combination and manifestation of symptoms in the first scenario are likely to be related to a frozen shoulder, and in the second are likely related to an unstable shoulder. We contend that these subclassifications may benefit clinical practice by facilitating interventions specific to different conditions or unique stages of a condition, such as the painful and stiff phases of frozen shoulder (Lewis, 2015; Lewis, Boyd, et al., 2022). We also argue that subclassification is essential to support meaningful research investigations.

We suggest, for non-traumatic presentations, the following:

1. That clinical diagnoses are presented, whenever possible, using non-pathoanatomical labels. For example, to replace the terms SIS, and partial and full thickness rotator cuff tendon tears with RCRSP.
2. That clinicians consider using consistent language when presenting clinical findings to patients, e.g., "Based on our discussion and following the physical examination it is *likely* that you have rotator cuff related shoulder pain." The clinician can then discuss the role and function of the rotator cuff muscles, tendons, and related structures. This should be followed with a discussion of appropriate management options (potential harms, benefits, expected time frames, commitments, etc.), guided by shared decision making (Hoffmann et al., 2020; Jones et al., 2022).

People seeking care want to understand why they have shoulder pain (Lewis, 2016; Lewis & Powell, 2022). Understanding the possible cause(s) and/or reasons for their symptoms may help facilitate an understanding of why a specific management may be beneficial (Barber et al., 2022; Mantel, 2003; Maxwell et al., 2021; Plinsinga et al., 2021). Shared decision-making enables the clinician and patient to agree on management that is most appropriate for the patient (Hoffmann et al., 2020; Jones et al., 2022).

In summary, we contend that RCRSP is both a non-threatening and non-pathoanatomical term that may help patients make sense of their symptoms, while (non-specific) shoulder pain may not be. Furthermore, RCRSP refers to something tangible while SPS does not, and is better supported than a diagnosis such as SIS, which is arguably outdated and no longer supported by recent research (Lewis, 2018). Clinicians may hypothesise that RCRSP is present if evidence of increased load relative to load-bearing capacity (physical and/or lifestyle) is identified, and referred pain, shoulder instability, and shoulder stiffness are excluded as best as possible. Clinically, when bilateral muscle performance tests – isometric, repetitions to pain, repetitions to fatigue – are assessed, reduced performance on the side of symptoms is identified, most commonly (but not exclusively) in the directions of shoulder elevation and external rotation. The clinician could then inform the patient, "Based on our discussion and the findings of the clinical assessment it is *likely* that you have RCRSP. The rotator cuff are the muscles and tendons and surrounding structures that contribute to shoulder movement." This may facilitate a discussion about the management options for muscles, tendons, and related structures, within a shared decision-making model of care.

PATHOAETIOLOGY

The pathoaetiology associated with historic clinical antecedents to RCRSP (e.g., SIS, rotator cuff tendinitis) have been discussed in the literature for more than 150 years (Adams, 1852; Codman, 1934). Since the 1970s, mechanisms to explain the symptoms have been debated and have included external or extrinsic theories, internal or intrinsic theories, and combinations of external and internal theories. We present a summarised discourse of these theories in the following section.

Extrinsic or external models leading to pain and disability

Fifty years ago, Neer (1972) introduced the term SIS, proposing that acromial abrasion onto the underlying subacromial bursa and rotator cuff tendons lead to tendon damage and symptoms. In his seminal paper, Neer argued that 95% of RC pathology was caused by the impingement of the overlying acromion. Although Neer's model of pathology was never proven, supporters of the impingement model initially performed open and then arthroscopic surgery to remove the anterior aspect of the inferior of the acromion. Estimates of 19,743 acromioplasties were performed in New York State, US, in 2006 (Vitale et al., 2010) and 21,353 in England, UK, in 2010 (Judge et al., 2014), so it is conceivable that millions of people around the world have had their acromions resected since 1972.

These data are of concern as studies have demonstrated that this surgical procedure has no greater clinical benefit, when comparing bursectomy in isolation versus acromioplasty and bursectomy (Henkus et al., 2009; Kolk et al., 2017), comparing acromioplasty to procedures designated as surgical placebos (Beard et al., 2018; Lähdeoja et al., 2020; Paavola et al., 2018), and comparing rehabilitation with acromioplasty followed by rehabilitation (Lähdeoja et al., 2020; Lewis, 2022). Furthermore, no subgroup of people have been identified that will benefit from an acromioplasty (Ketola et al., 2015). After Neer (1972) proposed his theory and extended his original thoughts a decade later (Neer, 1983), others have endeavoured to further substantiate the extrinsic acromial intrinsic model. These have included acromial shape, scapula dyskinesis, and acromiohumeral distance. These, together with challenges to these theories, are presented in the following sections.

Acromial shape

Based on a study of 140 shoulders in 71 cadavers, Bigliani et al. (1986) suggested that the acromion has three distinct shapes: flat (type I), curved (type II), and hooked (type III). Biomechanically, the hooked shaped acromion was argued to lead to more damage, although this proposition has been challenged (Lewis, 2016, 2018; Lewis et al., 2001; Lewis et al., 2015; Lewis, 2009a, 2009b).

The *scapuloacromial angle* is used to quantify the acromion shape. The angle is formed between the inferior aspect of the acromion and the coracoid process (Moses et al., 2006). Moses et al. (2006) reported that the mean scapuloacromial angle was 113–114° ($n = 56$). The angle was similar in people with RCRSP with or without RC tear, and in a group of people with glenohumeral instability (Moses et al., 2006). An association between acromial shape and full-thickness rotator cuff tendon tears may exist (Worland et al., 2003) but many of these tears are asymptomatic and may be part of normal ageing (Lewis, 2016; Lewis, 2009a; Maalouly et al., 2020; Worland et al., 2003).

The *critical shoulder angle* is the angle formed between the line connecting the inferior border of the glenoid with the most inferolateral point of the acromion and the line connecting the inferior with the superior border of the glenoid fossa (Moor et al., 2013). Björnsson Hallgren and Adolfsson (2021) did not find a correlation between the critical shoulder angle or the acromion index and the development of RC tears, or osteoarthritis, over a median 20-year period in people with unilateral shoulder pain. Furthermore, there were no radiological differences between the symptomatic shoulder and the contralateral side (Björnsson Hallgren & Adolfsson, 2021). Their findings challenged the reported aetiological association between acromial shape and the development of rotator cuff tears (Björnsson Hallgren & Adolfsson, 2021). No current research evidence has supported a causative relationship between acromial shape and RCRSP (Lewis, 2016; Lewis et al., 2015).

If correct, the acromial impingement theory should predict damage to the upper or superior (bursal) surface of the tendon (i.e., that part of the tendon that contacts the acromion), but this logical association does not appear to exist. In a study involving 43 athletes with partial-thickness RC tears, 39 (91%) had tears on the articular (joint) side, only 4 (9%) on the bursal side, and 100% of those with non-traumatic shoulder pain had articular side tears (Payne et al., 1997). In a study involving 249 cadavers, 13% ($n = 33$) had partial-thickness tears among whom 82% ($n = 27$) were either intra-tendinous or on the inferior surface and 28% ($n = 6$) were on the superior or bursal surface of the tendon (Fukuda, 2003). Sixty-nine partial-thickness tears mostly on the articular side of the tendon were observed in 200 shoulders from 100 cadavers (Ozaki et al., 1988). Another study of 306 cadaveric rotator cuff tendons showed that the prevalence of partial-thickness tears was 32%, and the majority were intra-tendinous or on the joint side of the tendon (Loehr & Uhthoff, 1987). Based on these consistent findings, partial thickness tears are principally intrasubstance or on the joint side of the tendon (see Figure 1). This directly challenges the validity of the acromial model of impingement. Further information is available (Lewis, 2016; Lewis, 2009a).

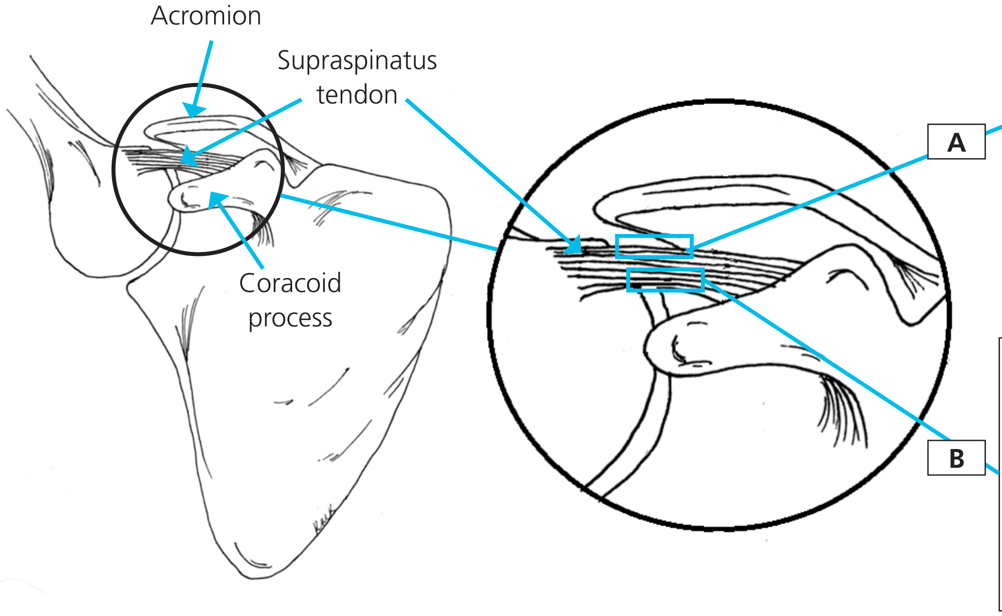
Scapular dyskinesis

Scapular dyskinesis refers to the deviation of the scapular position during shoulder movement (Kibler et al., 2012; Kibler & McMullen, 2003) and has been suggested as an extrinsic aetiological factor in the development of RCRSP (Hébert et al., 2002; Ludewig & Cook, 2000; McClure et al., 2006). Changes in the coordination of the scapular and humeral movements during shoulder elevation may affect the size of the subacromial space (Silva et al., 2010).

Although the reliability and validity of current scapular dyskinesis assessment is at best equivocal (D'Hondt et al., 2020; McClure et al., 2009; Plummer et al., 2017), it has been suggested as an extrinsic factor in the pathogenesis of RCRSP (Mackenzie et al., 2015; Seitz et al., 2011). Increased scapular upward rotation in the coronal plane during arm elevation in people with shoulder impingement syndrome has been reported (Finley et al., 2005;

Figure 1

Locations of Rotator Cuff Tendons Tears



A: Neer (1972) argued that 95% of rotator cuff pathology occurs due to impingement by the under surface of the acromion onto the RC tendon. If this was correct, we would expect to see the majority of tendon damage on the top/superior/bursal side of the tendon. However, observational studies report tears in this location occur in the minority of cases.

B: In a substantial challenge to Neer's (1972) impingement theory, the majority of partial thickness tendon tears (> 80%) are located on the joint/inferior/articular side of the tendon. In a further challenge, many tears, wherever they are located, do not cause pain, or impairments such as loss of movement or substantial weakness.

McClure et al., 2006), but, in contrast, others have reported a decrease in scapular upward rotation (Ludewig & Cook, 2000; Su et al., 2004). In the transverse plane, studies have reported equivocal findings: increased scapular anterior tipping (Borstad & Ludewig, 2002), decreased posterior tipping (Lin et al., 2011; Lukasiewicz et al., 1999), and increased posterior tilting (McClure et al., 2006). Medial rotation of the scapula has been reported (Borstad & Ludewig, 2002; Hébert et al., 2002; Ludewig & Cook, 2000; Warner et al., 1992), but the results have not been duplicated in other kinematic studies (Finley et al., 2005; Lukasiewicz et al., 1999). This may, in part, be due to the many methodologies used to assess scapular position and movement.

Although scapular dyskinesis has been associated with RCRSP and is considered part of its pathogenesis, the patterns of dyskinesia vary remarkably between studies (Borstad & Ludewig, 2002; Finley et al., 2005; Hébert et al., 2002; Lin et al., 2011; Ludewig & Cook, 2000; Lukasiewicz et al., 1999; McClure et al., 2006; Su et al., 2004; Warner et al., 1992). Clearly, more research is warranted, and a causative relationship between scapular dyskinesis and RCRSP has not be established.

Reduction in the subacromial space distance

The subacromial space is the area between the inferolateral edge of the acromion and the apex of the greater tuberosity of humerus. It can be quantified by measuring the *acromiohumeral distance* (AHD) (Cholewinski et al., 2008; Desmeules et al., 2004; McCreesh et al., 2014; McCreesh et al., 2016; McCreesh et al., 2015). The mean AHD has been reported to be 9–11 mm (Flatow et al., 1994; Petersson & Redlund-Johnell, 1984). A reduction in AHD normally occurs during arm elevation (Flatow et al., 1994). Swelling of the rotator tendons may not directly cause a reduction in the AHD reduction but may increase the subacromial occupation ratio, which means the tendon occupies relatively more space within the AHD (McCreesh et al., 2017). Although the AHD may be decreased significantly in people with RCRSP (Leong et al., 2016; Maenhout et al., 2012), this observation does not appear to be consistent, as the AHD in people with RCRSP at rest or during shoulder abduction does not appear to be significantly different when compared to the AHD in people without symptoms (Desmeules et al., 2004; Kalra et al., 2010; McCreesh et al., 2017; Michener et al., 2015; Navarro-Ledesma et al., 2017; Savoie et al., 2015; Timmons et al., 2013).

Navarro-Ledesma et al. (2017) investigated 97 patients with RCRSP and found no significant correlation between AHD, shoulder pain, and disability index. Individuals with and without shoulder pain all had a significant decrease in AHD after exercise. However, only the symptomatic group showed a significant increase in rotator cuff tendon thickness (McCreesh et al., 2017). Although AHD is a two-dimensional measurement, a recent study (n = 52) demonstrated that AHD is significantly correlated (R = 0.61, p = 0.01) with the subacromial volume measured by magnetic resonance imaging (Kocadal et al., 2022). The results of this study align with that of McCreesh et al. (2017), and suggest that an increase in the rotator cuff tendon volume is a possible cause of the decrease in subacromial volume (Kocadal et al., 2022). Therefore, although a reduction of space between the acromion and humerus may not cause RCRSP, RCRSP may be associated with rotator cuff tendon swelling. This summary does not find definitive support for changes in AHD being associated with the symptoms associated with RCRSP.

Acromioclavicular osteophytes and the CAL

Osseous changes in the acromioclavicular joint and the CAL may be factors in RCRSP (Lewis et al., 2001; Mackenzie et al., 2015). Osteophytes in the acromioclavicular joint were reported to occur in 28.9% of individuals aged 15–100 years (n = 692 shoulders), and a strong correlation with increasing age (r = 0.65, p < 0.001) has been reported (Mahakkanukrauh & Surin, 2003). These results are consistent with those of clinical studies demonstrating that acromial bone spurs are significantly related to rotator cuff tears (Hamid et al., 2012; Ogawa et al., 2005; Oh et al., 2010; Sasiponganan et al., 2019). However, an acromial bone spur and rotator cuff tear may not have a cause-and-effect relationship but be normal age-related changes. Acromioplasty (removal of bone spurs) is not superior to an exercise programme without surgery or a placebo acromioplasty (Cheng et al., 2018; Lähdeoja et al., 2020; Lewis, 2016, 2018; Lewis, 2009a; Sun et al., 2018).

Degenerative changes in the CAL may be associated with symptoms for people with RCRSP. This ligament is typically under tension with the arm in a neutral position, and the tension increases (up to 38 N) during arm elevation (Chambler et al., 2003; Park et al., 2015; Yamamoto et al., 2010). A significantly greater displacement was observed in people with RCRSP (Wang et al., 2019; Wu et al., 2012; Wu et al., 2010). CAL samples from people with RCRSP taken at the time of subacromial decompression revealed free nerve endings and neovascularity (Tamai et al., 2000). These two findings suggest possible inflammation within the CAL that may be related to symptoms. Research is needed to better understand the relevance and relationship between the CAL and RCRSP.

In summary, although acromial spurs have been suggested as the major external cause of pathology in RCRSP, the available evidence does not support this hypothesis. The CAL may be associated with pain in people with RCRSP, but further research is needed. If a relationship does exist, it may not be external pressure from the CAL onto the tendon that leads to symptoms but from the underlying structures (such as tendon swelling) onto the CAL and changes within the CAL that are associated with symptoms in RCRSP. Currently, any relationship (associative or causative) is speculative and requires further research to support or refute the involvement of the CAL with RCRSP.

Intrinsic or internal models

The source of the symptoms

The evidence for an extrinsic or external pathoaetiological process leading to RCRSP is at best equivocal. Because of this, others have proposed an internal or intrinsic model as the basis for symptoms. The mechanisms causing pain are uncertain (Lewis, 2018, 2022; Lewis et al., 2015; Lewis, 2009a), although tendon (Littlewood, 2012) and bursal tissues (Gotoh et al., 1998; Henkus et al., 2009) are commonly considered. There is no definitive evidence that the basis for the pain is due to bursal or tendon-based nociception and as such symptomatic diagnoses such as rotator cuff tendinitis (tendon inflammation), tendinosis (tendon degeneration), and even tendinopathy (source of the pain is the tendon but of unknown aetiology) cannot be made with certainty. Vascular, myofascial, neuropathic, and central pain mechanisms may also be involved (Dean & Griffin, 2022; Van Griensven et al., 2020; Vardeh et al., 2016; Worsfold et al., 2022). Collin et al. (2014) and Costouros et al. (2007) respectively reported that 12.2% (6/49) and 5.6% (14/216) of people with shoulder symptoms had neuropathy, as detected by electrodiagnostic studies. Neuropathic pain in RCRSP may be due to comorbidities such as brachial plexus injury or supraspinal nerve neuropathy in some cases (Collin et al., 2014; Lewis, McCreesh, et al., 2022; Shi et al., 2014). For those living with persistent RCRSP, Ngomo et al. (2015) and Berth et al. (2009) reported a significant decrease in the motor signal of the affected shoulder, in the brain. These changes were unrelated to the pain intensity ($r < 0.03$, $p = 0.43$), but rather to pain chronicity ($r = 0.45$, $p = 0.005$) (Ngomo et al., 2015).

Tissue overload

The primary hypothesis underpinning the intrinsic model is that an increased and uncharacteristic load, defined as when the physiological capacity of the muscle and tendon unit is exceeded, is the basis for symptoms (Lewis et al., 2015; Lewis, 2009a; McCreesh & Lewis, 2013). Proponents of the term RCRSP acknowledge that overload may be multidimensional (Lewis, 2016, 2022; Lewis, McCreesh, et al., 2022; Lewis et al., 2015) including biomechanical (Lewis & Whiteley, 2022), psychosocial (Chester et al., 2018; Chester et al., 2022), genetic (da Rocha Motta et al., 2014), age-related (Leong et al., 2019), and endocrine (e.g., diabetes) (Leong et al., 2019) factors, and may involve myriad lifestyle factors such as smoking, sleep disturbance, adiposity, inadequate nutrition (Burne et al., 2022), and systemic low-grade inflammation and metabolic syndrome (Burne et al., 2019; Burne et al., 2022).

The relationship between observable structural changes in the rotator cuff tendons such as tendinosis or tears via ultrasound, magnetic resonance imaging, and direct observation (arthroscopy) and symptoms in RCRSP remain at best equivocal (Lewis, 2016, 2022; Lewis et al., 2015; Lewis, 2009a; Lewis, 2011). This has led to the speculation that intrinsic biochemical changes within the tendon and surrounding structures may be related (associated or causative) to the symptoms people experience with RCRSP. This will be discussed in the following section.

Based on the observation of 268 and 180 people with RCRSP, respectively, Tsai et al. (2007) and Chillemi et al. (2016) reported a significant association between pain and subacromial bursa abnormalities, including hypertrophy, inflammation, oedema, and necrosis in patients with RCRSP. Tsai et al. (2007) reported a significant difference in the mean subacromial bursa thickness between painful (1.74 ± 0.41 mm) and asymptomatic (0.75 ± 0.23 mm) shoulders in patients with unilateral RCRSP. Chillemi et al. (2016) categorised patients with RCRSP into three groups according to their pain severity. The pain severity was significantly associated with hypertrophy/hyperplasia (Cramer's index $V = 0.80$, $p < 0.01$), presence of inflammatory cells ($V = 0.58$, $p < 0.001$), bursal oedema ($V = 0.40$, $p < 0.01$), and necrosis of the subacromial bursa ($V = 0.29$, $p = 0.03$). This suggests a relationship between inflammation in the subacromial bursa and RCRSP may exist. Nevertheless, the effectiveness of subacromial bursa-specific treatment is uncertain. Localised subacromial injection may provide short-term (< 3 months) pain relief for RCRSP (Mohamadi et al., 2017), but it remains unclear whether its effect is on the bursa, rotator cuff tendons, the CAL, other biological tissues, or contextual.

Sustained extracellular matrix (ECM) damage due to inflammation is a possible reason for pain and dysfunction in RCRSP. Upregulation of inflammatory cytokines and increased oxidative stress are potential factors associated with RCRSP and may hinder tissue repair (Blaine et al., 2011; Blaine et al., 2005; Ko et al., 2008; Lakemeier, Reichelt, et al., 2010; Lakemeier, Schwuchow, et al., 2010; Millar et al., 2016; Millar et al., 2009; Sakai et al., 2001; Savitskaya et al., 2011; Shindle et al., 2011; Voloshin et al., 2005; Wang et al., 2001; Yanagisawa et al., 2001).

Tendon cells, known as tenocytes, respond to mechano-transduction by communicating with neighbouring cells through cytokines and other immune mediators, such as tumour necrosis factor α (TNFα), transforming growth factor (TGF) β, and prostaglandin E2 (PGE2). *In vitro*, TNFα downregulates collagen expression and increases the production of adhesion molecules and pro-inflammatory cytokines such as interleukin (IL)-6, IL-8, and metalloproteinases (MMPs) gene expression in human tenocyte cultures (Al-Sadi et al., 2012; John et al., 2010). Mechanical shearing of the ECM triggers the release of TGFβ, which reduces the proliferation of tenocytes and collagen production. *In vivo* mechanical stress-induced tenocyte cell death releases high levels of TGFβ and IL-1β, which serve in a paracrine manner to trigger an anabolic response in adjacent tenocytes (Lavagnino et al., 2015). IL-33, an alarmin, is released following tendon tissue damage and activates the immune system. This regulates type I collagen production (Millar et al., 2015). Alarmin protein S100A9 is an endogenous molecule released from activated immune cells in response to persistent inflammatory diseases (Crowe et al., 2019). The levels of IL-33, alarmin proteins S100A9, and hypoxia-inducible factors (HIF)-1α had corresponding changes in painful and post-treatment pain-free human supraspinatus tendon (Millar et al., 2015; Mosca et al., 2017).

Results of RCRSP immune biomarker studies have shown an increase in inflammatory markers cyclooxygenase (COX)-1 and -2, TNFα, IL-1β, IL-6, HIFs, vascular endothelial growth factor (VEGF), and degenerative enzymes matrix MMP-1, -9, -13 in patients with RCRSP (Benson et al., 2010; Blaine et al., 2011; Castagna et al., 2013; Chaudhury et al., 2016; Dakin et al., 2015; Gotoh et al., 1999; Jacob et al., 2012; Lakemeier, Schwuchow, et al., 2010; Lo et al., 2004; Millar et al., 2016; Millar et al., 2015; Osawa et al., 2005; Riley et al., 2002; Sakai et al., 2001; Shindle et al., 2011; Voloshin et al., 2005; Yanagisawa et al., 2001).

IL-1β is involved in the inflammatory process in tendinopathies (Mobasheri & Shakibaei, 2013; Tang et al., 2018), and is an inflammatory mediator produced by leukocytes in the connective tissue. IL-1β triggers the release of various pro-inflammatory substances, including COX-1 and -2, PGE2, and IL-6 (Tang et al., 2018; Tsuzaki et al., 2003). In tendon inflammation, IL-6 regulates the immune function for tendon healing by enhancing collagen synthesis (Andersen et al., 2011). Enzymes MMP-1, -3 and -13 are promoted by IL-1β (Sun et al., 2008), resulting in degenerative changes in tendons following inflammation. *In vivo* and *in vitro* studies have shown that the expression of IL-6 and COX-2 may be facilitated by mechanical strain (Legerlotz et al., 2012; Yang et al., 2005). IL-6 and COX-2 exhibit both pro- and anti-inflammatory effects depending on excessive or gradual loading (Langberg et al., 2003; Mobasheri & Shakibaei, 2013; Spiesz et al., 2015; Thorpe et al., 2015; Yang et al., 2005) and may account for the effectiveness of loading exercise as a treatment for pain and dysfunction in RCRSP.

Activated phagocytes, through the release of MMPs and the deposition of new collagen matrix, facilitate tissue repair via the release of cytokines, including IL-33 and S100A9 proteins as described above. The recruitment of monocytes and neutrophils is a highly coordinated process involving chemokines known as monocyte chemoattractant protein-1 (MCP-1) (Deshmane et al., 2009). Elevated levels of IL-1β, IL-6, IL-33, TNFα, and MMPs are commonly found in other rheumatic conditions, including osteoarthritis, rheumatoid arthritis, and spondyloarthritis (Hirohata & Kikuchi, 2012; Lo et al., 2004; Nishimoto, 2006; Zhao et al., 2013). Increasing evidence indicates that microtrauma to tendons might contribute to the progression of persistent inflammatory arthritis and increase mechanical sensitivity (Gracey et al., 2020; Steinmann et al., 2020). This may be of interest to clinicians in exploring the similarities of arthropathies with RCRSP. A summary of the biochemical studies' results and relevant new hypotheses regarding RCRSP is shown in Table 1.

Unsurprisingly, diabetes, smoking, infection, and persistent inflammation may adversely affect the repair process and prolong inflammation and pain in RCPSP (Burne et al., 2022). Several mechanically sensitive substances, including tenocytes, IL-6, and COX-2, may be involved in the pathophysiology of

Table 1

Summary of the Results of Biochemical Studies in RCRSP and Associated New Formulated Hypotheses

Mechanisms	Tendon physiology	Results of biochemical studies in RCRSP	New hypotheses according to these findings
Inflammatory	Tenocytes Comprise > 90% of cells in healthy tendons Detect mechanotransduction Maintain tendon homeostasis Excessive mechanical stress detected by tenocytes → ↑ TNFα → ↓ collagen expression + ↑ pro-inflammatory cytokine ILs and MMPs IL-1β → ↑ pro-inflammatory substances COX-1 and -2 → ↑ degenerative enzymes MMPs IL-6 → tendon healing by enhancing collagen synthesis	↑ COX-1 and -2 ↑ TNFα ↑ IL-1β, IL-6, ↑ HIFs, ↑ VEGF	↑ inflammatory cytokines (TNFα, IL-1β, VEFG, COX-1, -2) → ↑ oxidative stress on RC tissue (↑HIFs) ↓ tissue repair responses IL-6 and COX-2 exhibit both pro- and anti-inflammatory effects depending on mechanical loading on tissue: Excessive loading may lead to RC tissue inflammation Suitable loading (RC strength training) → regulate inflammation → reduce pain and improve function Need further research on the effect of exercise and changes in IL-6 and COX-2 levels in patients with RCRSP
Degenerative	MMPs are enzymes for tissue degradation MMPs are promoted by cytokines → IL-1β following the inflammation	↑ MMP-1, -9, -13	Enzymes MMPs promote structural degeneration in RC tendon → Tendon stiffness, decrease tensile strength → Traumatic RC tear ↑ IL-1β, IL-6, IL-33, TNFα, and MMPs are also common in other arthritic conditions including osteoarthritis, rheumatoid arthritis, and spondyloarthritis Similarities: Chronic inflammatory signs, stiffness, decreased structural strength (i.e., arthritis → joint deformities; RCRSP → RC tear)

Note. COX = cyclooxygenase; HIFs = hypoxia-inducible factors; IL = interleukin; MMP = matrix metalloproteinase; rotator cuff = rotator cuff; RCRPS = rotator cuff related pain syndrome; TNF = tumour necrosis factor; VEGF = vascular endothelial growth factor.

RCRSP (Costa-Almeida et al., 2019; Langberg et al., 2003; Mobasheri & Shakibaei, 2013; Pingel et al., 2014; Spiesz et al., 2015; Thorpe et al., 2015; Yang et al., 2005). The hypothesis of mechanically induced inflammation in RCRSP may be supported by specific acute RC tendon swelling (Kocadal et al., 2022; McCreesh et al., 2017).

Future research is needed to investigate if the cascade of biomarkers is related to symptoms in RCRSP and if interventions such as exercise and lifestyle management influence the presence of systemic and local biochemistry and impact on pain and related symptoms.

Combined extrinsic and intrinsic models

Seitz et al. (2011) summarised mechanisms that may contribute to RC tendinopathy and SIS, and suggested a combination of extrinsic and intrinsic factors. They suggested that extrinsic factors, such as acromial contiguity and tendon abrasion, and intrinsic factors, such as tendon degeneration, may co-exist, resulting in symptoms.

Seitz et al. (2011) suggested that internal impingement may be the mechanism leading to rotator cuff tendinopathy. Internal impingement was suggested to occur during shoulder abduction and external rotation when the joint (inferior) surface of the supraspinatus tendon becomes impinged between the greater tuberosity and the posterosuperior glenoid fossa. The certainty that this is a direct cause of symptoms remains equivocal and requires further research (Drakos et al., 2009; Lewis et al., 2001; Mackenzie et al., 2015).

The rat shoulder has been used to study the role of extrinsic, intrinsic, and combined rotator cuff pathology. Soslowsky et al. (2002) investigated the effect of extrinsic compression (Achilles tendon allografts wrapped around the left acromion), intrinsic overload using downhill eccentric running, or a combination of the two in rats at 4 weeks, 8 weeks, and 16 weeks. No tendinopathy was observed in the extrinsic only group. The rats subjected to overload demonstrated an increase in tendon cross-sectional area and reduced maximal strain at all time points. The greatest change was found in the combined intrinsic/extrinsic group, suggesting that compression potentiated overload even though compression alone did not produce pathology.

The application of this finding may be that extrinsic factors, such as an acromial spur may not be sufficient to cause tendon pathology but overload in the presence of extrinsic factors may be the most provocative. However, these findings are problematic and there is no evidence for a relationship between the outcomes measured by Soslowsky et al. (2002) and pain. Furthermore, due to profound anatomical and biomechanical differences between the rat and human shoulder, direct translation would be arguably inappropriate (Lewis, 2009a). In summary, the evidence for a combined extrinsic and intrinsic model for RCRSP is at best uncertain.

CONCLUSION

In this scholarly review we have presented hypothesised mechanisms that may result in pain associated with RCRSP. We have discussed internal or intrinsic models, external or extrinsic models, and combined internal and external models. In addition to physiological overload, lifestyle factors such as stress, smoking, poor sleep, and high BMI may be associated with the pathogenesis and symptoms of RCRSP. Although a summary of findings may favour an internal mechanism, this is by no means certain. Substantial research is needed. One interesting finding is that biochemical imbalances may be an important consideration in the development of pathology and symptoms, and this too must be the focus of future investigations.

KEY POINTS

1. Rotator cuff related shoulder pain (RCRSP) is suggested as a clinical term to replace subacromial/shoulder impingement syndrome.
2. Current research evidence does not support an external (extrinsic) or combined extrinsic and internal mechanism for the pathogenesis of RCRSP.
3. A synthesis of the research supports intrinsic physiological factors in the pathogenesis of RCRSP, of which imbalances of biochemistry may play a role.

DISCLOSURES

No funding was received for this project. No competing interests are at stake and there is no conflict of interest with other people or organisations that could inappropriately influence or bias the content of the paper.

PERMISSIONS

Jeremy Lewis has granted permission for the use of Figure 1.

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Current Physiotherapy Management of Parkinson's Disease: Is Aquatic Physiotherapy Utilised as a Treatment Modality?

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ABSTRACT

Little is known about the use of aquatic physiotherapy for people with Parkinson's disease (PD). Recent systematic reviews indicate that aquatic physiotherapy has a positive impact on mobility, balance, and quality of life. This study aims to explore current practice in aquatic physiotherapy and identify barriers and enablers to using aquatic physiotherapy from a physiotherapist's perspective. Physiotherapists currently treating people with PD were invited to complete an online survey. Potential differences in levels of confidence treating people with PD, or using aquatic physiotherapy, with years practising were explored. Free-text responses were thematically categorised. One hundred and thirteen physiotherapists completed the survey. The majority were aged 30–39 years (37%), practising in Australia (86%) and over half (56%) had been practising for > 11 years. One third used aquatic physiotherapy in PD. There was no difference in confidence levels among participants who used aquatic physiotherapy for people with PD, relative to the number of years they had practised ($p = 0.13$). An increased falls risk and medical fragility were reported as challenges in the aquatic environment. Overall, aquatic physiotherapy is not commonly utilised for people with PD, with therapist, environmental, and participant challenges identified. Updating clinical practice guidelines and ensuring therapist education may enhance uptake of aquatic physiotherapy for PD.

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Key Words: Aquatic Physiotherapy, Clinical Practice, Hydrotherapy, Intervention, Management, Parkinson's Disease

INTRODUCTION

Aquatic physiotherapy has been used frequently in musculoskeletal and other neurological conditions such as osteoarthritis, low back pain, multiple sclerosis, and stroke (Barker et al., 2014; Marinho-Buzelli et al., 2015). There is a growing body of research into the use of aquatic physiotherapy as a treatment option for Parkinson's disease (PD), with several recent systematic reviews showing that it has a positive effect on gait, balance, and quality of life (Carroll et al., 2020; Carroll et al., 2017; Neto et al., 2020; Pinto et al., 2019; Terrens et al., 2018). The systematic review by Pinto et al. (2019) found that aquatic physiotherapy had a moderate level of evidence for improving balance when combined with land-based therapy or used as a stand-alone treatment. However, of the 19 studies included in this systematic review, the findings from only six of eight randomised controlled trials (RCTs) were included in the meta-analyses. A subsequent systematic review by Neto et al. (2020) replicated this result with respect to aquatic physiotherapy being a superior treatment option for improving balance in those with PD, and also indicated that aquatic physiotherapy led to greater improvements in mobility and quality of life compared to land-based exercise. This systematic review is potentially more robust compared to others as it only included RCTs in its design, although it is worth noting that the quality of included RCTs ranged from 4 to 8 (out of 10) on the PEDro scale. Sample sizes of aquatic interventions in studies throughout all systematic reviews were relatively small; therefore, larger and more adequately powered studies may be required to confirm the results presented in these systematic reviews.

Despite benefits with respect to buoyancy, clients with PD are potentially vulnerable in the aquatic environment, considering the effects of aquatic physiotherapy on the cardiovascular and respiratory body systems (Aquatic Physiotherapy Group, 2015). Immersion in water causes an increase in stroke volume and a decrease in diastolic blood pressure (Aquatic Physiotherapy Group, 2015). Approximately 30% of people with PD suffer from orthostatic hypotension, which means that participation in exercise in the aquatic environment carries a potential risk of an adverse event. Swimming in people with PD is compromised (Neves et al., 2020), potentially due to bradykinesia and impaired coordination resulting in difficulty floating horizontally (Tosserams et al., 2020). Given these benefits and risks, it is not known whether aquatic physiotherapy is being routinely used as a treatment modality by physiotherapists for people with PD, and why it is or is not being implemented (Carroll et al., 2020; Cugusi et al., 2019; Neto et al., 2020; Radder et al., 2020; Terrens et al., 2018).

Physiotherapists use clinical practice guidelines to assist with determining what interventions are most effective in certain patient populations, particularly those with more complex conditions, such as PD (Moseley et al., 2020). The current European Guidelines for Physiotherapy in Parkinson's Disease GRADE-based (Grading of Recommendations, Assessment, Development, and Evaluations) recommendations unfortunately do not contain recommendations or synthesised evidence regarding aquatic physiotherapy (Keus et al., 2014). PD guidelines such as those published by the National Institute of Clinical Excellence (NICE) (2017) and the earlier Royal Dutch Society for Physical Therapy document (Keus et al., 2004) similarly made no mention of aquatic physiotherapy. These guidelines were developed prior to systematic reviews being published supporting the use of aquatic physiotherapy in this population and it is not known when these guidelines are due to be updated. As there are no aquatic clinical guidelines to direct physiotherapists regarding its use and efficacy, the extent to which aquatic physiotherapy is being prescribed for people with PD is unknown. Therefore, the primary aim of this study was to investigate physiotherapists' current clinical practices around the use of aquatic physiotherapy in people with PD.

METHODS

Study design and participants

Physiotherapists who work with people with PD were invited to participate in this cross-sectional study using an online survey. To be eligible, individuals needed to be currently qualified to practise as a physiotherapist in their country, be currently working as a physiotherapist, and have treated at least one client with PD in the last 12 months. There were no restrictions on the types of workplace or expertise level of physiotherapists, although participants had to be able to understand written English. This study was approved by the Monash University Human Research Ethics Committee (project ID 17812).

Recruitment strategy

Physiotherapists were recruited using a snowballing approach to maximise participation across different countries and work locations. The survey was advertised via national and international professional associations (e.g., Australian Physiotherapy Association, Chartered Society of Physiotherapy in the UK) and emails were sent to the research team's clinical and research contacts in Australia and internationally inviting physiotherapists to participate. Contacts were also encouraged to forward the email to their clinical partners. Flyers were also disseminated at relevant international conferences including the 2019 World Parkinson's Congress in Japan and the 2019 World Confederation of Physical Therapy Congress in Switzerland. There was no remuneration for completing the survey. Based on a previous study examining the practices of physiotherapists for osteoarthritis using a similar recruitment strategy (Nicolson et al., 2018), we anticipated that between 100–150 physiotherapists would participate and that a sample of this size would be sufficient to be able to generalise findings.

Survey development and design

The online survey was developed in Qualtrics (Qualtrics, Provo, UT) by the research team, who have extensive clinical experience in PD and survey design. The questions were designed to address the aims of the project, which was to examine physiotherapists' current clinical practices regarding the use of aquatic physiotherapy in PD, and choices of treatments more broadly. Questions recording demographic information such as age, gender, country, qualification, workplace, and years practising as a physiotherapist comprised the first third of the survey. The survey covered current practices in managing people with PD including previous training or professional development for treating people with PD and training in aquatic physiotherapy. If participants indicated that they use aquatic physiotherapy, they were directed to additional questions regarding why they use it, and any challenges faced. Their self-perceived confidence in providing aquatic therapy was also assessed using a purpose-designed scale ranging from 0 (not at all confident) to 10 (extremely confident). Likewise, if participants indicated that they do not use aquatic physiotherapy, they were invited to provide a reason why not. Piloting of the survey was undertaken by all researchers to ensure all possible question combinations were logical and that data were captured for every scenario. A copy of the survey is available from the authors upon request.

Data collection

Data were collected on the secure Monash-licensed Qualtrics survey platform between March and August 2019. Physiotherapists who responded to the study advertisement could proceed directly to the online survey and were presented with an overview of the study. If participants chose to continue, they were asked to complete the three eligibility questions outlined above (i.e., registered physiotherapist, currently working, and has a PD caseload). If participants responded negatively to any one of these questions, they were not considered eligible to participate in the study and thanked for their interest. If participants were eligible, they were immediately directed to the first question of the survey. Consent was implied if the participant commenced the survey.

Statistical analysis

Descriptive statistics were used to summarise demographic data and data regarding intervention types and challenges. Confidence in treating people with PD and using aquatic physiotherapy as a treatment modality were evaluated according to years practising as a physiotherapist using the Kruskal-Wallis test. This non-parametric test was applied to take a conservative approach to avoid over-estimation of results. In the thematic analysis, free text responses were coded for themes by AT using inductive coding, and included in the descriptive analysis.

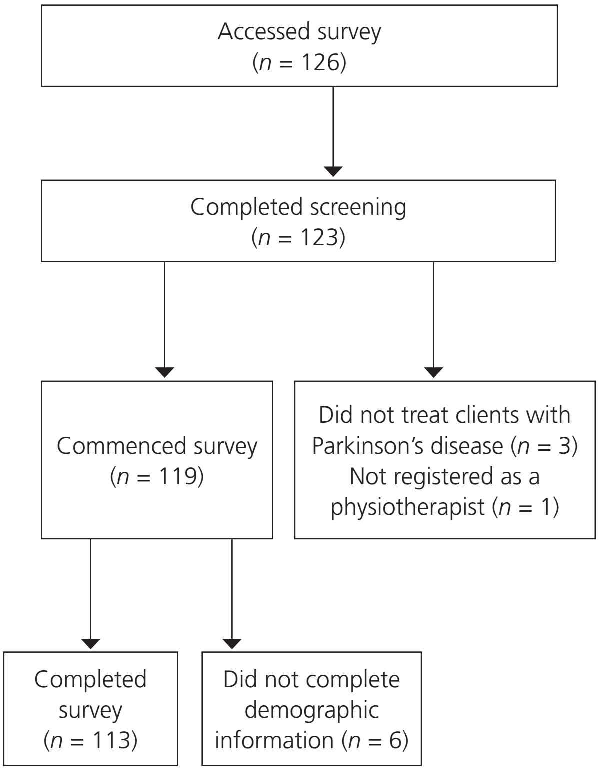
RESULTS

Survey responses

The survey was accessed by 126 physiotherapists, with a participation rate of 98% (123/126) and a completion rate of 90% (113/126) (Figure 1). Six participants did not progress past answering information regarding their demographic characteristics, and were found to not be different from other participants in terms of age ($x^2 = 3.11$, $p = 0.79$), years practising as a physiotherapist ($x^2 = 4.23$, $p = 0.25$), and confidence treating people with PD ($x^2 = 7.76$, $p = 0.44$). Therefore, these participants were excluded from further analyses.

Figure 1

Flowchart of Participants Through the Study



Participant characteristics

Table 1 displays the demographic data from all participants. The majority of participants were female (101/113, 89%) and aged 30–39 years (42/113, 37%). Most respondents (97/113, 86%) were from Australia, with 16 (14%) physiotherapists from other countries, such as the United Kingdom (5/113, 4%) and New Zealand (4/113, 3%). The majority (103/113, 90%) of participants identified that they practised in a metropolitan setting, 71% (82/113) worked full time and 70% (80/113) worked in a hospital environment. Education levels varied from a bachelor degree (57/113, 50%) to clinical doctorate (3/113, 3%), and 56% (64/113) had been practising for more than 11 years.

Current practice of physiotherapists regarding aquatic physiotherapy

About one-third (39/113, 35%) of participants reported that they used aquatic physiotherapy when treating people with PD. For those who used aquatic physiotherapy, the most common reason for selecting this as a treatment modality was because it is known to be an effective intervention (22/39, 56%), with the second most common reason being that existing comorbidities (i.e., osteoarthritis) made land-based exercise difficult (5/39, 13%). Some physiotherapists felt that people move easier in the aquatic environment (4/39, 10%) and that it is a safe environment in which to treat clients (2/39, 5%). Two (5%) participants offered aquatic intervention as it was 'expected' of them, and one participant (3%) felt that the clients enjoyed the pool and that the pool is relaxing. Physiotherapists who did not use aquatic physiotherapy as a treatment modality (74/113, 65%) reported that this was because they did not have access to a pool (22/74, 30%) or did not know that it was a suitable treatment

Table 1

Demographic Data

Participant characteristic	*n*	%
Age (years)		
20–29	27	24
30–39	41	36
40–49	23	21
50–59	14	12
60–69	8	7
Sex		
Male	12	11
Female	101	89
Country		
Australia	97	86
International [a]	16	14
Work location		
Metropolitan	101	89
Rural or remote	12	11
Employment		
Full-time	80	71
Part-time	32	28
Casual/locum	1	1
Work setting (could choose multiple)		
Hospital	78	69
Community	60	53
Other	6	5
Education level		
Bachelor degree	59	52
Postgraduate certificate or diploma	16	14
Entry-level diploma or master's [b]	11	10
Postgraduate master's	22	20
PhD or Clinical doctorate	5	4
Number of years practising		
0–5	30	26
6–10	21	19
> 11	62	55
Working in a specialised Parkinson's disease programme	32	28
Yes		

Note. $N = 113$. All data are response counts unless otherwise specified.

[a] United Kingdom (*n* = 5); New Zealand (*n* = 4); United States of America (*n* = 3); China (*n* = 1); Egypt (*n* = 1); Ireland (*n* = 1); Thailand (*n* = 1).

[b] A postgraduate certificate or diploma is a postgraduate qualification in a specialist area of physiotherapy. An entry-level diploma or master's degree is defined as a postgraduate qualification that allows the clinician to practise as an entry-level physiotherapist upon completion.

technique (19/74, 26%). Other noteworthy reasons included client preference for land-based therapy (10/74, 14%) and time constraints (10/74, 14%).

Eighty-two out of 113 (73%) participants reported receiving specific training in treating clients with PD, with the majority stating that they had accessed online resources (65/113, 58%). The majority (77/113, 68%) of participants felt confident treating people PD, with a median self-reported confidence rating of 8 out of 10 (interquartile range [IQR] = 1). Around half of all respondents (59/113, 52%) reported having had training in aquatic physiotherapy, with the most common form of training being in-house education (41/59, 69%). Of those who used aquatic physiotherapy, self-reported confidence using aquatic physiotherapy was also high, with a median confidence rating of 8 out of 10 (IQR = 3).

A Kruskal-Wallis test showed that participants who had been practising as a physiotherapist for longer had higher confidence treating clients with PD ($x^2(3) = 24.9$, $p = 0.01$). There was no difference in confidence levels among those who used aquatic physiotherapy for people with PD in terms of years practising ($x^2(3) = 5.7$, $p = 0.13$).

Challenges when treating in an aquatic environment

Physiotherapists who used aquatic physiotherapy reported several challenges to treating people with PD in the aquatic environment. Responses have been classified into three main categories, namely patient, therapist, and environmental factors, as shown in Table 2. In terms of patient factors, physiotherapists reported that they were concerned with the increased risk of falls in the aquatic environment (35/39, 90%). The majority of the physiotherapists also felt that the medical fragility of the PD population was a challenge (32/39, 82%). A small proportion of physiotherapists reported that "fatigue" (1/39, 3%), "dysphagia" (1/39, 3%), and "poor cognition" (1/39, 3%) posed a problem when treating people with PD in the aquatic setting.

Minimal environmental factors were reported, with "safety getting dressed and undressed" (3/39, 8%), "hypophonia" (2/39, 5%), and having an adequate "amplitude of movement in the water" (1/39, 3%) identified. From a therapist perspective, physiotherapists found that having to manage the multiple health issues of this population (29/39, 74%) and not knowing what exercises to use in the pool (16/39, 41%) were factors that prevented them from treating people with PD in the aquatic environment.

DISCUSSION

This study investigated physiotherapists' current practice in using aquatic physiotherapy for people with PD. Only one third of our surveyed physiotherapists reported using aquatic physiotherapy in their treatment of people with PD, which suggests that this is not a well-utilised treatment modality despite recent evidence demonstrating that it might be (Neto et al., 2020; Terrens et al., 2020, 2021; Terrens et al., 2018). This study highlights several barriers to implementing aquatic physiotherapy in practice.

Confidence treating people with PD was high in this cohort, and among those who used aquatic physiotherapy, confidence using this treatment modality was equally high. The majority of physiotherapists indicated that they accessed online materials to help guide them when treating people with PD, which shows that the development and updating of such resources is important to help assist physiotherapists in following best practice guidelines and therefore selecting their treatment choices.

Only half of the respondents reported that they had training in aquatic physiotherapy. In addition, fewer than half of participants also reported that they did not know what exercises to use in the pool, which demonstrates the need for further education and guidelines to be available for physiotherapists regarding the use of aquatic physiotherapy in PD. This finding also highlights that aquatic physiotherapy remains an area that requires further development, particularly in teaching undergraduate students. As this study is the first to report physiotherapists' management of PD in relation to aquatic physiotherapy, it is not possible to compare findings to prior studies, and suggests a need for larger scaled studies in this area to confirm the results and enhance generalisability.

This cohort of physiotherapists reported patient, therapist, and environmental challenges within the aquatic environment. The majority of participants reported that the increased falls risk and the medical fragility of people with PD were the main barriers to using aquatic physiotherapy with this population.

Table 2

Challenges Encountered When Treating People with Parkinson's Disease in the Aquatic Environment

Patient	Therapist	Environmental
Falls	Managing multiple health issues	Safety getting dressed [a]
Medical fragility	Knowing what exercises to use in the pool	Hypophonia [a, b]
Fatigue [a]		Amplitude of movement [a]
Dysphagia [a]		
Poor cognition [a]		

[a] Direct quotes from participants. [b] Hypophonia was classified as an environmental factor as it is difficult to hear people with soft voices over the ventilation required in the aquatic environment.

This is consistent with previous research in patients with spinal cord injuries where therapists identified medical comorbidities as a barrier to aquatic physiotherapy (Marinho-Buzelli et al., 2019). Although a moderate number of physiotherapists from this survey reported having access to a pool, it is known that access to pools may vary between different countries, as costs for maintaining or hiring a pool can be prohibitive to healthcare centres or private physiotherapists.

Treatment choice by the patient on whether they wish to participate in exercises in an aquatic environment also has to be taken into account when considering physiotherapy management of this clientele. Several barriers to participating in aquatic physiotherapy from a patient's perspective have been identified previously, such as fatigue, and safety getting dressed and undressed (Terrens et al., 2021). The study by Terrens et al. (2021) was nested within a larger study, and examined health-related quality of life and patient perceptions and experiences regarding aquatic physiotherapy. Although the qualitative section of this study only had a small number of participants (*n* = 13), several barriers were identified using the COM-B system, a framework that illustrates how capability, opportunity, and motivation factors result in behaviour change (Michie et al., 2011), that can help guide future aquatic physiotherapy practice. These barriers from the perspectives of both the patient (as outlined in our previous publication) and the physiotherapist (as reported in this study) need to be considered when implementing an aquatic physiotherapy programme in people with PD.

While approximately a third of participants reported that they used aquatic physiotherapy, around a quarter of those who did not were unaware that it was a suitable treatment option when treating people with PD. Although aquatic physiotherapy has been shown to be beneficial in people with PD (Neto et al., 2020; Pinto et al., 2019; Radder et al., 2020), it is not being routinely prescribed as a treatment modality. Previous studies have shown that there is typically a 17-year knowledge translation time lag (Balas & Boren, 2000; Morris et al., 2011) from the development of evidence regarding an intervention to the time of implementation in practice, and potentially more frequent reviews of clinical practice guidelines would reduce such a lag. There has been a large body of evidence supporting aquatic physiotherapy in the PD population, which has been published since physiotherapy practice guidelines (Keus et al., 2004; NICE, 2017) were released. This includes two systematic reviews examining RCTs that agree aquatic physiotherapy is better than land-based therapy for improving balance and quality of life (Cugusi et al., 2019; Neto et al., 2020). Considering this evidence, it would be beneficial for all physiotherapy clinical practice guidelines for PD, including future editions of the European Guidelines for Physiotherapy in PD, to include aquatic physiotherapy to offer clinicians another intervention choice when treating clients with PD.

Limitations

Although this study included a relatively small cohort of physiotherapists, the survey completion rate was high and there was a diverse range of participants from different age groups, work settings, and with variable years of experience. Nevertheless, this was a cross-sectional study with participants predominantly from Australia and care must be taken when generalising results internationally. This study did not collect data on years of experience working in neurorehabilitation, only total years working as a physiotherapist, and this information may have provided further insight into the participant pool. As recruitment was via the snowballing method and advertisements at conferences that the researchers attended, selection bias may have occurred. Due to differences between countries in terms of access to pool, hire costs, and maintenance, it may not be possible for all physiotherapists to use aquatic physiotherapy when treating clients with PD. Augmenting these results with in-depth qualitative studies may confirm and aid in understanding why clinicians do or do not use aquatic physiotherapy in this population. The majority of the evidence supporting the use of aquatic physiotherapy in the PD cohort has been published after the last edition of the European Guidelines for Physiotherapy in PD; therefore, it is not unexpected that these guidelines do not contain recommendations regarding its use.

CONCLUSION

Aquatic physiotherapy is not a well-utilised treatment technique for people with PD, despite evidence of its efficacy. Several therapist, environmental, and participant challenges were identified, with a large number of therapists not knowing what type of aquatic exercises to use. To improve utilisation of aquatic physiotherapy, further education for physiotherapists and an update in clinical practice guidelines for PD needs to occur.

KEY POINTS

1. Recent systematic reviews indicate that aquatic physiotherapy has a positive effect on mobility, balance, and quality of life in people with Parkinson's disease (PD).
2. Aquatic physiotherapy is not a well-utilised modality among physiotherapists.
3. Several barriers from a physiotherapist perspective have been identified, such as knowing what exercises to use in the pool for this population, the falls risk and medical fragility of the clients, and safety when getting dressed in the change rooms.
4. Physiotherapy clinical practice guidelines for PD require updating to include aquatic physiotherapy and further education needs to be provided to physiotherapists highlighting the benefits of this treatment modality.

DISCLOSURES

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PERMISSIONS

This study was approved by the Monash University Human Research Ethics Committee (project ID 17812). Informed consent was obtained from all participants.

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