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- Physiotherapy and abdominal surgery
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Behaviour change: Is human interaction the nub of the issue?

Someone I know recounted a recent visit to a physiotherapist after many months of putting up with a painful shoulder brought on by movements that required arm abduction. He seemed somewhat bemused by the set of exercises he had been given to do three times per day, as he did not understand what they were about or how they would help him get rid of his pain. He said that he had maintained the exercises for "about a day" – but also mentioned that he felt too guilty to go back to the physiotherapist for further advice.

I have been reflecting on this exchange in light of my recent attendance at the 2019 World Confederation for Physical Therapy (WCPT) Congress in Geneva. This was not my first attendance at a WCPT Congress and, as with previous congresses, I found it was an inspirational experience. I truly felt part of our global body of physiotherapists. It was an opportunity to interact at a personal level with old and new colleagues, to share ideas and experiences, and to look at things in different ways through the eyes of physiotherapists who work in a different context to New Zealand. I also felt proud to be able to contribute to our profession.

One of the discussion sessions at WCPT was about behaviour change in physiotherapy. This session proved to be personally rewarding and satisfying because of how attendees engaged with the topic. Together we discussed and debated the use, meaning and inferences behind words such as "compliance" and "adherence". "Compliance" suggests that a patient will comply with the command of the physiotherapist, while "adherence" suggests that patients will "stick fast" to the provided rehabilitation programme. We came to realise that both of these words imply that, as physiotherapists, we are using our own perspective and expertise to prescribe what we consider to be best for a patient.

Many attendees at the session acknowledged and spoke of how difficult and challenging it is to change patients' behaviour. Because the theories underpinning behaviour change originated in the domain of psychology (see the reference list for reading pertaining to behaviour change theory and practice), some of the audience even questioned whether behaviour change is therefore "out of scope" for physiotherapists. Nevertheless, the session's attendees also recognised that behaviour change would require interactions between patient and therapist that facilitated and supported the development of self-efficacy and self-determination by the patient, and that allowed the patient choice and control. Largely, the feeling in the audience was that behaviour change is an important aspect for successful rehabilitation, but also that knowledge and understanding of strategies to achieve behaviour change seem complex and overwhelming.

So how can we address this? There is an increasing body of literature within physiotherapy and rehabilitation science which identifies that healthful and helpful behaviours develop as a result of perceptions arising from human interactions. Is it, therefore, the importance of human interaction that physiotherapists should focus on first? Do we need to pay more attention to providing patients with the space and opportunity to identify and choose ways to incorporate health-enhancing movement into their daily activities – movement (or exercise or physical activity) that would make sense to them and that they would be able to sustain? Surely, if patients understood better why they are doing what they do and how this would be helpful in their rehabilitation journey, would they not be much more likely to "comply" with their own "prescription" of such movement or exercise?

Could physiotherapists pay more attention to allowing and enabling patients to find their preferred way through the rehabilitation process by discovering – and then taking into account – their "place and space"? For example, if the gentleman referred to earlier had understood that he could have been "exercising" by paying attention to, and correcting, the postural set of his injured shoulder while ballroom dancing (his preferred recreational activity) instead of feeling guilty that he had not complied with instructions to do the designated set of exercises three times daily, then this would have opened up not only a successful pathway to rehabilitation, but also an open and collaborative dialogue with the physiotherapist.

Perhaps the question posed by an audience member is the nub of the issue: Was it the patient's or the physiotherapist's interaction that needed to change?

Ngā mihi,
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The physiotherapy management of patients undergoing abdominal surgery: A survey of current practice

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ABSTRACT

The aim of this study was to determine the physiotherapy management of patients undergoing upper and lower abdominal surgery performed via open or laparoscopic approaches in public hospital surgical units throughout New Zealand. The study also aimed to establish factors influencing physiotherapy practice and determine how New Zealand practice compares to current best evidence. A purpose-designed survey was distributed via post to the senior surgical ward physiotherapist of all public hospitals in New Zealand offering abdominal surgery (n = 23). A response rate of 83% (n = 19) was obtained. No respondents reported routine physiotherapy input with patients prior to surgery. Only one surgical centre (5%) provided prehabilitation, and this was to high-risk patients only. Postoperatively most respondents reported routine assessment and treatment of patients following open upper abdominal surgery, but *not* following open lower abdominal surgery or laparoscopic surgery. Early mobilisation and respiratory physiotherapy interventions were the most commonly implemented interventions postoperatively. This study identified that physiotherapy interventions for patients receiving abdominal surgery mainly focus on postoperative assessment and treatment of patients undergoing open upper abdominal surgery. Few units routinely assess these patients preoperatively or offer prehabilitation. This study will allow physiotherapists working with patients undergoing abdominal surgery in New Zealand to compare their own practice to that of others and consider their use of current best available evidence.

Reeve, J., Anderson, L., Raslan, Y., Grieve, C., Ford, J., & Wilson, L. (2019). The physiotherapy management of patients undergoing abdominal surgery: A survey of current practice. *New Zealand Journal of Physiotherapy, 47*(2), 66-75. https://doi.org/10.15619/NZJP/47.2.02

Key Words: Abdominal Surgery, Survey, Physiotherapy Practice

INTRODUCTION

Abdominal surgery is the most common surgery undertaken in Australia and New Zealand (Australian Institute of Health and Wellness, 2017), and may involve a variety of major organs and structures such as the liver, pancreas, stomach, oesophagus or kidneys (Reeve & Boden, 2016). Upper abdominal surgery (UAS) is defined as an incision above or extending above the umbilicus. Lower abdominal surgery (LAS) is defined as an incision below the umbilicus. Abdominal surgery may be open (involving an incision greater than 5cm), laparoscopic (usually involving several small incisions of approximately 0.5 – 2cm) or a combination of both. Initially, laparoscopic surgeries were widely undertaken for some lower risk abdominal surgeries. Typically, these were associated with less pain, shorter recovery times, a shorter length of hospital stay and reduced complication rates compared with open abdominal surgeries (Spanjersberg, van Sambeeck, Bremers, Rosman, & van Laarhoven, 2015; Veldcamp et al., 2005). However, more recent surgical advances have improved the ability to undertake more complex surgeries via laparoscope or hand-assisted laparoscopic surgeries (HALS), also known as minimally invasive surgery. In HALS an additional incision allows a hand to be passed into the abdomen for surgical manipulation and tissue removal. Whilst these surgeries usually demonstrate accelerated recovery times, a shorter length of stay in hospital and reductions in postoperative complication rates (Benlice, Costedio, Stocchi, Abbas, & Gorgun, 2016;

Spanjersberg et al., 2015), they often involve longer anaesthetic times compared with their equivalent open procedure (Owen et al., 2013).

Physiotherapy management of patients following major abdominal surgery aims to reduce postoperative complications and encourage early postoperative activity to avoid the sequelae of surgery and immobility (Hanekom et al., 2012; Makhabah, Martino, & Ambrosino, 2013). Recently there have been several high-quality studies which have better defined the efficacy of physiotherapy interventions for patients undergoing abdominal surgery (see Reeve & Boden, 2016 for a review of this evidence). However, it is not currently known what comprises physiotherapy interventions for such patients in New Zealand and whether this follows current best evidence recommendations. Given the changes in surgical techniques, it is timely to determine if and how these changes have impacted on physiotherapy practice in this population. Therefore, the aim of this study was to establish the current preoperative and postoperative physiotherapy management of patients undergoing all abdominal surgery and surgical approaches across public hospital surgical units in New Zealand. The study also aimed to establish what factors influence physiotherapy service provision for patients undergoing abdominal surgery in New Zealand and to contextualise this with current best available evidence.

METHODS

This study targeted all public hospitals in New Zealand offering abdominal surgery. Hospitals were identified from the New Zealand Ministry of Health website (www.health.govt.nz), and 37 public hospitals offering surgical treatment were identified. Telephone contact to each of these hospitals was required to identify those that specifically offered upper, lower, open and/or laparoscopic abdominal surgery. In total, 26 public hospitals were found to offer abdominal surgery and thus were approached to take part in the study.

At the time of this study no survey had previously been designed or evaluated that investigated the physiotherapy interventions for patients undergoing abdominal surgery. Therefore, a survey was purpose-designed for the task. The survey comprised 48 questions and was divided into four sections: demographic information, service provision, preoperative physiotherapy management and postoperative physiotherapy management. The majority of questions in the survey were closed questions, with a small number of open questions utilised to give respondents the opportunity to comment or give specifics where appropriate. The survey was developed by two senior respiratory physiotherapists and two student physiotherapists as part of a BHSc (Physiotherapy) student research project. The survey was piloted by two practising physiotherapists with experience managing patients undergoing abdominal surgery. As a result, minor amendments were made to clarify wording, reduce ambiguity and improve the flow of the survey. The study and survey received ethical approval from the Auckland University of Technology Ethics Committee (ref: 17/10) and was administered in April 2017. Completion and return of the survey were taken to indicate informed consent.

A cover letter explaining the purpose of the survey, a survey and a return envelope were posted to each of the identified hospitals, addressed to the senior physiotherapist of the acute/surgical ward. The most senior physiotherapist involved in the management of adults undergoing abdominal surgery was asked to complete the survey in accordance with general practice at their centre. If no senior physiotherapist was available, then any physiotherapist involved in the care of patients undergoing abdominal surgery could complete the survey. Respondents were requested to return the survey within three weeks. Surveys were coded to enable the research team to follow up any non-responders after this time, and repeat surveys were sent to non-responders. Following this, all surveys were de-identified and non-responders were not approached further. In instances where the hospital did not offer physiotherapy management but did offer abdominal surgery, respondents were asked to return the survey stating no physiotherapy was offered to their patients undergoing abdominal surgery.

Data analysis

All closed question response data were of the nominal/ordinal form and analysed using Microsoft Excel 2016. Descriptive statistics were used to summarise findings, and categorical variables were summarised as frequencies and percentages. Open questions were analysed by content analysis and development of themes. Content analysis was undertaken by summarising responses into a series of single themes for each open question.

RESULTS

Response rate

A total of 26 surveys were distributed to public hospitals in New Zealand identified as potentially offering abdominal surgery according to our initial search strategy. Two surveys were returned by physiotherapists stating that their units did not offer abdominal surgery and one respondent indicated that their unit provided no physiotherapy services to patients undergoing abdominal surgery; thus, 23 public hospitals were eligible to take part in the survey. Of these, 83% (n = 19) returned completed surveys. The results presented below are calculated from those who responded to the survey (n = 19).

Demographics

Of the 19 respondents that completed the survey, the majority of physiotherapists (n = 12; 63%) reported completing their undergraduate physiotherapy qualification over 10 years ago and 13 (68%) respondents reported having between one and five years' clinical experience as a senior physiotherapist on surgical wards.

All respondents reported open and laparoscopic UAS and LAS surgery was performed in their surgical centre. Hand-assisted laparoscopic UAS and LAS was performed in eight (42%) surgical centres. All respondents (n = 19, 100%) reported that upper gastrointestinal (UGI) and colorectal (n = 19; 100%) surgery was performed. The types of abdominal surgery undertaken in hospitals in New Zealand are shown in Figure 1.

Enhanced recovery after surgery (ERAS) protocols were reported to be utilised in 15 (79%) centres following abdominal surgery.

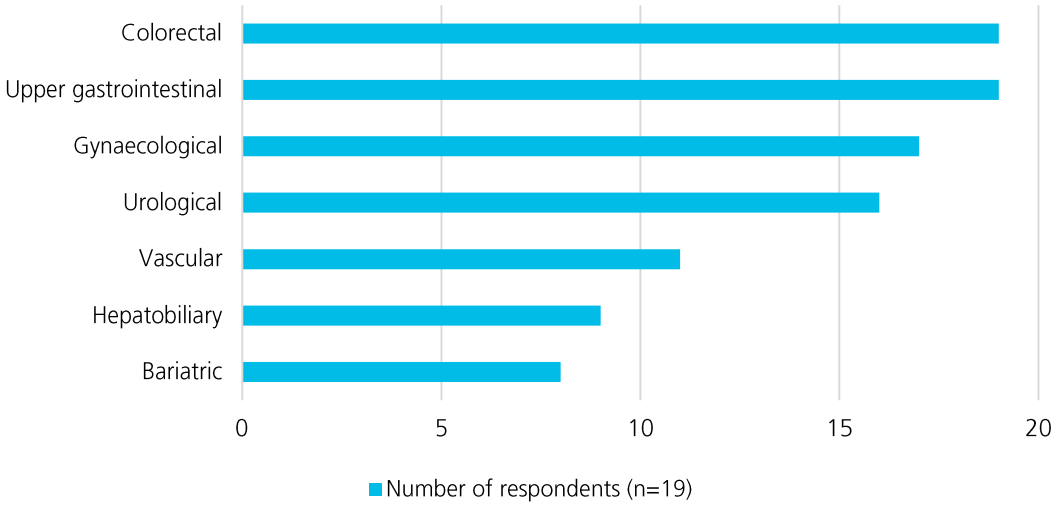


Figure 1: Types of abdominal surgeries offered in hospitals in New Zealand

Physiotherapy service provision to patients undergoing abdominal surgery

Two (11%) respondents reported having one or fewer full-time equivalent (FTE) physiotherapists staffing the abdominal surgical wards daily; 15 (79%) reported having between one and four FTE physiotherapists; and two (11%) reported between five and eight FTE physiotherapists. In all cases, this excluded weekend service provision.

Table 1 shows the number of respondents who reported providing a weekend, evening and/or overnight (out of normal work hours) physiotherapy service for patients following abdominal surgery. Only one respondent (5%) reported that they did not provide any weekend, evening or overnight service for patients following abdominal surgery.

Preoperative physiotherapy management for patients undergoing abdominal surgery

No respondents reported assessing *all* patients undergoing abdominal surgery preoperatively, with most reporting that they did not assess *any* patients preoperatively (n = 11; 58%). This was due to a variety of reasons. However, most of the respondents that reported not assessing *any* patients preoperatively stated this was due to insufficient time or resources (n = 7; 37%) or that preoperative education in their centres was delivered by nurses and/or information leaflets (n = 5; 26%). Two respondents (11%) reported they were about to commence a preoperative physiotherapy service.

Eight respondents (42%) reported seeing "some" patients who had been referred to physiotherapy by the surgeon or anaesthetist preoperatively, and that generally these patients were selected because they were considered at high risk of developing postoperative complications. High-risk patients were considered by respondents as having complex comorbidities, open UGI surgery, chronic respiratory disease, or other concerns identified by the medical team. Respondents reported assessing these referred patients at pre-admission clinic visits. Risk prediction tools were reported to be utilised by two respondents (11%) to identify those patients at high risk of developing a postoperative pulmonary complication although neither respondent named the tool utilised for risk prediction.

Table 1: Types of services offered for patients following abdominal surgery (n = 19)

Service offered	Overnight n (%)	Evening n (%)	Weekend n (%)
Yes, as routine service	0 (0)	0 (0)	7 (37)
Yes, but only prn	1 (5)	1 (5)	10 (53)
On-call service only	10 (53)	10 (53)	1 (5)
No service	6 (32)	6 (32)	1 (5)
Missing data	2 (11)	2 (11)	0 (0)

Notes: n, number; prn, as required

Of those respondents that assessed "some" patients preoperatively (n = 8, 42%), preoperative education and advice was identified as the main intervention administered. All eight respondents stated education was delivered via face-to-face contact, and three respondents reported additionally providing an information booklet. Those providing preoperative education and advice included education in undertaking effective breathing exercises postoperatively (n = 7) and chest clearance techniques (n = 5). Three (16%) respondents reported also providing "brief" preoperative exercise advice.

Most respondents offered no prehabilitation services (n = 18, 95%). However, one respondent (5%) reported providing exercise prehabilitation occasionally to selected high-risk patients. This programme commenced within two weeks prior to surgery and comprised home-based aerobic exercise training once to twice weekly. A further respondent (5%) stated they had the ability to refer patients for prehabilitation to an off-site clinic, as no prehabilitation was administered in their centre. No respondents reported offering inspiratory muscle training programmes to patients undergoing abdominal surgery.

Postoperative physiotherapy management for patients undergoing abdominal surgery

Figure 2 identifies the type of abdominal surgical procedures where postoperative physiotherapy assessment and treatment was reported to be *routinely* administered.

Physiotherapy management following open UAS

Seventeen respondents (89%) reported assessing all patients following open UAS, while 10 respondents (53%) reported implementing prophylactic physiotherapy treatment interventions with all patients postoperatively. Physiotherapy assessment and treatment commenced on postoperative day one (POD1) in all cases. No respondent reported assessing or treating patients on the day of surgery. Two respondents (11%) reported that they did not routinely assess or treat *any* patients following open UAS but relied on referral from other medical team members.

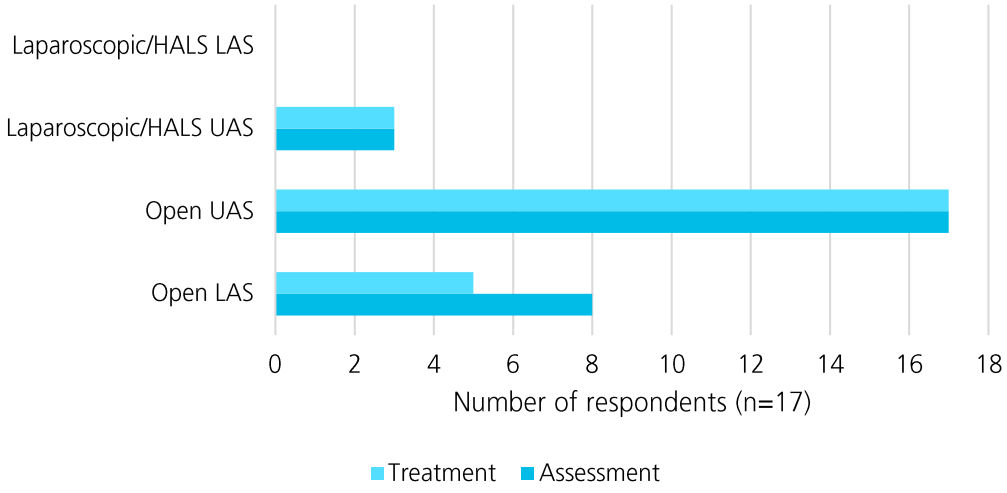
Of those patients in surgical centres where postoperative physiotherapy assessment was routinely undertaken (n = 17), patients were usually assessed once daily (n = 12/17; 71%). Respondents were asked to indicate prophylactic interventions that they considered they would normally use or not normally use with patients having undergone uncomplicated open UAS (Table 2).

Both nurses and physiotherapists reported routinely assisting patients to sit out of bed and subsequent ambulation interventions. However, respondents reported physiotherapists were the discipline to usually initiate ambulation interventions, and these commenced on POD1 where possible. Exercise interventions, the staff involved and the usual day of commencement are shown in Table 3.

Physiotherapy following open LAS, HALS and laparoscopic surgery

Seven respondents (37%) stated that their postoperative care of patients undergoing open LAS did not differ to their management of those undergoing open UAS. Seven respondents (37%) reported physiotherapists were not normally involved in the postoperative care of patients undergoing open LAS. The remaining respondents (n = 5, 26%) reported that open LAS patients were only seen by a physiotherapist if they were considered high-risk, otherwise nursing staff managed all postoperative care.

Following laparoscopic surgery, three respondents (16%) reported that physiotherapists prophylactically assessed and treated patients undergoing upper abdominal laparoscopic or HALS. All other respondents (n = 16, 84%) reported no involvement in either UAS or LAS via laparoscope or HALS.



Notes: HALS, hand assisted laparoscopic surgery; UAS, upper abdominal surgery; LAS, lower abdominal surgery.

Figure 2: Abdominal surgical approaches where physiotherapists provide routine postoperative assessment and treatment

Table 2: Prophylactic physiotherapy interventions routinely used by physiotherapists in the management of patients undergoing uncomplicated open upper abdominal surgery (n = 17)

Treatment intervention	Normally utilised postoperatively n (%)	Not normally utilised postoperatively n (%)
Supervised mobilisation	17 (100)	0 (0)
Deep breathing exercises*	16 (94)	0 (0)
Cough/supported cough	16 (94)	1 (6)
ACBT	13 (76)	4 (24)
Forced expiratory technique	12 (71)	5 (29)
Incentive spirometry	4 (24)	13 (76)
PEP devices	2 (12)	15 (88)
Manual chest techniques e.g. clapping, shaking, vibrations	0 (0)	17 (100)
Non-invasive ventilation*	0 (0)	16 (94)

Notes: ACBT, active cycle of breathing techniques; n, number; PEP, positive expiratory pressure; *n = 16

Table 3: Exercise interventions undertaken following open upper abdominal surgery; staff undertaking them; and the postoperative day commenced (n = 17)

Intervention	Physiotherapist-led n (%)	Nurse-led n (%)	Not routinely undertaken n (%)	Postoperative day commenced Mode (range)
Lower limb exercises	5 (26)	1 (5)	10 (53)	1 (0-2)
Sitting out of bed	13 (77)	15 (88)	0 (0)	1 (0-1)
Ambulation	17 (100)	11 (65)	0 (0)	1 (1)
Stair climbing	13 (77)	0 (0)	4 (24)	Pre-discharge (3-7)
Discharge exercises and advice booklet	11 (65)	4 (24)	3 (18)	Day of discharge (1-4)

Note: n, number

Use of allied health assistants following abdominal surgery

Sixteen (84%) respondents reported using allied healthcare assistants to assist with undertaking postoperative mobilisation with patients; five respondents (26%) reported they also utilised healthcare assistants to assist in undertaking respiratory interventions. All stated healthcare assistants became involved when the patient was determined to be medically stable but had not reached preadmission respiratory status and/or an acceptable mobility level.

Discharge criteria

Table 4 outlines criteria that respondents reported must be achieved prior to being discharged from physiotherapy following abdominal surgery.

Factors influencing physiotherapy management for patients undergoing abdominal surgery

Respondents were given statements to reflect upon regarding their translation of research findings into clinical practice (Table 5).

Respondents were also asked to rank which factors influence their physiotherapy management via a Likert Scale (1 "no influence at all" to 5 "very influential"). The results are shown in Table 6.

DISCUSSION

The excellent response rate to this survey (83%) suggests the results are highly likely to be representative of the population studied (Fincham, 2008). The results of this study document

Table 4: Physiotherapy management prior to discharge from physiotherapy (n = 19)

Discharge criteria	n (%)
Independent with secretion clearance OR non-productive of sputum	19 (100)
Stable respiratory status (SpO2, RR, CXR)	18 (95)
Mobilising at preadmission level of mobility	9 (47)
Independent with activities of daily living e.g. showering, toileting	4 (21)

Notes: CXR, chest x-ray; n, number; RR, respiratory rate; SpO2, peripheral oxygen saturation

Table 5: Self-determined familiarity with the research evidence base (n = 19)

Statement	n (%)
I use the literature regularly to influence my practice and can name the studies I use	2 (11)
I feel very familiar with the literature but am unable to specifically name the studies which have influenced this	9 (47)
I am familiar with the literature but other factors influence my practice rather than the literature	4 (21)
I am not familiar or up to date with the current literature in the area	4 (21)

Note: n, number

Table 6: Participant ranking of factors influencing physiotherapy practice (n = 19)

Influencing factor n (%)	1 (no influence)	2	3 (neutral)	4	5 (very influential)
Literature recommendation	0 (0)	0 (0)	3 (16)	12 (63)	4 (21)
Personal experience	0 (0)	1 (5)	1 (5)	9 (47)	8 (42)
Unit policy/protocol	1 (5)	2 (11)	6 (32)	5 (26)	5 (26)
Surgical colleagues' preferences*	2 (11)	6 (32)	1 (5)	6 (32)	3 (16)
Financial and/or resource constraints	2 (11)	1 (5)	4 (21)	7 (37)	5 (26)

Notes: n, number; *n = 18

physiotherapy practice for patients undergoing abdominal surgery in New Zealand. Results will allow New Zealand physiotherapists to benchmark their service provision and interventions with other centres in New Zealand and overseas (Patman, Bartley, Ferraz, & Bunting, 2017), and against best practice recommendations (Hanekom et al., 2012; Reeve & Boden, 2016). The results will also provide a platform from which to further investigate the physiotherapy management of adults undergoing abdominal surgery in New Zealand.

This survey demonstrated that physiotherapists from all responding surgical centres were routinely involved with patients undergoing UAS, but few were routinely involved with those undergoing open LAS. This practice is likely to be based on evidence that suggests PPCs are 15 times more likely and that pneumonia is almost three times more likely following UAS compared with LAS (Arozullah, Khuri, Henderson & Daley, 2001; Smith et al., 2010). It also reflects recently published recommendations that routine physiotherapy following LAS is unnecessary (Reeve & Boden, 2016) providing that, where necessary, high-risk patients are assessed to determine the risk/presence of PPC and treated as appropriate.

Our study also demonstrated that prophylactic physiotherapy interventions were not usually undertaken with patients undergoing laparoscopic surgery and HALS. Typically, laparoscopic surgery and HALS have accelerated recovery times, reduced complication rates and a shorter length of hospital stay, with the incidence of PPCs after traditional laparoscopic surgery being negligible (Antoniou, Antoniou, Koch, Pointner, & Granderath, 2014; Smith et al., 2010; Spanjersberg et al., 2015). Additionally, physiotherapy following laparoscopic surgery has not been shown to improve outcomes (Fagevik Olsén, Josefson, & Lönroth, 1999). However, given the increasing complexity, duration and types of major surgeries (such as hepatic, oesophageal, pancreatic and colorectal

surgeries) being undertaken by more advanced laparoscopic and HALS procedures, there is a need to re-evaluate the prevalence of postoperative complications amenable to physiotherapy; and to determine whether physiotherapy interventions following such surgeries improves outcomes. Until further contemporary data are available, it is recommended that physiotherapists undertake risk assessment of patients undergoing advanced laparoscopic surgery and initiate treatment where necessary.

Preoperative education

The purpose of preoperative physiotherapy education is to improve patient knowledge regarding rehabilitation required in the postoperative recovery period; to teach postoperative exercises to reduce postoperative complication risk; and to enhance patient's recovery to their desired level of function postoperatively. In previous decades physiotherapy preoperative education was, anecdotally, widely provided for patients undergoing major surgery, but more recently, physiotherapy practices have primarily focused on postoperative education (Patman, 2018). In our survey, most respondents reported not providing any preoperative physiotherapy education to patients undergoing abdominal surgery, primarily due to resourcing issues. Surveys in Australia have shown similar findings in relation to preoperative practices (Browning, Denehy, & Scholes, 2007; Patman et al., 2017; Scholes, Denehy, Sztendur, & Browning, 2006) despite an accumulating body of evidence demonstrating preoperative physiotherapy education reduces the incidence of PPC in patients undergoing open UAS (Boden et al., 2018; Fagevik Olsén, Hahn, Nordgren, Lönroth, & Lundholm, 1997; Samnani, Umer, Mehdi, & Farid, 2014). Moreover, the largest and most recent of these was a multicentre, international randomised controlled trial undertaken in two Australian centres and one New Zealand centre. This trial delivered a single 30-minute preoperative face-to-face education session and provided a booklet within a hospital multidisciplinary preadmission clinic within six weeks of open UAS. The intervention halved the incidence of PPCs in the treatment group when compared with a control group who received the booklet alone without face-to-face education (Boden et al., 2018). Together with the previous studies, Boden et al.'s (2018) study presents robust evidence that preoperative education delivered by a physiotherapist within six weeks of major open UAS improves outcomes and should be a recognised evidence-based intervention in patients undergoing this type of surgery. Given the likely low cost of this intervention compared with the costs associated with PPC development (Shander et al., 2011), we would recommend New Zealand surgical centres consider implementing such interventions for patients undergoing major open abdominal surgery.

Prehabilitation

With the increasing focus on prevention rather than cure, there has been developing interest over the last decade in investigating the efficacy of utilising preoperative exercise interventions (prehabilitation) to improve surgical outcomes. Prehabilitation aims to improve functional capacity and cardiopulmonary fitness to enable patients to withstand the stresses of surgery, and reduce postoperative morbidity and mortality (West, Wischmeyer, & Grocott, 2017). Typically, prehabilitation provides preoperative exercise-based interventions (unimodal), but more recently models have changed to include medical, nutritional, behavioural and psychosocial optimisation (bi/trimodal models). Whilst the rationale for prehabilitation is widely accepted, in practice the implementation of these programmes in patients with often short surgical waitlist times and complex neoadjuvant therapies can be challenging. In New Zealand, only one surgical centre in this survey reported implementing an exercise-based prehabilitation programme, and this was implemented for only "some" high-risk patients. There is clear evidence of the impact of poor preoperative cardiorespiratory fitness on postoperative outcome (West, Lythgoe, et al., 2014; West, Parry, et al., 2014) and of the impact of prehabilitation on preoperative cardiorespiratory fitness (Loughney, West, Kemp, Grocott, & Jack, 2015; Snowdon, Haines, & Skinner, 2014; West et al., 2015). However, the evidence for this translating into improved postoperative outcomes is yet to be conclusively demonstrated (Hijazi, Gondal, & Aziz, 2017; O'Doherty, West, Jack, & Grocott, 2013; West et al., 2017). Similarly, whilst the research investigating the efficacy of prehabilitation in improving outcomes for patients undergoing abdominal surgery is extensive (to date there are approximately 19 systematic reviews), this same research is limited by the heterogeneity seen in the populations being investigated; the type, frequency, duration and timing of interventions; and in the uni-, bi-, or tri-modal approaches to prehabilitation. Additionally, there are numerous methodological limitations to these studies, such as small sample sizes and low-quality study designs. Furthermore, the lack of standardisation of the outcome measures makes interpretation of the results challenging. Indeed, only a handful of studies have attempted meta-analysis of data due to the heterogeneity of the studies included in the systematic reviews (Kendall, Oliveira, Peleteiro, Pinho, & Bastos, 2018; Loughney et al., 2015; Moran et al., 2016). Thus, despite a rapidly growing body of literature, to date no firm conclusions can be drawn regarding the efficacy of prehabilitation in improving surgical outcomes for patients undergoing abdominal surgery. In general, authors suggest that exercise prehabilitation should be offered to all patients undergoing elective major or complex abdominal surgery, and where resources are scarce, this should be limited to those at high risk of perioperative complications (Hijazi et al., 2017; Reeve & Boden, 2016; Tew, Ayyash, Durrand, & Danjoux, 2018).

Postoperative physiotherapy

The role of the physiotherapist in the postoperative period is to prevent postoperative complications (particularly PPCs) and facilitate return to the desired level of function (Reeve & Boden, 2016). The current study found that most physiotherapists in New Zealand public surgical units routinely assessed and prophylactically treated patients following open UAS. Routine interventions consisted of deep breathing and coughing exercises (DB&C), and supervised ambulation interventions, normally commencing on POD1. The use of prophylactic respiratory interventions in the early postoperative stage is consistent with physiotherapy service provision in other countries and expert consensus (Hanekom et al., 2012; Patman et al., 2017), despite the necessity for DB&C interventions remaining contentious across different major surgical groups (Pasquina, Tramèr, & Walder, 2003; Reeve et al., 2010),

including those undergoing UAS (Mackay, Ellis, & Johnston, 2005; Pasquina, Tramèr, Granier, & Walzer, 2006; Silva, Li, & Rickard, 2013). For example, in patients undergoing UAS, two studies (Mackay et al., 2005; Silva et al., 2013) have demonstrated that the addition of deep breathing exercises to physiotherapy-directed early (POD1) postoperative ambulation does not further reduce PPCs compared with early postoperative ambulation alone. This suggests that early postoperative ambulation on POD1 may be all that is necessary in low-risk patients, and that the routine use of prophylactic DB&C may not be justified. Despite the uncertain evidence regarding the use of DB&C in this population and given the potential cost-versus-harm benefits of implementing these interventions, guidelines currently continue to suggest that DB&C exercises continue to be employed (Hanekom et al., 2012).

In the current study, the widespread initiation by physiotherapists of supervised ambulation in the early postoperative period in patients following abdominal surgery mirrors recommendations from the literature to utilise such interventions to prevent the deleterious impact of prolonged immobility. Most respondents reported initiating these interventions once daily, commencing on POD1. Our results regarding the widespread use of ambulation interventions by physiotherapists may reflect that enhanced recovery after surgery (ERAS) protocols are reportedly widely utilised in New Zealand surgical centres, and that patients managed within ERAS protocols mobilise more frequently and achieve independent mobilisation earlier than those cared for without ERAS (Basse, Hjort-Jakobsen, Billesbølle, Werner, & Kehlet, 2000). This occurs despite the early mobilisation component being the least adhered to of all the ERAS components (Boulind et al., 2012; Gustafsson et al., 2011); that ERAS pathways and mobilisation goals differ between centres (Basse et al., 2000); and that patients may perform little ambulation outside of physiotherapy-directed ambulation in the first few postoperative days (Browning et al., 2007). One study investigating the impact of delayed ambulation found that for each postoperative day that patients did not mobilise greater than 10 m from the bed, they were three (95% CI 1.2 to 8) times more likely to develop a PPC (Haines et al., 2013). A recent study demonstrated that in patients following colorectal surgery, missing supervised ambulation interventions in the early postoperative period correlated with an increased length of stay in hospital, and that participating in three supervised ambulation sessions each day commencing on POD1 predicted a reduced length of stay (Stethen et al., 2018).

Despite the protocolisation of ambulation found within ERAS paradigms, few respondents in our study reported ambulating patients to a specific target level of exertion, intensity, time or distance. Whilst some studies have shown better outcomes to be associated with standardised, structured approaches to the implementation of ambulation protocols early in the postoperative period (Pashikanti & Von Ah, 2012), the evidence for this remains limited and no uniform definition of what constitutes early mobilisation/ambulation currently exists for patients following abdominal surgery (Feldheiser et al., 2016). Recently, one such standardised protocol was nested within a high-quality randomised controlled trial in 441 patients undergoing UAS (which included patients in New Zealand) (Boden et al., 2018). This protocol used a postoperative physiotherapy-directed standardised ambulation programme commencing on POD1 and found the median (IQR) time to achieve ambulation for over 10 minutes following open UAS was three (IQR 1-5) days and, importantly, that there were no adverse events associated with this level of ambulation. To date, the optimal frequency, duration and intensity levels of ambulation to reduce postoperative complications have yet to be determined, and until further robust evidence is available, it is suggested that a standardised protocol similar to Boden et al.'s (2015) protocol for early ambulation is followed, as this has been demonstrated to be safe and achievable in New Zealand surgical populations.

Most of the respondents to our study reported that alongside personal experience, utilising evidence-based practice was a strong influencing factor on their practice. Overall, findings from this survey have indicated that physiotherapists in surgical centres in New Zealand adhere to evidence-based guidelines for managing patients undergoing abdominal surgery postoperatively. However, while there is an increasing body of evidence suggesting interventions such as preoperative education (Boden et al., 2018; Fagevik Olsén et al., 1997; Samnani et al., 2014) and prehabilitation exercise interventions (Katsura, Kuriyama, Takeshima, Fukuhara, & Furukawa, 2015; Mans, Reeve, & Elkins, 2015; Moran et al., 2016; Tew et al., 2018) may be effective in reducing postoperative complications and enhancing postoperative recovery, to date, this does not appear to have impacted upon clinical practice. Whilst the contemporary nature of some of this research may be one reason for the delay in translation of evidence to practice, other potential reasons should be identified and addressed where necessary.

Limitations

This study sought to obtain the relevant information from one physiotherapist per abdominal surgical centre in New Zealand, and we acknowledge that opening this survey to *all* physiotherapists in each centre might have resulted in differing responses. We tried to alleviate this potential variability by targeting the senior physiotherapist in each centre, anticipating that this person was most likely to be determining practice in the surgical centre. Additionally, open questions offered the possibility for respondents to comment on the diversity of practice in each centre. We acknowledge that this survey was administered only to public hospitals in New Zealand and that responses from physiotherapists working in private hospital abdominal surgical centres may differ. Of the 36 private hospitals identified through New Zealand databases, a significant proportion of these offered day surgery or minimally invasive surgery only, and this, together with different funding models, drove our decision to omit private hospitals from this survey.

Clinical implications

This study will allow physiotherapists working in abdominal surgical units around New Zealand to compare their preoperative and postoperative management of patients undergoing abdominal surgery to other similar centres, both in New Zealand and overseas (Patman et al., 2017). It is hoped that this study will assist practitioners to evaluate their practice

in accordance with current evidence, implement changes where appropriate and audit the impact of implementing such changes.

CONCLUSION

This study has determined the current physiotherapy management of patients undergoing abdominal surgery in public hospitals throughout New Zealand. It has identified common physiotherapy interventions that are utilised with these patients in preoperative and postoperative settings, and the similarities and differences in practice as well as factors that influence current practice. It has compared current New Zealand practices to that of the most recent literature, thus allowing physiotherapists to evaluate their own practice regarding best available evidence.

KEY POINTS

1. Most physiotherapists in surgical centres in New Zealand adhere to evidence-based guidelines for the postoperative inpatient management of patients undergoing open upper abdominal surgery.
2. Physiotherapists working in New Zealand surgical centres are rarely routinely involved in the management of patients undergoing open lower abdominal surgery or laparoscopic surgery.
3. Prior to their surgery, people undergoing abdominal surgery in New Zealand rarely receive education and advice or prehabilitation interventions from physiotherapists.

DISCLOSURES

No funding was obtained for this study. There are no conflicts of interest which may be perceived to interfere with or bias this study.

PERMISSIONS

Ethical approval was gained from the Auckland University of Technology Ethics Committee (ref: 17/10).

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Individuals' experiences of the consequences of anterior cruciate ligament reconstruction surgery

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ABSTRACT

Anterior cruciate ligament (ACL) injuries have a profound impact on an individual's life. The aim of this study was to explore participants' experiences and perspectives of outcomes of their ACL reconstruction (ACLR) from two to 10 years following surgery, in relation to physical activity, sports, occupation and quality of life. Ten participants completed patient-reported outcome measures (PROM), namely the Tegner Activity Scale, the Knee Outcome and Osteoarthritis Score (KOOS) and the Sports Confidence Scale; and they participated in individual face-to-face semi-structured interviews. The interviews were recorded and transcribed verbatim. The general inductive approach was used for data analysis, and PROMs were analysed descriptively. Two themes were identified from the interviews: "Continuum of fear of re-injury versus confidence" and "Ongoing knee-health related problems and need of health professional advice". Anterior cruciate ligament reconstruction may lead to long-term fear of injury and behavioural manifestations, with fluctuating levels of confidence during sports. Participants had ongoing knee health-related problems and were concerned about the future risk of re-injury or osteoarthritis. Participants reported good knee function, and yet scored low on quality of life scales (KOOS, median 53/100). The Sports Confidence Scale indicated low knee-related confidence levels (median 41.5/80). Health professionals should consider long-term individual-specific maintenance programmes that improve and maintain confidence and self-efficacy for those with ACLR.

Kaur, M., Ribeiro, D. C., Theis, JC., Webster, K. E., & Sole, G. (2019). Individuals' experiences of the consequences of anterior cruciate ligament reconstruction surgery. *New Zealand Journal of Physiotherapy, 48*(2), 76-93. https://doi.org/10.15619/NZJP/47.2.03

Key Words: Anterior Cruciate Ligament Reconstruction, Fear of Re-injury, Confidence, Quality of Life

INTRODUCTION

Anterior cruciate ligament (ACL) rupture is one of the most debilitating sports injuries with an annual incidence of 68.6 per 100,000 person-years for isolated ACL tears in the United States of America (Sanders et al., 2016). Individuals undergo anterior cruciate ligament reconstruction (ACLR) to improve knee stability, typically intending to return to their pre-injury level of sports; and to maintain their quality of life (QOL) (Heijne, Axelsson, Werner, & Biguet, 2008). However, the goal to return to their pre-injury level of sports is challenged by participants often experiencing fear of re-injury (Kvist, Ek, Sporrstedt, & Good, 2005). Only 55% of individuals with ACLR have been found to return to competitive sports post-surgery (Ardern, Taylor, Feller, & Webster, 2014).

Different health-related QOL levels have been reported for participants with ACLR. For example, low QOL (based on the Knee Osteoarthritis and Injury Outcome Score, Quality of Life [KOOS-QOL]) was reported at an average of nine years in one cohort (Filbay, Ackerman, Russell, Macri, & Crossley, 2014), while another cohort with an average 11.5 years post-surgery reported similar levels of QOL compared to uninjured controls (Möller, Weidenhielm, & Werner, 2009). Paradoxically, athletes who continue to play competitive sports after ACLR report lower knee-related QOL in the long term than those who have changed to recreational level sports (Filbay, Crossley, & Ackerman, 2016).

Previous qualitative research has focused on participants' experiences related to rehabilitation post-ACLR. Those studies

described the rehabilitation journey as a long and arduous process, often associated with a loss of identity and emotional responses such as frustration and anger (Scott, Perry, & Sole, 2017; Heijne et al., 2008). Further, psychosocial barriers to return to sports post-ACLR have been identified (DiSanti et al., 2018). To improve our understanding of outcomes of ACL injury and reconstruction, the aim of the present study was to explore participants' experiences and perspectives of the outcomes of their ACL injury and surgery from two to 10 years in relation to physical activity, sports, occupation and their QOL. This study is nested within a larger research project exploring long-term outcomes of ACLR.

METHODS

Design

A qualitative study design was used with semi-structured interviews. The Consolidated Criterion for Reporting Qualitative Research (COREQ) checklist was used for reporting the study (Tong, Sainsbury, & Craig, 2007). Prior to the study, researchers bracketed their perceptions and thoughts related to the field of study (Sorsa, Kiikkala, & Åstedt-Kurki, 2015) to mitigate the influence that such preconceptions may have on the research process and data analysis (Tufford & Newman, 2012; Palaganas, Sanchez, Molintas, Visitacion, & Caricativo, 2017; Petty, Thomson, & Stew, 2012). The study was approved by the University of Otago Human Ethics Committee (Health) (ref: H15/034).

Participants

Participants were recruited from the local community via advertisements for a study exploring biomechanical and physical outcomes of ACLR. Participants had provided written informed consent to participate in the larger study and confirmed their willingness to be interviewed. The participants were recruited sequentially based on their response. Those included were men and women between 20 and 50 years old, who underwent a primary ACLR (any type of graft), with or without associated ligamentous, meniscal or chondral injury within the past two to 10 years. Participants were excluded if they had bilateral or revision surgeries; other lower limb, pelvic or low-back musculoskeletal injuries which needed health care over the past 12 months or were limiting their daily function, sports or occupational performance; or had known systemic, neurological or cardiovascular disorders.

Data collection

Prior to the interviews, participants completed a demographic questionnaire; the Tegner Activity Scale (Tegner & Lysholm, 1985); the Sports Confidence Scale (Ardern, Taylor, Feller, & Webster, 2012); and the Knee Injury and Osteoarthritis Outcome Scale (KOOS) (Roos, Roos, Lohmander, Ekdahl, & Beynnon, 1998) via Qualtrics (Provo, UT, USA, 2015). $KOOS_4$ was calculated as an average score of four sub-scales excluding "function during daily activities" due to a high ceiling effect for that sub-scale (Hamrin Senorski et al. 2017). These data were collected to describe the participants as a group. Quantitative data from the patient-reported outcome measures (PROM) provided ratings by participants regarding their symptoms, function, QOL and fear related to their knee health; and their responses were explored in depth during the interviews.

Face-to-face individual interviews were held. Four of the interviews were conducted only by MK, while two interviewers (MK and GS, both women) were present for the remaining interviews. At the time of interviews, MK was a PhD candidate with clinical experience in musculoskeletal rehabilitation and was new to the qualitative research methodology. GS is an established clinical researcher within the field of musculoskeletal physiotherapy, and is experienced in quantitative and qualitative research methods. Participants had met MK during the quantitative data collection sessions prior to the interviews. The participant information sheet clarified that the study contributed towards the PhD thesis of MK and that the co-researchers were physiotherapy academic staff.

All interviews were conducted in the School of Physiotherapy, University of Otago, and took between 20 to 40 minutes. While participants were informed that they could bring a support person, none chose to do this. No interview was repeated. The interview guide had open-ended questions, and was developed and refined by the research team (Appendix 1). While the guide provided structure, the selection and wording of specific questions and their respective order depended on how the interview proceeded. The interviewer also referred to the individually completed PROM, and could ask participants to clarify and explain their ratings. Field notes were made during and after the interview. The interviews were recorded with a digital audio recorder (Sony R- IC Recorder) and transcribed verbatim.

Data analysis

Quantitative and qualitative data were analysed using an Excel spreadsheet (Microsoft Office 2013). Descriptive analyses (median and ranges) were performed for the PROM.

The general inductive method was used for the interview data (Thomas, 2006). The transcriptions were read multiple times, and text segments that reflected the participants' experiences were identified and coded. The codes were categorised and the researchers developed links between these categories and identified themes relevant for the research aims. After the primary analysis of the available data and when no new codes evolved from the next two interviews, it was deemed that data saturation had occurred (Fugard & Potts, 2015); this occurred by the eighth participant.

The primary author (MK) analysed all interviews, while GS analysed every second interview. The codes produced by the researchers were data driven, and were then compared, discussed and negotiated. The categories and emerging themes and sub-themes were discussed and confirmed within the research team. The key themes were cross-referenced back to the original text to ensure that it was an accurate representation of the participants' perceptions of their experiences. Supporting quotes that most accurately reflected the key themes and sub-themes were selected. A summary of the results was sent to the participants for verification and feedback.

RESULTS

Seven women and three men (median age 28.5 years, range 20 to 52 years) participated in the study. One participant declined to take part due to unknown reasons. Three participants were health professionals, three held academic or education positions, and four were students. Three participants underwent reconstruction within five months of incurring their ACL rupture, while the remaining participants had delayed surgery (Appendix 2). Time since reconstruction ranged from three to 10 years, and all participants had been discharged from rehabilitation. Five participants had returned to their preinjury level of sports participation, one had increased their level of sports participation, while the remaining four participants had decreased their level of sports participation by two or more scores (Table 1).

Despite a high median KOOS "function daily living" score (99/100), as a group the participants still experienced "knee-related symptoms" (median 59/100) and slightly impaired "knee function during sports and recreational activities" (median 84/100). The median KOOS4 was 69/100 (Table 1). Overall, they scored low on KOOS "knee-related QOL" (median 53/100). Results from the Sports Confidence Scale (Table 1) indicated that, as a group, these participants still had decreased confidence in their knee (41.5/80).

From the qualitative data, 13 categories were converged into two themes. Themes and subthemes with supporting quotes are described below (Table 2), with additional supporting quotes in Appendix 3.

1. The "fear of re-injury" versus "confidence" continuum

This theme describes a continuum between fear of re-injury and confidence when engaging with physical and sports activities. It consisted of three sub-themes: contributors to fear of re-injury; behavioural manifestations of fear; and confidence.

Contributors to fear of re-injury

Four main contributors to fear of re-injury were defined from the data and were related to the participants' experiences with the injury, surgery and rehabilitation (Figure 1). Contributors included participants' fear of re-experiencing the intense pain associated with the initial injury (Quotes 1, 2 and 3), and the memory of the inciting injury movement (Quote 4). While most participants described being cautious and mindful towards their knee health during physical activity, some of the participants expressed anxiety associated with the knee and were avoiding specific activities (Quote 5). One participant described himself as confident during sports but still cautious with the specific activity that was related to his injury, namely sprinting to catch a ball (Quote 6).

The difficulty of undergoing a long period of rehabilitation accompanied with loss of muscle strength (Quote 7) was the third factor contributing towards the fear of re-injury. Furthermore, the injury and rehabilitation had impacted on family dynamics and commitments. For one participant, knee health hindered her actively engaging with children. Another participant had to take greater day-to-day responsibility for her children as her partner's work now demanded extended periods away from the family (Quote 8). Family responsibilities thus contributed towards the fear of re-injury as participants did not want to impose the inconvenience associated with the commitment to rehabilitation on their family again.

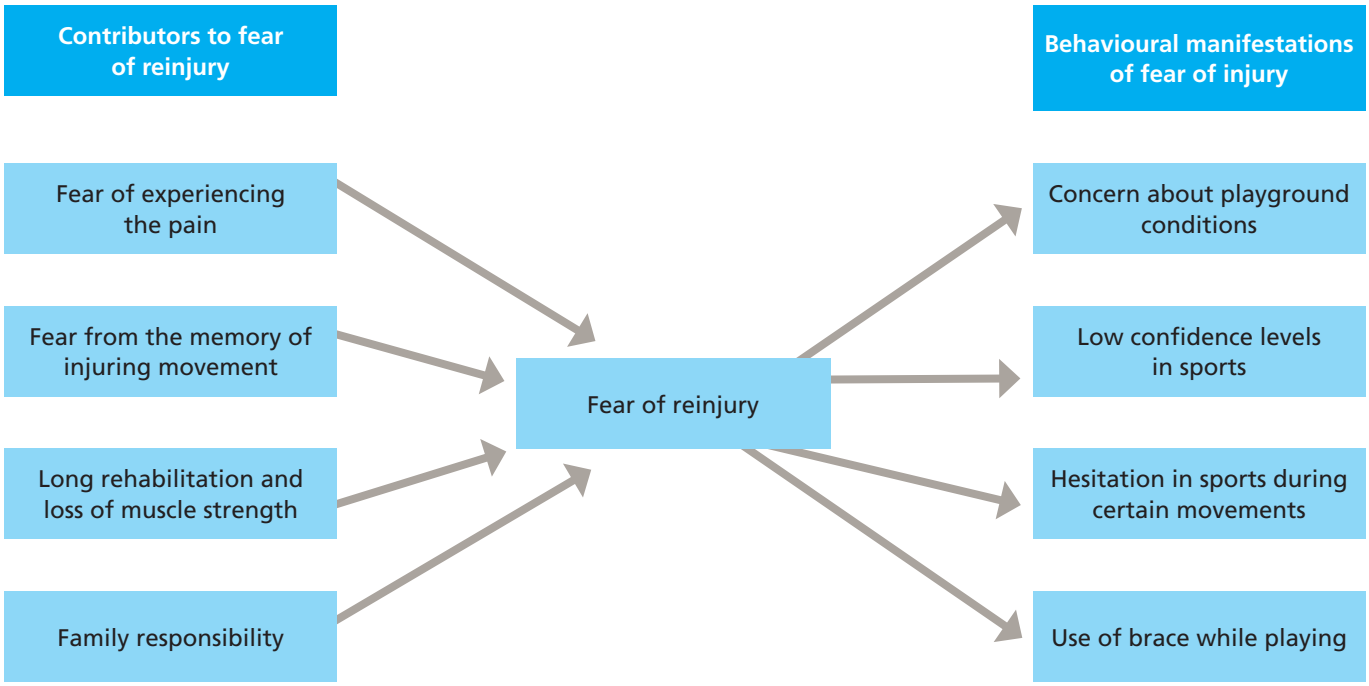

Figure 1: Fear of re-injury and its consequences

Table 1: Participant demographics and patient-reported outcomes

ID/sex	Length of interview (mins)	Time since ACLR (years) / side of injury	Pre-injury Tegner scores	Post-injury Tegner	KOOS-Pain	KOOS-Symptoms	KOOS-ADL function	KOOS Sports/ recreation	KOOS QOL	KOOS4	Confidence during sports
P1 (F)	23.5	9 /left	6	6	97	54	99	90	63	78	41
P2 (F)	27.2	10/right	6	1	67	39	93	80	19	54	51
P3 (F)	20.2	9/right	3	3	78	89	99	40	38	67	64
P4 (F)	19.5	5/right	9	9	97	61	100	90	69	81	37
P5 (M)	41.0	3/left	9	9	100	61	100	85	63	80	39
P6 (M)	32.0	4/left	3	4	94	57	99	70	56	73	47
P7 (F)	39.1	5/right	7	4	94	71	100	80	75	82	45
P8 (F)	38.2	7/left	9	7	72	46	94	50	44	56	52
P9 (F)	20.0	3/left	7	3	86	46	100	75	50	67	37
P10 (M)	30.5	9/right	5	5	97	75	100	100	44	83	32
Median (range)		6 (3-10)	6.5 (3-9)	5.1 (1-9)	94 (67-100)	59 (39-89)	99 (93-100)	80 (40-100)	53 (19-75)	69 (54-83)	41.5 (32-64)

Notes: Tegner activity scale, scale from 0 "sick leave or disability pension because of knee symptoms" to 10 "competitive sports – national or elite" (Tegner & Lysholm, 1985); KOOS, Knee injury and Osteoarthritis Outcome Score: "0" indicates extreme knee problems and "100" indicates no knee problems (Roos et al., 1998); KOOS4: an average of pain, symptoms, function during sports and recreation, and quality of life (Hamrin Senorski et al. 2017); ACLR, anterior cruciate ligament reconstruction; ADL, activities of daily living; QOL, quality of life; Confidence during sports, maximum score 80, higher scores indicate lower levels of fear of injury (Ardern et al., 2012)

Table 2: The key themes and the subthemes

Theme/ subthemes	Categories	Quote number	Participant quote
1. Fear of re-injury versus confidence continuum			
Contributors to fear of injury			
	Fear of experiencing injury pain	1	"I remember just being in a lot of pain, so I don't really want to have to feel it [again]." P4
		2	"I felt really uncomfortable playing when there are lots of people around me, like if people, I was always scared that someone would push me over and twist my knee and I would be in pain. I think I was always more scared of the pain. I didn't want to feel that pain again." P8
		3	"I just would never want to go through it again, I mean I know I could get through it but it's, yeah it messed me up for a bit…." P6
	Memory of inciting injury movement	4	"I wasn't doing anything different, like I've jumped that way 100 times before so it's just kind of … a memory thing, I suppose, and like when I came back, one of the first games I played, I stopped real suddenly to stop myself from going offside and it kind of locked back on me and I just … freaked out a little bit […]….." P7
		5	"I don't jump on the trampoline as much, I do it sometimes but I'm really conscious that it feels, in my head, I think it could go wrong very easily […]." P2
		6	"There is definitely times where I don't trust myself to run […] or to sprint to be able to catch a ball or something so I will just jog because I don't have the confidence because both times that I have done it [the ACL rupture] has been at a sprint so that is the time when I am the least confident." P8
	Long rehabilitation period and loss of muscle strength	7	"It's mostly the weakness that I've got on that side and… yeah the long-term, like …. if I'm fit, then it's fine but I'm not always fit and yeah there's definitely weakness on that side and I don't want to have to repeat all the rehab and everything else again, 'cause it does take a while for it to feel normal." P1
	Impact of the injury and rehabilitation on family responsibility	8	"Main thing probably is the fear, because my husband works [… abroad] and I am here with kids so I can't afford to be injured because I got no family [close by], and will be really difficult […] if I re-injured my knee." P3
Behavioural manifestations of fear of injury			
	Concern about playing conditions	9	"I hate playing on slippery, when it is wet. If we are playing outside I don't like playing it, it is unstable. Wet surfaces are pretty bad. Just the uneven surface makes me feel uncomfortable." P8
	Hesitation in sports during certain movements	10	"I'm just a bit, I think twice when I'm doing a heavy pivotal movement on the right and on the left I will just do it without thinking. Obviously I, actually modified, meaning ...I try to change it to my left if I could." P10
		11	"…I'm not as adventurous anymore, how I used to be […]; I play the safe road now. [….] I've got older brothers and they're go go go, so I do pull back a bit and stay with mum sometimes now instead of going off with them. But other than that I still join in. I still go bike riding and skiing and everything." P9
	Use of brace during playing	12	"I do use a brace when I do snow skiing. I don't think it does anything but it just gives me a little bit more confidence or […] knowing just to protect it as such." P9

Theme/ subthemes	Categories	Quote number	Participant quote
Confidence			
	The fluctuating confidence spectrum	13	"But with the right conditions and knowing that my fitness is in the right place, then it doesn't hold me back." P1
		14	"I'd say most of the time I don't think about it [the knee] too much." P1
		15	"I know that it's never going to be as good as my left but I can live with that but I want to make sure I do everything possible to make that better. For some reason I think I'm actually stronger now than before." P10
		16	"I remember the way I was playing soccer at the start …, I was just tip toeing around, I wasn't really like trying to turn, I was real conscious of the way I was turning … but then, throughout the football season I just learnt that I can actually manage all of those things... I think I am still ...gaining confidence in it…." P5
		17	"I don't feel confident in that knee or either of them now though, so no it's not just the one that had the operation." P2
		18	"I played in the team but I had to pull out of the team because... I don't know if I didn't trust it or if my knee wasn't strong enough, but it wouldn't hold out with my head. I was almost protecting my knee in everything I did, so every time I jumped up I'd land on the other leg. I'd always turn on the other leg, and I was kind of just leaving the injured one behind, or the surgery one behind. Tried again in 2014 and then just decided I'd flag it and just do something else." P9
2. Ongoing knee-health related problems and need of health professional device			
	Ongoing problems	19	I probably walk, like so I used to walk a lot and now I think if I walked to work, for example then how sore am I gonna be for the rest of the day or will my knee be able to cope then walking home, does that make sense 'cause …" P2
		20	"Yeah I don't like to [run on hard surface], well I do run on concrete a bit but I really prefer not to, just 'cause like I get a lot more pain ,.. a little bit more pain, not a lot but definitely the softer surfaces." P7
	Continuing daily struggles	21	"Kneeling gets really uncomfortable. I can do it for a little bit, but I prefer to sit in a low squat than kneel... Pain will be minor and it is not ... too major but then sometimes it will be mainly, from after playing a game or training and it will just ache. Going upstairs is generally fine, it is the going down, if I am walking in bare feet, on like hard concrete it is not very good." P8
		22	"… It ...[reduced physical activity] is the combination of both, part of it would probably be because of my study… but also because I have put on, I guess, quite a lot of weight, and so I am slower and don't feel as comfortable. I can't compete at that same level because I am slower, and a lot of the girls coming through, especially for basketball, are young and fast and… to play at that level, the higher level, it is just hard. Um, it is fine to some extent for short periods of time, but because of my knee, I often feel that I have never been able to get as fit again…"P8
	Maintenance of muscle strength	23	"I pulled it [hamstrings] about three times, and then I just went, I had to sit out of football for about a month or two this season. P5

Theme/ subthemes	Categories	Quote number	Participant quote
		24	"At this stage I feel like I have … got to keep … building or, at least, maintain the leg strength, and I have learnt from earlier in the year I can't neglect the hamstrings especially because if I do, I think it makes [them]… susceptible, so I better get working at that." P5
		25	"I like to walk up stairs wherever I go rather than take the lift, push play, you know that kind of thing…" P6
	Seeking health-professional advice	26	"I think maybe an exercise plan that challenges my head and lets me know that I can do these things. Maybe to know I've got the strength, like physically do a test or something and see that yes, you do have the strength to do these things. It's not going to give way. And then do the activities and realise that it's fine" P9
		27	"I need my specialist to every so often to and have a check up and make sure my knees fine 'cause for me it really helps to reassurance from, for example from the likes of doctor xxx. Because … I have a lot of faith in him and he's a specialist in his area. So if he tells me I'm doing the right thing, then I know I'm doing the right thing." P10
Concern for long-term disabilities			
	Concern for future OA and TKR	28	"I am aware that I might develop osteoarthritis in the knee, and I just take it as it comes." P3
		29	"I'm just worried about when I get old, it's gonna be really sore but immediate future, no issues." P7
		30	"My concern is that people say that if you have ACL surgery you're likely to need a knee replacement in the future." P9

Notes: An em dash (–) was used to indicate a pause; an ellipsis (...) the removal of some text that did not alter the meaning of the quote; and square brackets [ ] to indicate the addition of text to clarify meaning. ACL, anterior cruciate ligament; P, participant

Behavioural manifestations of fear of injury

Fear of re-injury had four main behavioural manifestations. Participants were concerned about the playing surface condition and showed hesitation with specific activities. Five participants expressed concern about wet, frosty or uneven playing surfaces as they felt this increased the chance of slipping and re-injuring their knee (Quote 9). Most participants reported being hesitant, guarded or very conscious of their reconstructed knee during specific sports-related movements, particularly during changing direction while sprinting, turning and pivoting (Quote 10). Three participants with a decrease of ≥ 3 for the Tegner score described continuing to avoid "high-risk" activities, including those considered by them to be for fun or adventurous (Quote 11). It became apparent during the interviews that a fear of re-injury was contributing towards changed behaviour in terms of general physical activity as participants tended to think about their knee safety first. Two participants used braces for their knee during sports to increase confidence, while one participant strapped the knee during weight training in the gym (Quote 12).

Confidence

Participants appeared to be fluctuating between fear of re-injury and confidence, with a spectrum of confidence levels, which was also reflected by the Confidence During Sports Scale (range 32 to 64). The varying confidence spectrum may affect the overall performance of participants in such a way that those with low levels of confidence were unable to perform at maximum effort. Only three participants described themselves as having regained confidence in their injured knee (Quote 13) and could participate in their sport without having to focus on the knee (Quote 14). Some participants had regained trust in their knees, investing much effort to optimise results by strengthening the thigh muscles (Quote 15). One participant described how continuing to train and playing soccer contributed towards steadily improving confidence (Quote 16).

One participant also indicated loss of confidence in the contralateral uninjured knee, (Quote 17) and another participant described her struggle with returning to sport, deciding after a while to quit (Quote 18). These results indicate individual-specific levels of confidence and trust in their reconstructed (and contralateral) knees.

2. Ongoing knee health-related problems and need of health professional advice

Most participants described ongoing knee health-related problems such as pain, stiffness, achiness and pain after running, albeit at different levels. One participant described her concerns for pain, which she experienced after walking to her office (Quote 19). Another participant described avoiding hard surfaces while running as it caused her knee pain and soreness (Quote 20). However, those problems did not always appear to limit their ADL or sports-related knee function (Quote 21). Further, one of the participants attributed other health- and life-related factors to her decline in physical activity levels (Quote 22).

Participants were aware of the need for long-term maintenance of muscle strength, in particular for graft site-related weakness, to maintain confidence and decrease risk of re-injury. Muscle weakness related to the site of the graft was an issue, specifically of the hamstring or quadriceps muscles (quadriceps weakness following a patella tendon graft, and hamstring weakness following a hamstring tendon graft). One participant described having recurrent hamstring strains following his hamstring tendon graft (Quote 23). Maintenance and improvement of muscle strength was perceived to be critical to manage the fear of re-injury and improve confidence (Quote 24). One participant also indicated positive changes in daily behaviour following the surgery specifically to maintain and increase knee-related physical performance, for example taking stairs instead of the lift (Quote 25).

Participants indicated the need for ongoing health professional advice to manage the fear of injury, and to improve muscle strength and movement control (Quote 26). For some participants, contact with their health professional provided reassurance (Quote 27). Six of the participants were concerned about the long-term risk of knee osteoarthritis and pain (Quote 28 and 29), and one mentioned concern about the possibility of the future need for knee replacement (Quote 30).

DISCUSSION

This study explored individuals' experiences of outcomes and consequences of their ACL injury up to 10 years post-reconstruction. Two main themes relating to the research question were "fear of re-injury versus confidence continuum", and "ongoing knee health-related problems". Overall, a range of experiences were described, with different strategies to adapt to the influences of injury on their lives. Positive experiences and outcomes were evident by some participants describing slowly regaining confidence during sports, returning to a pre-injury level of sports or even increasing the level of physical activities post-surgery compared to their pre-injury level. Such participants were making a conscious effort to engage in physical activity (e.g. preferring to walk up the stairs rather than using the lift) and to improve or maintain knee health. They described that they had been more aware of their knee when returning to physical activities and sports, but in a "mindful" and "caring" way, instead of worrying about the future of the knee. In contrast, a more pronounced fear of injury and avoidance of specific activities were described by other participants. Such participants also appeared to have more anxiety and fear related to the future of the knee, and seemed to prefer activities associated with low levels of physical exertion (e.g. driving rather than walking).

Fear of re-injury was present, irrespective of participants' level of physical activity or time since surgery (up to 10 years). The fear was primarily driven by experiences of the pain associated with the ACL injury and surgery. The fear also appeared to be influenced by the commitments the long post-surgical rehabilitation period had required, frequently conflicting with family commitments. Such conflicting commitments (rehabilitation versus family roles) have been described previously (Burland et al., 2018; Ross, Clifford, & Louw, 2017; Scott et al., 2017; Tjong, Murnaghan, Nyhof-Young, & Ogilvie-Harris, 2014). The fear influenced return to sports such that one participant was unable to return to the preinjury sport, changing to alternative sports. Previous studies showed that fear of re-injury was present up to two years post-surgery (Heijne et al., 2008), decreasing at around three years post-surgery (Gignac et al., 2015). In a previous study from our centre, participants (<3 years post-surgery) suggested that maintaining physical activity and confidence in the knee would require vigilance for life to decrease risk of a knee re-injury (Scott et al., 2017). Our current findings also indicate that fear or anxiety of re-injury can persist for a longer period than is usually expected.

Fear of re-injury may be a subconscious protective response, particularly when considering the relatively high incidence of re-injury (Lai, Ardern, Feller, & Webster, 2018). Heightened awareness of the knee during various activities has also been described in a recent study with 12 participants with ACLR (Burland et al., 2018), and by participants who had undergone non-surgical management for ACL rupture (Takata et al., 2017). Fear may thus also be considered a rational response to the ACL injury.

In the second theme emanating from this study, participants discussed their concerns about ongoing knee health-related problems such as pain, soreness and potential risks of future osteoarthritis. These concerns are realistic. For example, higher rates of anterior knee pain and pain during kneeling have been reported previously in literature in those with bone patellar tendon bone grafts (Poehling-Monaghan et al., 2017). Risk of osteoarthritis within 10 years following injury has also been reported previously and is known to affect QOL in the long term (Lohmander, Englund, Dahl, & Roos, 2007). Besides a high risk of re-injury of the injured and the contralateral knee when returning to sports (Paterno, Rauh, Schmitt, Ford, & Hewett, 2012), a sevenfold increase in odds has also been reported for undergoing a total knee replacement after having an ACL injury, compared to those without such injury (Khan et al., 2018). Thus, the participants' concerns, as found in this study, should not be minimised; rather, health professionals should provide opportunity for open discussion to allay potentially excessive concerns while still acknowledging the risks.

Changed priorities in terms of sports, physical activity and behaviour modifications since ACL injury were described by most of the participants; however, such changes were not entirely due to consequences of the knee injury and surgery. In our previous study with individuals less than three years following ACLR, the participants highlighted their family's support towards their rehabilitation and recovery. In contrast, for some participants (two to 10 years post-ACLR) in the current study, their focus was on responsibilities towards family support, mainly their children. Two participants attributed the changed physical activity levels to commitment to university study. Such changed life responsibilities influencing decision-making for return to sports and activity choices have been described for individuals post-ACLR (Burland et al., 2018). Thus, besides fear of re-injury and residual knee impairments, changed life priorities and responsibilities contributed towards decision-making for return to physical activity and sports.

Overall, participants suggested a need for access to long-term health professional advice, either to improve their knee health or for reassurance related to their knee, such as graft site-related weakness, minor pain, soreness in the knee and maintenance of muscle strength. Patients with ACLR should be informed by health professionals about the implications of such risks before surgery, along with providing individual-specific strategies to minimise such risks. Considerations should include the individual's specific sports-, recreation- or work-related goals and life priorities. Overall, this demands considering the physical and psychological responses to the injury (Burland et al., 2018). Discussions may also be needed as to whether changes in physical activities or types of sports are recommended, particularly those sports that may have a lower risk of re-injury of the knee. Thus, physiotherapists should continue monitoring the individual's goals and ability to accept or control fear, anxiety or concerns related to re-injury and long-term knee health.

Health professionals involved in rehabilitation are increasingly aware of their role in identifying emotional or psychological responses to ACL injuries (Ardern, Taylor, Feller, Whitehead, & Webster, 2013; Scott et al., 2017; von Aesch, Perry, & Sole, 2016). Our earlier study with participants who had undergone ACLR less than three years earlier (Scott et al., 2017), described participants' emotional responses as loss of their identity due to the injury, and feeling out of control, depressed and frustrated at various stages of their rehabilitation. While those responses were not described in detail by the current participants up to 10 years following ACLR, the fear of re-injury and the loss of confidence during specific tasks were still evident. This study, thus, highlights the importance of identifying the individuals at-risk of long-term fear of re-injury, loss of confidence and low self-efficacy. Questionnaires such as the Tampa Scale of Kinesiophobia (Kvist et al., 2005) or the ACL Return to Sports Index (Webster & Feller, 2018) may be useful to identify patients at risk of excessive fear-related movement-avoidance behaviours. Principles of motivational interviewing may be helpful to establish the individual's concerns and goals for the future, and develop an individual-specific plan (Coronado et al., 2018).

Self-management strategies may be considered post-ACLR to address fear of re-injury. In a previous study from our centre, physiotherapists reported using a biopsychosocial approach as part of the care they provided for the rehabilitation of patients with ACLR in New Zealand (von Aesch et al., 2016). Collectively, past studies (Burland et al., 2018; Coronado et al., 2018; Sonesson, Kvist, Ardern, Österberg, & Silbernagel, 2017; Ardern et al., 2013) highlight the importance of addressing the psychosocial needs of the patients during rehabilitation following ACL injury. Such strategies may include self-management of lingering symptoms, enhancement of self-efficacy, and encouragement of changes in sporting goals and activities where necessary.

The quantitative data for this research project was collected prior to the interviews, allowing the interviewer to refer to them during the interview and to establish rapport with the participant. The participants' perspectives about the influence of ACLR on their lives appeared to be in agreement with the results of PROM. Credibility of the results of this study was ensured by: (1) development of the interview guide by the research team through review and reflection; (2) the audio recordings and verbatim transcriptions of the interview, open atmosphere during the interviews, the researchers bracketing prior experiences and thoughts, and member checks of the study results with the participants; (3) peer debriefing of the overall results by three of the authors.

Trustworthiness and dependability of data were established by the parallel coding of every alternative interview by a second researcher and by providing additional quotes (Appendix 3) (Thomas, 2006). All interviews were face to face and employed the same method of data collection for all the participants. Confirmability of the study findings was ensured by the open discussion in the research team following the analysis.

The current study included a small sample size, and selection bias may have influenced our data, whereby individuals with residual impairments may be most likely to volunteer to participate in research studies. However, we suggest that the group of participants had a wide range of physical activity levels, ages and family responsibilities. Three participants were health professionals, which may have influenced their perspectives and experiences. Overall, the study provided insights into experiences of individuals typically attending community-based physiotherapy practices in the New Zealand healthcare context. The KOOS scores for participants were within the "acceptable range" (Muller et al., 2016), with the exception of lower KOOS QOL scores (Table 1). The KOOS QOL (median = 53) and symptoms (median = 59) of our participants appeared to be lower compared to other groups (MOON consortium: KOOS QOL = 75, symptoms = 85) (MOON Knee Group, 2018), and a Scandinavian group: KOOS QOL = 69, symptoms = 86 (Granan, Forssblad, Lind, & Engebretsen, 2009)). The experiences and perspectives may not apply to individuals who considered themselves fully recovered post-surgery.

CONCLUSION

Up to 10 years post-surgery, the participants reported long-term fear of injury and behavioural manifestations, with fluctuating levels of confidence, and variable levels of QOL. Maintaining thigh muscle strength and continuing with sports was seen to enhance confidence. Participants raised concern for long-term risk of re-injury and of developing knee osteoarthritis. Health professionals should consider long-term individual-specific maintenance programmes that improve and maintain confidence and self-efficacy, and promote physical activity in those that have undergone ACLR.

KEY POINTS

1. Participants with ACLR had fluctuating levels of confidence during sports while striving to live life as normally as possible.
2. Physiotherapists need to consider long-term fear of injury and behavioural manifestations which may persist long-term following ACLR surgery.
3. A rehabilitation maintenance plan may need to be considered for overall knee health, reassurance and strategies to improve self-confidence and self-efficacy.

DISCLOSURES

No funding was obtained for this study. There are no conflicts of interest which may be perceived to interfere with or bias this study.

PERMISSIONS

This study was approved by the University of Otago Human Ethics Committee Health (ref: H15/034).

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Appendix 1

INTERVIEW GUIDE

Section 1 – General information about the knee

1. Please could you give me some background information about yourself in terms of your occupation and sports background?
2. Please could you describe to me how your knee injury happened, and what happened with the knee since then?
3. How do you feel about your reconstructed knee at the moment?

Section 2 – Level of sports and recreational activities

4. Please tell me more about your level of physical activities for recreational purposes and exercise in the past year.
    a. Prompt: Do you think your reconstructed knee still influences the physical activity levels?
    b. How does your current physical activity or sports level compare to before injury?
    c. If there are still differences in the level of activity before and after the injury, can you explain why you have not returned to the same level?
    d. Prompt: Are there factors that make you feel more hesitant? If so, why do you feel hesitant or fear re-injury during sport?

Section 3 – Health-related quality of life

5. How would you describe your confidence in your knee during sports and recreational activities?
    a. Prompt: How much are you troubled by lack of confidence in your knee?
6. How have you modified your lifestyle in terms of your sports, occupation and recreation to accommodate your reconstructed knee?
7. How do you think pain and other problems related to your knee interfere with your normal work?
8. In hindsight, what other choices may you have made in terms of surgery and rehabilitation?
9. In hindsight, what worked very well for you during surgery and rehabilitation?
    a. What didn't work well for you?
10 Overall, how is your knee health these days? What works well for you in terms of physical activities and sports, and what does not?

Section 4 – Recommendations and advice for ACLR participants

11. What are your concerns for the future in terms of any activities related to your knee?
    a. Prompt: Would you be able to maintain your current exercise level in the future?
    b. Expectations? Challenges?
    c. Knee function? Activity level?
    d. How likely are you to recommend anterior cruciate ligament reconstruction surgery to patients with anterior cruciate ligament injury?
12. What will be your overall advice for people who have had an anterior cruciate ligament reconstruction?

Appendix 2

SURGICAL DETAILS OF PARTICIPANTS

Participant ID	Time between injury and surgery	Type of graft	Surgical details	Additional surgeries
P1	6 months	PT	Primary ACLR, partial lateral meniscectomy	–
P2	8 years	PT	#	–
P3	6 months	Allograft	Reconstruction of right knee, meniscectomy	–
P4	#	HT	Primary ACLR	–
P5	3 months	HT	Arthroscopic ACLR left knee, single bundle with meniscal repair	–
P6	7 months	HT	Primary ACLR	–
P7	2 months	HT	Primary ACLR	Second surgery: Scar tissue removal; third surgery: screw removal
P8	12 months	PT	Primary ACLR with meniscal repair	–
P9	13 months	HT	Primary ACLR	–
P10	5 months	PT	Primary ACLR, meniscectomy	Cyst removal surgery 2 years post primary ACLR

Notes: ACLR, anterior cruciate ligament reconstruction; PT, patellar tendon; HT, hamstring tendon; P, participant; #, missing data; **–**, no subsequent surgeries; All participants had guided rehabilitation

Appendix 3

ADDITIONAL QUOTES FROM PARTICIPANTS

Themes/Subthemes	Categories	Quotes
1. Fear of re-injury versus confidence continuum		
Contributors of fear of injury		
	Fear of experiencing injury pain	"I don't like running, I don't like high impact sports, too scared to go back to skiing because I know several people who had the operation and they re-injured their knee when they had a crash, so I am quite happy the way my knee is there, I don't want to re-injure it. I keep away from contact sports and skiing which is a shame but I am happy the way it is. It's partly the fear that I will re-injure my knee. I am just worried that I will fall on my knee, that's all…you know." P3
	Memory of inciting injury movement	"… It kind of scares you 'cause you know exactly how you've done it and how you could do it again so like just trying to avoid doing a similar movement to what I did at the time I guess." P4
		"I've got no control whatsoever ice skating and I just feel like I would be at too much of a risk of doing something to myself. I was a good enough skier beforehand that I've got the control to do it whereas I've got no control whatsoever ice skating and I just feel like I would be at too much of a risk of doing something to myself and it's that knowing that yes, it is a possibility to do again whether it would be the same knee or the other knee and I don't want to do it again." P1
	Long rehabilitation period and loss of muscle strength	"So it's definitely less weight on the leg with the reconstruction when it comes to anything using my quads." P1
	Impact of the injury and rehabilitation on family responsibilities	"… I don't do stuff with the kids which I would, like I'd probably run around and kick a ball around outside with them." P2
Behavioral manifestations of fear of re-injury		
	Concern about playing conditions	"Yeah [playground conditions] that sort of plays a role, definitely when it is [a] muddy surface and [a] wet surface, which we quite often get in Dunedin …, Yeah you do think about it." 'P5
		Slippery surfaces are one that I am concerned about in the Winter especially, icy stuff …" P9
		"Yeah wet muddy surface, I don't know, I worry about, you know, your foot getting lost and it twisting … yeah so pretty cautious about surface." P5
		"Just the uneven surface makes me feel uncomfortable." P8
		"I wouldn't play football on the hard concrete with the kids." P6
		"I can't do the same weights on that leg, but otherwise it doesn't really stop me from doing anything that I want to." P1
		"Cos that's how I did it when I was turning on my foot. 'Cos I wore like studded shoes so just be like when I have to do quick turns playing sport would be one I'd be a bit more cautious and probably like run around it rather than pivoting." P4
		"It's just… turning. Turning, pivoting on my foot is, on that leg is what scares me. I don't know why it doesn't scare me on my left but, yeah, I'm a bit guarded trying to turn on it because that's how I've done it. Probably just because I do guard my knee a little bit so it's more just a protective sort of means. But I'm still guarded." P4
		I do guard my knee a little bit, so it's more just a protective sort of means. P4

Themes/Subthemes	Categories	Quotes
		"Yeah it's good. It's fine. I don't worry about that too much. The only direction thing I worry about now is with water-skiing. So if I have my left foot forward and my right foot back, I'm fine turning, no I'm fine turning left, problems turning right. And, again, I don't know if it's strength or mind." P9
	Hesitation in sports during certain movements	"Yeah definitely with like lunges, like I'll do walking lunges but I won't do the jumping lunges just because I know at all the time. I spent a lot of time in front of the mirror like watching my knee, you know, making sure that it was in line and 'cause gym doesn't have any mirrors, it's like I don't want to… but lunges, I just, yeah I'm just a bit wary of technique, my techniques not very good so especially if I don't have a mirror where I can correct it." P7
		"I think I can give 100% …, but it is probably not, you know, I don't do it, I have got to think about it a little bit and […] convince myself, no I am fine to go all out here, and I have done that through this last part of the season and have realised that I can handle it, and it withstands all that effort." P5
		"I was pretty reckless then and fearless, and now I think about it a bit more and go, ok I might sort of hold out of that tackle; might not lunge for that ball." P5
		"I was a bit afraid, like for the sort of turning and twisting and kicking stuff because I'm not, soccer's not one of the sports I've played a lot, that I might do something to myself." P1
		"I make sure …. that every turn I take is done well." P9
		"Downhill, putting pressure forward, so if I was jumping down a slope, I'd be quite nervous." P9
		"I think twice if I'm changing my direction very quickly on that, on my right knee." P10
		"I probably am just a little bit more careful […] I never really was into high- risk stuff anyway but […] I've got flatmates that go long boarding and [...] sliding down [the street] on food trays and stuff. I don't know whether I would think differently but my reason was sort of […] I won't do that 'cause my knee's not better so I don't know whether I use it as an excuse to not do something I already don't wanna do, or whether if I felt really strong and more invincible than I do feel, maybe I would, I dunno but it's probably a good thing ..." P7
	Use of brace while playing	"[Strapping] usually if I'm on a mountain that I'm less familiar with." P1
		I don't know if it [brace] was doing anything or if it just gave me confidence in my mind but I seemed to have. It doesn't seem to make a difference to how I actually ski whether I wear it or not but I certainly don't wear it for any other activities anymore." P1
		"Only on the heavier weights [during gym training]. Because on the heavy lifts as you mentioned before, sometimes when fatigue kicks in there's a bit of wobble on your joints." P10
Confidence		
	The fluctuating confidence spectrum	"I think it is that, it is still that lack of confidence, you know." P5
		"It's pretty fine. Like I don't really notice it." P4
		"Probably a lot more disability is in my head, I can recognise it now and I probably could run; it might need just take pain killers." P3
		"I'm like an old lady knees, aye." P2

Themes/Subthemes	Categories	Quotes
		"I said I won't do any less but I won't do any more, so whatever the physio told me to, whatever the rehab people said, I did exactly that and I hit all the marks, so when he said when you're gonna be walking, I was walking and when he said you can start going out in the morning and I still remember that … , it was a great day to be able to run for a minute, and then it was just a sliding scale and then just kept going… and here I am now, …" P6
		I'm just mindful of OK this is probably one of those times where you can either button off or you just take it a wee bit easy; you know, better to be cautious than to go oh bother …" P6
2. Ongoing knee health-related problems and need of health professional advice		
Ongoing knee health-related problems		
	Ongoing problems	"Yeah, yeah, so like sitting, if I, I have to sit on the ground quite a bit, like with the kids or with my work sometimes we do and getting up's sore, like sitting down." P2
		"I can't kneel for example, or just, if I even have to kneel down to get something, it hurts and sometimes if I kneel on something, where the scar is, it's shocking, so yeah, and driving after a while, it gets sore." P2
		"… it's not that I don't actually like doing it, and once I do it the trouble I have is getting down 'cause generally, like I'm usually someone who moves really fast and from position to position but I can't, I have to get myself in one place that I can then reach everything." P2
		"Yes, I have got [on] with daily activities,… If I run it hurts, if I rise upstairs, it clicks a lot then." P3.
		Yeah ... like sitting. If I, I have to sit on the ground quite a bit, like with the kids or with my work sometimes we do, and getting up's sore, like sitting down ... I can't kneel for example, or just, if I even have to kneel down to get something, it hurts and sometimes if I kneel on something where the scar is, it's shocking ..., and driving after a while, it gets sore…" P9
		"… No, not really, mmm, I don't need to do much physically, like the idea of having a standing desk is quite appealing but I wouldn't, I'm concerned that if I was to do that, I couldn't handle it, like standing for too much might be worse" P2
		"Yeah I don't like to. Well I do run on concrete a bit but I really prefer not to, just 'cause like I get a lot more pain, yeah a little bit more pain, not a lot but definitely the softer surfaces, so it's just a little bit tender for like that real hard impact kind of stuff." P7.
		"Because I think that is where I would lock my knee out, and then that is the kind of feeling I don't like, so sprinting is hard and it is quite scary. I guess that is how I perceive going hard out and going full on in sport is being able to sprint and that is the one thing that I haven't been able to do. Changing direction is fine, I am able to change direction, I am able to jump, it is just the sprinting." P8
		"It [pain] would be less than that probably. It would be behind my kneecap. It would be more after sport than during. So like if I've worked pretty particularly hard on that leg... it might get a bit sore but even then I'd say it's less than every month. It'd be like every three or four months and it wouldn't last more than a day." P8

Themes/Subthemes	Categories	Quotes
		"Yeah, but it's this, it's like a flow-on effect aye. I've had the most trouble with my hip, which we think is resultant from the knee … you know how your body compensates … and I've had it looked at by physios and osteos and all that kind of stuff and it's linked to the knee." P9 "… it still gives me pain, and it wasn't sore when I had the operation done." P9
		" I'm just worried about when I get old, it's gonna be really sore, but immediate future, no issues." P7
		"Yea, I expect to have knee replacement in future at some point, may be hip replacement too." P3
		"I do take two Panadol, two Ibuprofen in the morning because if I don't, by the end of day it hurts ... yep every day, and I find if I forget to take those pills in the morning by it hurts bit, if I take it is fine, and you sort 18 hours of the day, 10 hours of the day pain free, and the days if no pills during the day, when I have forgotten them by lunch time." P3
		"Cause I know that when I say problem, its I know for a fact, I know that this is not as good as my left, and I still have this fear in my head that my knee is going into valgus. That's my biggest fear currently. I had to do 200kg squat or whatever, I had to reach failure by eight and I reached it by eight with that weight so, and I thought it was appropriate weight. But because its heavy, I sometimes I feel my knee wobble a little bit and going, I don't know maybe it didn't go out but I thought it was going valgus, which I did notice my left leg was completely stable." P10
		"Sometimes if it, you know, if it pops really hard there's a bit of discomfort but nothing major." P10
		"I can't do the same weights on that leg, but otherwise it doesn't really stop me from doing anything that I want to. So it's definitely less weight on the leg with the reconstruction when it comes to anything using my quads." P1
		"Not enough that I avoid stairs. It's just that, it only happened last year that one day I was going up some stairs and there was a big click and it hurt briefly and then since then I've noticed it make more noise as I go up and down stairs, and it's just, it's not even pain, it's just there's a little bit of discomfort." P1
	Continuing daily struggles	"I can't kneel on a hard surface for very long at all, I usually transfer all the weight over to the other knee straight away. If there's a cushion or something soft, then yes, but not like on the floor." P1
		"My knee like locked at the start so I just had to think about ok, I just need to … change what I'm doing, so ... I can sit on my knee a lot but it doesn't stop me from doing stuff, it's more like I just have to re-think how I'm gonna like do stuff..." P7
		"I don't know maybe I won't like kneel on it for a while, something like that will be about the only thing that affects me in every day." P5
		"… With my kids if, you know 'cause that's another thing, they're a bit bigger now, but until quite recently, I was holding my little one a lot and …, now I have to say to them, just don't climb on me, don't, because it's just too, too hard..." P2
		"Achiness after running, I'm not sure what that's caused to, and achiness when it's really cold in the winter, in the morning. Now and then downstairs I'm conscious of it. I don't jump around and leap from things how I used to. I'm definitely cautious with it." P9

Themes/Subthemes	Categories	Quotes
		"Yeah … like sitting, if I, I have to sit on the ground quite a bit, like with the kids or with my work sometimes we do and getting up's sore, like sitting down, … I can't kneel for example or just, if I even have to kneel down to get something, it hurts and sometimes if I kneel on something, where the scar is, it's shocking … and driving after a while, it gets sore…" P9
		"Yeah,… just continual care … you know like when you get switched around to too many people, they just don't, you can't get that continuity and so having that is like the best thing I reckon, yeah." P7
	Maintenance of muscle strength	"My left leg is considerably stronger than my right which is quite annoying as that is my dominant leg. On a day-to-day basis it's not very noticeable because the strength of the right leg is more than enough for my activities." P10
		"Yes, I did afterwards, but I tried to get, I tried to get, um in recovery, get back to everything too quickly. I had a bit of a strain in [my hamstring] there." P9
		"… yet the main [hamstring] injuries I got were training for the marathon because it was repetitive." P6
		"Yeah I think probably my fear of injury is less when I'm stronger so I just remember. Like. when I was going through my rehab, I was … was supposed to jump onto this box, it was … this high, not even 30cm … and you had to jump and that scared me so much but like as I got stronger, I was like yep, no this is alright, like I can, so like the stronger I get, the less worried I am about injury and then I get weak again, I'm like oh it could go but I know that's not true 'cause it's a ligament and you know like, but it's just the feeling of being strong and yeah and knowing that you've got a lot of support around my knee, just yeah that would make me a lot more confident, yeah." P7.
	Seeking health-professional advice	"… I could approach them and say, hey I need some exercises because I feel like I am getting quite weak, or something like that, but otherwise, no, I don't think. They could probably do a follow-up maybe; I guess that could be quite good." P8
Concern for long-term disabilities		
	Concern for osteoarthritis and knee replacement	"I guess I do have the vague wondering if I'm going to end up with osteoarthritis or not in the knee." P1
		"Ah well maybe if I stop being so mobile, will it stiffen up more, I don't know, I mean not." P6

Notes: ACL, anterior cruciate ligament; OA, osteoarthritis; P, participant; TKR, total knee replacement; An em dash (–) was used to indicate a pause; an ellipsis (…) the removal of some text that did not alter the meaning of the quote; and square brackets [ ] to indicate the addition of text to clarify meaning

Knowledge and perceptions of cardiopulmonary resuscitation amongst New Zealand physiotherapists

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ABSTRACT

Cardiopulmonary resuscitation (CPR) is an essential life-saving skill shown to save lives and improve outcomes of survivors. Physiotherapists are ethically obliged to ensure the safety of patients and to assist in an emergency if required. The purpose of this study was to explore the knowledge and perceptions of CPR amongst New Zealand physiotherapists. Chi-square statistics were used to test associations between the independent variables of age, sex, years of experience, scope and place of work, and postgraduate qualification against CPR training, beliefs and knowledge. A total of 688 physiotherapists completed the online survey. Only half of respondents (56%) had received formal CPR training in the previous year. One-fifth had used CPR in an emergency, with most applications being successful. Physiotherapists working in private practice, public hospitals and community settings were more likely to have CPR certification compared to other settings (p = 0.004). Significant CPR knowledge gaps existed in older (>39 years) physiotherapists (p = <0.001). The current low frequency of CPR training and the likelihood of having to perform CPR in an emergency (1 in 5) is a risk for physiotherapists. Future research should focus on a practical assessment of physiotherapists' CPR skills to assess competency.

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Key Words: Physiotherapy, Cardiopulmonary Resuscitation, Patient Care, Regulation and Compliance, First Aid

INTRODUCTION

Cardiopulmonary resuscitation (CPR) is an essential life-saving skill that aims to maintain a circulation sufficient to preserve life until specialised treatment becomes available (Australian and New Zealand Committee on Resuscitation, 2016). Early, high-quality CPR has been shown to save lives and improve outcomes for survivors (Pearn, 2000; Perkins et al., 2015). Health professionals play a vital role in ensuring all links of the cardiac arrest *Chain of Survival* (Figure 1) are performed in a timely and proficient manner (Nolan, Soar, & Eikeland, 2006).

The Physiotherapy Standards Framework states that physiotherapists are ethically obliged to incorporate safety and risk management strategies within their practice to ensure the safety of patients (Physiotherapy Board of New Zealand,

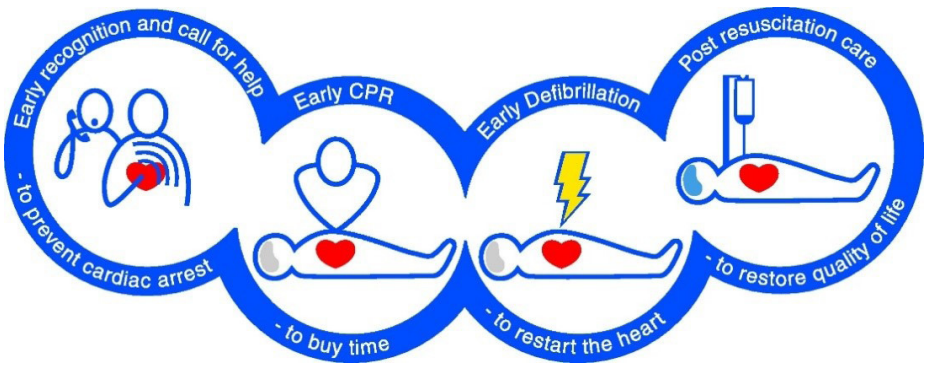

Figure 1: The cardiac arrest Chain of Survival

2018a). The Australian and New Zealand Committee on Resuscitation (ANZCOR) believes that all health professionals have a duty of care and legal obligations under the Crimes Act 1961 (s151) and the Health and Disability Commissioner Act 1994 (Right 4s2 of the Code of Health and Disability Services Consumers' Rights) to attend to a medical emergency (Australian and New Zealand Committee on Resuscitation, 2015). The Sports Physiotherapy Code of Conduct states that in an emergency, New Zealand sports physiotherapists will assist with the care of others if required (Sports Physiotherapy New Zealand, 2013). The code recommends that when providing physiotherapy services at sports events, physiotherapists should hold up-to-date competencies in basic life support including use of an automated external defibrillator (AED), CPR, airway management and first aid.

In New Zealand, five people per day are treated by St John Ambulance Service for out-of-hospital cardiac arrest, and 74% of patients receive bystander CPR (St John New Zealand, 2018). The incidence of cardiac arrest in a large New Zealand hospital was calculated as one event every 2.65 days (Jones, Miles, & Mitchell, 2011). In an emergency, the median ambulance response time is six minutes to urban areas and nine minutes to rural/remote locations where St John is the ambulance provider (St John New Zealand, 2018). Physiotherapists encounter patients with different general health backgrounds in a variety of locations ranging from community settings such as sports fields to private practice and hospital (Physiotherapy Board of New Zealand, 2018b). In these settings, physiotherapists may work with patients in conjunction with medical, nursing or ambulance personnel, or be the only recognised health professional providing care. Therefore, physiotherapists should have adequate CPR knowledge and training to respond appropriately in an emergency situation. Previous research has investigated the attitude, knowledge and practice of CPR amongst doctors (Chew et al., 2011; Ong, Yap, Chan, Sultana, & Anantharaman, 2009), nurses (Saramma, Suja Raj, Dash, & Sarma, 2016), surf lifeguards (Moran & Webber, 2012a; Moran & Webber, 2012b; Webber, Moran, & Cumin, 2019), paramedics (Roshana, Batajoo, Piryani, & Sharma, 2012), radiographers (Edomwonyi & Egbagbe, 2006), dental students (Devishree, Mahesh, & Jain, 2018) and medical students (Tsegaye, Tesfaye, & Alemu, 2015). There is limited research, however, investigating the practice of CPR amongst physiotherapists.

Only two published studies about physiotherapists' attitudes towards CPR were identified in the literature (Kallested, Berglund, Herlitz, Leppert, & Endlund, 2012; Mbada, Hakeem, Adedoyini, Awotidee, & Okonji, 2015). One was a study of 140 hospital-based physiotherapists in South-Western Nigeria that investigated their knowledge, attitude and practice of CPR (Mbada et al., 2015). The authors found that 64% of the respondents had poor to average theoretical knowledge of CPR, and only 45% of the respondents demonstrated a positive attitude towards the importance of CPR.

The second study was of 2,614 healthcare professionals from two Swedish hospitals in which participants completed a questionnaire about physical/mental discomfort and attitudes to CPR before and after training (Källestedt et al., 2012). A total of 228 allied health professionals were included in the sample, including physiotherapists, occupational therapists, psychologists, social workers and biomedical analysts. All groups of healthcare professionals felt more confident in CPR knowledge after training; however, a limitation was that they did not conduct pre- or post-practical CPR skills testing. Unfortunately, as the physiotherapist group was an undefined subset of the 228 allied health professionals in the study, the applicability of the findings was limited.

The purpose of this study was to survey New Zealand physiotherapists to determine their CPR knowledge and qualifications, beliefs about CPR use in an emergency, and perceptions of CPR competency. We hypothesised that there would be CPR knowledge gaps, low levels of perceived CPR competency and negative beliefs about CPR use amongst New Zealand physiotherapists.

METHODS

Study design

This was a cross-sectional study, and the data were collected between September 2018 and December 2018 using an Internet-based anonymous questionnaire. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement informed the study design and reporting (Vandenbroucke et al., 2014). Ethics approval was obtained prior to the commencement of data collection from the Auckland University of Technology Ethics Committee (ref: 18/343).

Research questionnaire

The research instrument used to gather data was a self-administered questionnaire (Appendix 1) consisting of 31 closed questions divided into three sections: 1) demographics (questions 1-7); 2) CPR practice/attitudes (questions 8-20); and 3) CPR knowledge (questions 21-31). The questions utilised several aspects of surveys conducted on Nigerian physiotherapists (Mbada et al., 2015) and New Zealand surf lifeguards (Moran & Webber, 2012a; Moran & Webber, 2012b; Webber, Moran & Cumin, 2019).

The first section sought information on sex, age, years of experience, postgraduate qualification, work setting and primary work type. The second section focussed on CPR background, including questions on last formal CPR training, current CPR certification, previous use of CPR and its outcomes, estimated success rates of CPR in out-of-hospital cardiac arrest, and beliefs about CPR certification for physiotherapists. Six questions using Likert-type scales asked respondents about their perceptions of CPR. A five-point scale ranging from *poor* to *highly effective* was used to assess self-estimated ability to perform CPR. Other questions used a five-point scale ranging from *strongly disagree* to *strongly agree* in relation to confidence to use CPR at work; the sense of duty to perform CPR at work; confidence to use CPR in a public domain; the necessity for self-protection before performing CPR; and mouth-to-mouth ventilation. The final section on the theoretical knowledge of CPR used true/false responses to 11 statements on CPR protocols from the ANZCOR guidelines, for example *stop CPR if the patient has not recovered after 15-20 minutes of resuscitation* (Australian and New Zealand Committee on Resuscitation, 2016).

A pilot test of the draft survey was conducted using a convenience sample of 10 New Zealand registered physiotherapists who were independent of the current research. They were asked to complete the questionnaire, and to provide feedback about the items and their understanding of them. Minor changes were made to the questionnaire following this review to improve the structure and flow of questions.

Participants

Clinicians were eligible to take part if they were registered and practising in New Zealand as a physiotherapist at the time of data collection, and had English language skills to complete the questionnaire.

The final questionnaire was hosted on the Internet-based survey site SurveyMonkey®, which enabled anonymous data collection. Informed consent was gained by the participant having to read information about the questionnaire and acknowledge their understanding before completing the questions. The survey site created a web-based questionnaire link which was posted with an invitation on the New Zealand Physiotherapy Jobs and Physio Stand Up Facebook pages. Questionnaire links were also emailed to the secretaries of the 12 Physiotherapy New Zealand special interest groups (SIGs), including Sports and Exercise Physiotherapy New Zealand, the New Zealand Manipulative Physiotherapists Association, and Hand Therapy New Zealand. Additionally, participants were encouraged to forward the link within their physiotherapy networks.

Data analysis

Data from the completed questionnaires were entered in SPSS Version 25 (Armonk, NY: IBM Corp) for statistical analysis. Descriptive statistics described or characterised all numeric variables using frequency and percentages. The characteristics of the physiotherapist population were reported. Continuous variables, including CPR training and the perception of its value, beliefs about CPR use, and knowledge of current ANZCOR CPR protocols were reported using numbers and percentages.

Chi-square statistics were used to test associations between the independent sociodemographic variables of age, sex, years of physiotherapy experience, scope and place of work, and postgraduate qualification against CPR training, beliefs and knowledge. A Bonferroni correction to reduce the chance of type I errors was not undertaken because this increases the likelihood of type II errors (Perneger, 1998).

RESULTS

Sample

At the start of the study, there were 5,064 New Zealand registered physiotherapists who held an annual practising certificate. During the three months when the online survey was open, 700 respondents completed the questionnaire. Twelve individuals who enrolled in the survey were excluded from the study because these respondents did not answer any questions relating to CPR, leaving a sample of 688 registered physiotherapists.

Physiotherapist demographics

The sample included more female than male physiotherapists (female 81%), while half (50%) were aged less than 40 years and had less than 15 years' experience (Table 1). More than half (54%) worked in private practice, and the most frequently reported scope of work was musculoskeletal practice (49%). These demographics are consistent with national data obtained from the regulatory body, which reported that the New Zealand physiotherapy profession is mainly female (76%), aged less than 45 years (60%) and had fewer than 20 years of experience (62%) (Physiotherapy Board of New Zealand, 2018b). The sample is also consistent with the professional sources which report that 68% of physiotherapists worked in private practice and musculoskeletal was the most common type of work (Physiotherapy New Zealand, 2018).

Table 1: Characteristics of sample population (n = 688)

	Number	%
Sex		
Female	554	80.5
Male	134	19.5
Age (years)		
20-29	132	19.2
30-39	208	30.3
40-49	165	24.1
50-59	138	20.1
Over 60	43	6.3
Experience (years)		
0-15	341	49.6
16 or more	347	50.4
Postgraduate qualification		
Yes	368	53.5
No	320	46.5
Main work setting		
Private practice	374	54.4
Hospital/outpatient clinic	150	21.8
Community	73	10.6
Other (sports team, university)	89	13.0
Main scope of work		
Musculoskeletal	337	49.2
Aged care	58	8.4
Neurology	56	8.2
Paediatrics	49	7.2
Cardiorespiratory	44	6.4
Other (e.g. women's health, hand therapy, mental health)	141	20.6

CPR training and perceptions of its value

Many respondents (56%) reported having received formal CPR training in the previous year; most (81%) held current CPR certification; and almost one-third (31%) had a qualification above basic life support (BLS) (Table 2). One-fifth of respondents (19%) had used CPR in an emergency, with the majority of applications being successful (56%). Most physiotherapists (61%) suggested a success rate of ≤ 25% for CPR in out-of-hospital cardiac arrest. When asked about the role of CPR training, most (76%) favoured mandatory inclusion of CPR training as part of their annual practicing certificate or in their continuing professional development portfolio.

Significant differences were found in current CPR certification by work setting, with those in private practice (83%), public hospitals (85%) and community settings (81%) more likely than physiotherapists in university (70%), sports teams (64%) and other settings (63%) (χ^2 (5) = 17.068, p = 0.004) to have current certification. No significant differences were evident when currency of CPR training was analysed by age, sex, years of experience, scope of work, work setting and postgraduate qualification.

When asked whether they had used CPR in an emergency, significant differences were found when analysed by age, sex and years of experience. Significantly, more males than females (males 28%, females 17%) had used CPR in an emergency (χ^2 (1) = 8.134, p = 0.004). Significantly, more older respondents had used CPR in an emergency (>39 years 24%, 20-39 years 14%) (χ^2 (1) = 11.288, p = 0.001). Those with 16 years or more of physiotherapy experience (≥ 16 years of experience 22%, 0-15 years 16%) also had significantly greater experience of CPR in an emergency (χ^2 (1) = 4.961, p = 0.026).

There were significant differences in response to the question about the status that should be given to CPR training in the physiotherapy profession. More females (26%) than males (21%) opted for voluntary status (status quo) of CPR training (χ^2 (3) = 12.748, p = 0.005), more older than younger physiotherapists opted for voluntary status (> 39 years 28%, 20-39 years 16%) (χ^2 (3) = 24.148, p = <0.001), and more

Table 2: Cardiopulmonary resuscitation training and perceptions of its value

		Number	%
Last formal CPR training	< 3 months	120	17.5
	3-12 months	265	38.6
	1-2 years	214	31.2
	> 2 years	87	12.7
Current CPR certificate	Yes	556	81.0
	No	130	19.0
Qualification above BLS	Yes	210	30.7
	No	475	69.3
Used CPR in emergency before	Yes	130	19.0
	No	556	81.0
If yes, was it successful?	Yes	73	56.2
	No	54	41.5
	Don't know	3	2.3
Estimates of success rate of CPR in out-of-hospital cardiac arrest	0-25%	420	61.3
	26-50%	183	26.7
	51-75%	70	10.2
	76-100%	12	1.8
CPR training for physiotherapists	Mandatory for APC	193	28.1
	Mandatory for CPD portfolio	331	48.3
	Voluntary (status quo)	151	22.0
	Don't know	11	1.6

Notes: APC, annual practicing certificate; BLS, basic life support; CPD, continuing professional development; CPR, cardiopulmonary resuscitation

physiotherapists with 16 years or more of experience opted for continuation of voluntary status (≥ 16 years 29%, 0-15 years 15%) (χ^2 (3) = 11.024, p = 0.012).

Beliefs about CPR use

Of those surveyed, 92% said their ability to perform CPR was at least *satisfactory*, with one half (53%) of all participants rating their ability as *very effective* or *effective* (Table 3). No significant differences were found when this self-estimated ability was analysed by work setting, main scope of work and postgraduate qualification.

Significant differences were evident when the self-estimation of CPR ability was analysed by age and work experience. Older respondents (> 39 years) were more likely than younger respondents to estimate effective CPR capacity (> 39 years of age 60%, 20-39 years 47%) (χ^2 (4) = 13.453, p = 0.009). Similarly, those with 16 years or more of experience were more likely to estimate effective CPR ability (≥ 16 years of experience 60%, 0-15 years 46%) (χ^2 (4) = 17.129, p = 0.002).

No significant differences were found when questions relating to the use of CPR in work and public settings were analysed by age, years of experience, work location and type. Some differences were evident when the data related to the use of CPR was analysed by sex. Significantly, more females than males (females 48%, males 35%) indicated that they would prefer not to do mouth-to-mouth ventilation during CPR (χ^2 (4) = 19.102, p = 0.001).

Knowledge of CPR principles and practice

Table 4 shows in descending order the number (and percentage) of participants who correctly answered each true/false statement from the ANZCOR CPR protocols. Most respondents (94%) reported the correct ratio of compressions to ventilations, the correct depth of cardiac compressions (84%) and the correct length of time to stop CPR (after 15 to 20 minutes of resuscitation) if the patient had not recovered (88%). Approximately two-thirds of participants responded correctly on statements relating to the first step at a medical emergency (70%); length of breathing check in an unresponsive patient (67%); automated external defibrillators (AED) not advising a shock for all victims of cardiac arrest (67%); and seeking help first when alone with a patient needing CPR (65%). Less than half correctly responded to statements on reassessing the patient every two minutes (37%) and the compression rate during CPR (22%), which should be between 100 to

Table 3: Beliefs about cardiopulmonary resuscitation use

		Number	%
How would you rate your CPR ability	Very effective	95	14.0
	Effective	266	39.2
	Satisfactory	265	39.1
	Fair/poor	52	7.4
I would be unsure how to react at work if CPR was needed	Strongly disagree/disagree	569	83.2
	Neutral	77	11.3
	Strongly agree/agree	38	5.5
At work it is my duty to intervene and perform CPR in an emergency	Strongly disagree/disagree	19	2.8
	Neutral	55	8.0
	Strongly agree/agree	610	89.2
I would be unsure how to react in public if CPR was needed	Strongly disagree/disagree	559	81.7
	Neutral	76	11.1
	Strongly agree/agree	49	7.2
I would need gloves, a face mask and other protective items to perform CPR	Strongly disagree/disagree	422	61.8
	Neutral	143	20.9
	Strongly agree/agree	118	17.2
I would prefer not to do mouth-to-mouth during CPR	Strongly disagree/disagree	187	27.7
	Neutral	183	27.1
	Strongly agree/agree	306	45.3

Note: CPR, cardiopulmonary resuscitation

120 compressions per minute (Australian and New Zealand Committee on Resuscitation, 2016).

No significant differences were evident in knowledge of protocols when data were analysed by sex, with the exception of the statement relating to time taken to assess breathing, where more females than males (69% v 59%) gave the correct response (χ^2 (1) = 4.592, p = 0.032). Some differences were evident in knowledge when data were analysed by age, with older respondents (> 39 years) more likely to be incorrect than younger respondents with regard to the AED advising a shock for all victims of cardiac arrest (> 39 years 41%, 20-39 years 26%) (χ^2 (1) = 18.409, p = <0.001), AED use on infants and children (> 39 years 43%, 20-39 years 33%) (χ^2 (1) = 18.409, p = <0.001), and the correct compression to ventilation ratio (> 39 years 10%, 20-39 years 2%) (χ^2 (1) = 196.531, p = <0.001). More physiotherapists engaged in musculoskeletal work were incorrect in responses relating to seeking help if alone (musculoskeletal 39%, other 31%) (χ^2 (1) = 4.865, p = 0.027), and length of time taken to check breathing in an unresponsive patient (musculoskeletal 40%, other 26%) (χ^2 (1) = 13.220, p = <0.001).

DISCUSSION

The current study was the first to investigate the knowledge and perceptions of CPR amongst New Zealand registered physiotherapists, and the first outside a hospital only setting. The methodology of the New Zealand study differed from the previous physiotherapy studies by sampling anonymously using an online survey format which allowed a larger sample, and physiotherapists across different work scopes and settings to participate. Physiotherapists, in general, had sound theoretical knowledge of CPR, with the percentage of correct answers for seven of the total CPR statements ranging from 62% to 94%. Some differences were evident in CPR knowledge when the statements were analysed by age, with physiotherapists older than 39 years more likely to be incorrect than younger physiotherapists with regard to the AED advising a shock for all victims of cardiac arrest, AED use on infants and children, and the correct compression to ventilation ratio. The majority of physiotherapists (92%) believed that their CPR ability was satisfactory or better, with respondents over 39 years and those with 16 years or more of experience more likely to estimate effective CPR ability.

In contrast to the current findings, the Nigerian study had a high percentage of poor knowledge and a negative attitude towards CPR (Mbada et al., 2015). This could be explained by the fact there is no requirement for CPR accreditation for Nigerian physiotherapists and very few physiotherapists in the study had actually received any previous CPR training. It would appear that CPR practice in Nigeria still falls under the domain of a medical

Table 4: Knowledge of current 'Australian and New Zealand Committee on Resuscitation' protocols

Statement	True/false	Correct		Incorrect	
		Number	%	Number	%
The correct ratio of compressions to ventilations on an adult patient is 30:2	True	613	94.0	39	6.0
Stop CPR if patient not recovered after 15-20 min of resuscitation	False	576	88.2	77	11.8
The recommended compression depth for adults during CPR is > 5 cm	True	549	84.2	103	15.8
The first step at a medical emergency is to check if the victim is responsive	False	458	70.1	195	29.9
Take no longer than 10 seconds to check for breathing in an unresponsive patient	True	439	67.2	214	32.8
The AED will advise a shock for all victims of cardiac arrest	False	433	66.5	218	33.5
If alone with adult patient go for help before starting CPR	True	422	64.8	229	35.2
The AED can be used on infants and children under 8 years of age	True	405	62.0	248	38.0
Each rescue breath (during CPR) should be given over 1 second	True	329	50.2	326	49.8
Reassess the victim after every 2 minutes of CPR to see if they have recovered	False	244	37.4	409	62.6
The compression rate during CPR is 100 per minute	False	144	22.1	509	77.9

Notes: AED, automated external defibrillator; CPR, cardiopulmonary resuscitation

physician, compared to Western countries that emphasise CPR training to members of the public, including school-age students.

One-fifth of New Zealand physiotherapists had used CPR in an emergency, with the majority of applications being successful. The result is similar to the study of Nigerian physiotherapists, with 27% having performed CPR (Mbada et al., 2015). Surprisingly, physiotherapists in the Nigerian and current study reported higher use of CPR compared to a CPR rate of less than 10% for New Zealand surf lifeguards (Moran & Webber, 2012a; Moran & Webber, 2012b; Webber, Moran & Cumin, 2019). Given that one in five New Zealand physiotherapists reported they had performed CPR during their career and that they may be the only recognised health professional available in an emergency before an ambulance arrives, CPR training should be current and frequent. A recent study showed that nurses' chest compression psychomotor skill quality is only retained for six months after training (Niles et al., 2017).

Despite the ethical and code of conduct recommendations, current CPR certification is not mandatory for New Zealand physiotherapists. In the current study, significant differences were found by work setting, with physiotherapists in private practice, public hospitals and community settings more likely to have current CPR certification than those in university, sports teams and other settings. It is concerning that physiotherapists in sports team settings are less likely to have CPR certification than other non-sports settings, despite the clear recommendations from the Sports Physiotherapy Code of Conduct (Sports Physiotherapy New Zealand, 2013).

Many respondents (76%) supported CPR certification as a mandatory part of their continuing professional development or annual practising certificate. In Nigeria, 92% of physiotherapists believed CPR certification should be mandatory at graduation, and 69% of physiotherapists believed the best method to increase awareness of the importance of CPR was to encourage training as part of the continuing professional development requirements (Mbada et al., 2015). Although CPR certification is not mandatory, 81% of respondents in the New Zealand study had CPR certification and 31% had additional qualifications above basic life support.

If CPR certification became mandatory for New Zealand physiotherapists, the potential benefits for patients would need to be weighed up against the cost, time off work for training, the system required for regulatory monitoring and the frequency of recertification. The Midwifery Council requires annual CPR certification for midwives (Midwifery Council of New Zealand, 2017), while the New Zealand Dental Council has biennial mandatory CPR certification requirements for oral health professionals (Dental Council of New Zealand, 2016). The Medical Council of New Zealand requires CPR certification for the initial registration of doctors only (Medical Council of New Zealand, 2019).

Our study had four identified limitations. First, because of the cross-sectional nature of the study, only associations rather than causality can be determined. Second, the use of self-reported data on CPR may have introduced bias that may not reflect actual behaviour (Mickalide, 1997; Nelson, 1996; Robertson 1992). Third, the survey was conducted online, eliciting an undefined sample and an unknown response rate, and preventing the ability to follow up with non-responders. Only 14% of the total practising physiotherapists responded to the survey. Whilst the demographic characteristics of the study appeared generalisable, it is unknown if the questionnaire responses are representative of the New Zealand physiotherapy population. To address this shortcoming, it is recommended further studies should use a predefined population with a representative sample that is capable of generating a high response rate. Fourth, knowledge of CPR protocols in written responses was used as a proxy indicator of CPR competence; no practical assessment of competency was undertaken. To better inform New Zealand physiotherapy practice, future research should examine the actual CPR competency of physiotherapists with a practical assessment on a manikin rather than a theoretical assessment.

CONCLUSION

This study provides the first insight into New Zealand physiotherapists' CPR knowledge and perceptions. The current sports physiotherapy practice guidelines recommend up-to-date basic life support competencies. However, in the present study, physiotherapists who worked in a sports team setting were less likely to have current CPR certification. These findings suggest that an educational campaign may be required by key professional and regulatory bodies on the ethical, legal and safety obligations of physiotherapists in an emergency.

Older and more experienced physiotherapists were more likely to rate their CPR ability as either *effective* or *very effective*. However, significant differences in CPR and AED knowledge were present in older physiotherapists, indicating the need for improved CPR knowledge and more frequent CPR training within the profession. The current low frequency of CPR training and the likelihood of having to perform CPR in an emergency (1 in 5) is a risk for physiotherapists in their care of patients.

KEY POINTS

1. Only 56% of New Zealand physiotherapists had undergone CPR training in the last year, and one in five had used CPR in an emergency.
2. Significant CPR and AED knowledge gaps existed in older (> 39 years) New Zealand physiotherapists.
3. Physiotherapists working in the sports setting were less likely to have CPR certification compared to those in non-sports settings, despite the clear recommendations from the Sports Physiotherapy Code of Conduct.
4. 76% of New Zealand physiotherapist respondents believe CPR certification should be mandatory via their annual practicing certificate or three yearly continuing professional development portfolio.

DISCLOSURES

No funding was obtained for this study. There are no conflicts of interest which may be perceived to interfere with or bias this study.

PERMISSIONS

This study was approved by the Auckland University of Technology Ethics Committee (ref: 18/343). Written permission for reproduction of Figure 1 in the New Zealand Journal of Physiotherapy was obtained from Laerdal Medical.

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Appendix 1

Self-administered questionnaire: What is the knowledge, attitude and practice of cardiopulmonary resuscitation among New Zealand physiotherapists?

Introduction

Hello and welcome to this survey exploring the knowledge, attitude and practice of cardiopulmonary resuscitation (CPR) among New Zealand physiotherapists. The survey contains questions about your current knowledge of CPR and your attitude about how and when you would use CPR.

The survey will take approximately 5-10 minutes to complete. Please make sure you answer all the questions.

There are three sections: demographic, CPR practice/attitude and CPR knowledge.

Please read each question carefully and only click the appropriate box.

Demographic section

1. Sex?	☐ Male ☐ Female
2. Age?	☐ 20-29 ☐ 30-39 ☐ 40-49 ☐ 50-59 ☐ 60+
3. Years of physiotherapy experience?	☐ 0-5 ☐ 6-10 ☐ 11-15 ☐ 16+
4. Postgraduate qualification?	☐ Yes ☐ No
5. Current employment status?	☐ Employed ☐ Self-employed ☐ Employer ☐ Other
6. What is your main work setting?	☐ Private practice ☐ Public hospital/clinic ☐ Community ☐ University ☐ Sports team/institute ☐ Other
7. What is your main scope of work?	☐ Musculoskeletal ☐ Sports ☐ Women's health ☐ Aged care ☐ Hand therapy ☐ Neurology ☐ Cardiorespiratory and/or cardiovascular ☐ Occupational health ☐ Paediatrics ☐ Mental health ☐ Academic ☐ Other

CPR practice/attitude section

1. When was your last formal CPR resuscitation training?	☐ <3 months ☐ 6-12 months ☐ 1-2 years ☐ >2 years
2. Do you have a current CPR certificate?	☐ Yes ☐ No
3. Do you have a current first aid qualification above basic life support/CPR level?	☐ Yes ☐ No
4. Have you ever used CPR in an emergency?	☐ Yes ☐ No
5. If you have ever used CPR, did the patient survive?	☐ Yes ☐ No ☐ Don't know ☐ Not applicable
6. What do you believe the success rate of CPR is in out-of-hospital cardiac arrest?	☐ 0-25% ☐ 26-50% ☐ 51-75% ☐ 76-100%
7. Do you think CPR certification for New Zealand physiotherapists should be:	☐ Mandatory as part of your APC ☐ Mandatory as part of your CPD portfolio ☐ Voluntary (status quo)
8. How would you rate your current CPR ability?	☐ Poor ☐ Fair ☐ Satisfactory ☐ Effective ☐ Highly effective ☐ Don't know
9. I would feel unsure of how to react at work, if I was presented with an emergency situation requiring CPR:	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
10. At work, I would consider it my duty to intervene in an emergency situation and perform CPR:	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
11. I would feel unsure of how to react if I was presented with an emergency situation in public (outside of work) requiring CPR:	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
12. I would need gloves, face mask and other items relevant to self-protection to perform CPR:	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree
13. I would prefer not to perform mouth-to-mouth ventilation during CPR:	☐ Strongly disagree ☐ Disagree ☐ Neutral ☐ Agree ☐ Strongly agree

CPR knowledge section

1. The compression rate during CPR is 100 per minute:	☐ True ☐ False
2. Each rescue breath (during CPR) should be given over 1 second:	☐ True ☐ False
3. If alone with an adult patient, go for help before starting CPR:	☐ True ☐ False
4. Stop CPR if the patient has not recovered after 15-20 minutes of resuscitation:	☐ True ☐ False
5. The automated external defibrillator will advise a shock for all victims of cardiac arrest:	☐ True ☐ False
6. Take no longer than 10 seconds to check for breathing when assessing an unresponsive patient:	☐ True ☐ False
7. Reassess the victim after every two minutes of CPR to see if they have recovered:	☐ True ☐ False
8. The automated external defibrillator can be used on infants and children under 8 years of age:	☐ True ☐ False
9. The first step at the scene of a medical emergency is to check if the victim is responsive:	☐ True ☐ False
10. The correct ratio of compression to ventilations on an adult patient during CPR is 30:2:	☐ True ☐ False
11. The recommended compression depth for adults during cardiopulmonary resuscitation is >5cm:	☐ True ☐ False

Notes: APC, annual practicing certificate; CPD, continuing professional development; CPR, cardiopulmonary resuscitation

Environmental factors influencing leisure participation of children with movement impairments in Aotearoa/New Zealand: A mixed method study

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ABSTRACT

We conducted a mixed method study to explore the environmental factors affecting leisure participation of children with movement impairments aged six to 12 years in Aotearoa/New Zealand. Families of children with movement impairments completed the "Craig's Hospital Inventory of Environmental Factors for Children-Parent Version" questionnaire and in-depth individual interviews of children, along with their parents or guardian, were undertaken. Fifty-nine families participated in the survey, with 22 of these also participating in the interview. We used descriptive statistics for quantitative data and the general inductive approach to analyse the qualitative data. The findings of each were then integrated. We found a mismatch between a child's ability and existing leisure activity opportunities/choices at various settings. Restrictions to participation included non-inclusive school-based physical education programmes, limited tailoring of community-based programmes and inaccessible neighbourhood environments. To maximise the leisure activity opportunities in Aotearoa/New Zealand, concerted efforts are required by health professionals, including physiotherapists, schools, disability organisations and policymakers, to create and offer adaptive and/or inclusive leisure activity programmes to children of all ages and abilities at their school, community and local neighbourhood.

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Key Words: Children, Environmental Barriers, Leisure Participation, Movement Impairments

INTRODUCTION

According to the World Health Organisation's framework of functioning, disability and health for children (World Health Organisation, 2007), restrictions to children's participation can occur during the interaction of a child with his or her surrounding environment. This could include all or any aspects of the physical environment and the child's functional ability within that environment, the family and community environment, the societal environment and services, and systems and policies that impact on them. In particular, leisure participation levels of children with impairments are reportedly influenced by environmental factors relating to a country or region-specific context, such as government policies, accessibility of public places, availability of after-school recreation centres and provision of support services (for example, information about available assistive technology) (Anaby et al., 2013; Hammal, Jarvis, & Colver, 2004; King et al., 2013; Michelsen et al., 2009; Shikako-Thomas, Majnemer, Law, & Lach, 2008; Ullenhag et al., 2012; Welsh, Jarvis, Hammal, & Colver, 2006). Specifically, King et al. (2013) have suggested that country of residence is the most important predictor influencing involvement in recreational and social activities of children with movement impairments.

Given the importance that country or region-specific environmental issues have in leisure participation, investigating the environmental factors that influence leisure participation in children with movement impairments is essential for developing specific intervention plans and modifications relevant to issues in a particular region. As well as investigating the contextual influences, it is also important to consider individual family

requirements within their environment and to identify the support required by a particular child and family. For example, a family with high socio-economic status may not report transportation as a barrier as they are likely to have their own mode of transportation (Bedell et al., 2013; Kramer, Olsen, Mermelstein, Balcells, & Liljenquist, 2012; Shimmell, Gorter, Jackson, Wright, & Galuppi, 2013).

Therapists could play an important role in improving children's participation in the community, including leisure participation, by identifying barriers in a child's individual context and identifying or providing solutions to address such barriers (Almqvist, Uys, & Sandberg, 2007; Majnemer, 2009). To date, no research has examined environmental factors that influence involvement in leisure activities by children with movement impairments in the Aotearoa/New Zealand context. Hence, the aim of this paper was to identify and explore common environmental factors that influence leisure participation by children with movement impairments in Aotearoa/New Zealand, and to recommend possible ways to improve their involvement in leisure activities.

METHODS

We used a convergent parallel design (Creswell & Plano Clark, 2011), where both a survey and an interview were conducted to complement each other and yield a deeper understanding of the leisure participation of children with movement impairments. The survey was used to identify common environmental factors that influence leisure participation, and the semi-structured qualitative interview framework was used to describe in-depth how environmental barriers can work to restrict the leisure participation. Ethical approval for both the survey and the interview were obtained from the University of Otago Human (Health) Ethics committee (ref: 12/314 and 13/132).

We recruited, nationwide, children aged six to 12 years with movement impairments who had the ability to understand simple questions. Specifically, we recruited children through 11 national and local disability organisations; the Child Development Centres of two large District Health Boards (Auckland and Canterbury); 35 therapists working for the Ministry of Education in schools; and the Movement Development Clinic in the School of Physical Education of a tertiary education institution. The study information was sent to families by direct contact (for example, the researcher, therapist or personnel at the agency contacted families in person or by telephone) or by indirect contact, such as posting flyers, emails, and advertising in websites and magazines.

We conducted a large survey to investigate leisure participation patterns and factors influencing leisure participation of children with movement impairments in Aotearoa/New Zealand (Kanagasabai, Mulligan, Hale & Mirfin-Veitch, 2017). To investigate the environmental factors, we used the Craig's Hospital Inventory of Environmental Factors (CHIEF) for Children-Parent Version. This questionnaire is easy to complete, has good test-retest reliability (intraclass correlation coefficient, 0.73) and has an acceptable measure of parental perceived environmental barriers for children with impairments aged two to 12 years (McCauley et al., 2012). It is a 10-item questionnaire that measures barriers to participation within the physical (two items), attitudinal (two items), service (three items), productivity (one item) and policy (two items) environments in the school and community contexts. It measures two dimensions: frequency (how often a particular barrier is a problem for the child); and magnitude (whether the barrier is a big or small problem). Frequency questions are scored from 0 (never a problem) to 4 (daily problem); magnitude questions are scored as either 1 (little problem) or 2 (big problem). The questionnaires were mailed to families who expressed interest in the study, and the completed questionnaires were returned via a self-addressed envelope.

Children who participated in the survey were purposively sampled for the interview to include various environmental settings across Aotearoa/New Zealand (the greater Auckland area, Wellington, Canterbury, Dunedin and Invercargill) and different levels of impairments. We used a child-centred method of data collection that included strategies such as semi-structured interviews; drawing; sharing photographs: playing quiet games; and demonstrating activities, equipment and leisure environments. The data collection strategies are described in detail in a previous paper (Kanagasabai, Mirfin-Veitch, Hale & Mulligan, 2018).

Data analysis

Data from the CHIEF for Children-Parent Version questionnaire were analysed using descriptive statistics for demographic data, and by calculating the frequency and magnitude of perceived environmental barriers.

The general inductive approach (Thomas, 2006) was used for analysis of the qualitative data. This approach is essentially evaluative and uses a constant comparative framework guided by the research objectives. Based on this approach to analysis, the raw texts were read multiple times to form initial categories relevant to the main aims of the study (Thomas, 2006). Subsequently, the initial categories were merged to identify the final categories, and then to build a model illustrating the relationships between the final categories. Two researchers (PS and HD) independently coded the qualitative data and identified the final categories to create the model. Then, three authors (HM, LH and BMV) commented on the final categories and the model. After numerous discussions, the model and its categories were derived by consensus.

Integration of qualitative and quantitative data is one of the key methodological concerns in mixed method studies (Creswell & Plano Clark, 2011). For this study, the findings from both the interviews and survey were integrated by simultaneously comparing and relating the data to each other (Creswell & Plano Clark, 2011). To collate the findings, the qualitative data exploring the impact of environmental barriers on leisure participation were complemented by the quantitative data of the frequency of common environmental barriers to leisure participation.

RESULTS

Of the 79 families who expressed an interest in participating in the study, 59 completed the survey. Of these, 22 families participated in an interview. Demographic details of the survey

and interview participants are presented in Table 1. The children who participated in the study had a variety of diagnoses, including cerebral palsy, muscular dystrophy, dyspraxia, spina bifida and arthrogryposis as well as other conditions resulting in impaired movement (for example, congenital syndromes, amputation). The majority of children had problems with mobility, along with problems with dexterity and agility. Most families lived in densely populated city and town regions, rather than in sparsely populated rural areas.

The integrated findings of the survey and interviews are presented below. Table 2 shows the frequency and magnitude of environmental barriers to participation of children with movement impairments, as perceived by their parents or guardian. Table 3 shows the main categories from the qualitative inductive analysis. A conceptual diagram of findings derived from both phases is presented in Figure 1.

Children in our study perceived that nothing stopped them from having fun, and they carefully selected their leisure activities and leisure environment and/or followed various adaptations to participate in an activity. However, children and their families reported various barriers in their environment that limited their opportunities for leisure activities. The overarching integrated theme was "*Mismatch between individual abilities and leisure activities choices*".

I personally don't feel there is a whole lot out there for our kids so I work at trying to make things happen. A lot of what is out there is not well publicised. With a huge population of Auckland, I am often surprised how little other kids get involved. I am sure there are a number of different reasons. I have always assumed [child's name] can participate in what interests him, and work out a way to make it possible. Still wish there would be more wheelchair sports events. (Parent #9)

This theme manifested in various environments, such as in the community, at school and within neighbourhoods, and is presented in more detail under subheadings below.

Table 1: Demographic details of survey and interview participants

Survey participants (n = 59)		Interview participants (n = 22)	
Age (years), mean (SD)	8.9 (1.6)	Age (years), mean (SD)	8.7 (2.0)
Sex, n male (%)	40 (67.8)	Sex, n male (%)	15 (68.2)
Diagnosis, n (%)		Diagnosis, n (%)	
Cerebral Palsy	26 (44)	Cerebral Palsy	11 (50)
Amputation	7 (11.8)	Amputation	4 (18.2)
Dyspraxia	7 (11.8)	Arthrogryposis	2 (9.1)
Muscular dystrophy	4 (6.7)	Spina bifida	1 (4.5)
Spina bifida	2 (3.4)	Ataxia telangiectasia	1 (4.5)
Arthrogryposis	2 (3.4)	Hereditary chorea	1 (4.5)
Other	11 (18.6)	Hypermobile joints	1 (4.5)
		Hemiparesis	1 (4.5)
Problems with*, n (%)		Problems with*, n (%)	
Mobility	48 (81.3)	Mobility	18 (81.8)
Dexterity	29 (49.1)	Dexterity	9 (40.9)
Agility	32 (54.2)	Agility	8 (36.4)
Associated problems*, n (%)		Associated problems*, n (%)	
Hearing	4 (6.7)	Hearing	1 (4.5)
Vision	14 (23.7)	Vision	3 (13.6)
Speech	14 (23.7)	Speech	4 (18.2)
Cognition	10 (16.9)	Cognition	3 (13.6)
Incontinence	8 (13.5)	Incontinence	1 (4.5)
Other (seizures, apnoea)	4 (6.7)	Coordination	1 (4.5)
Community type, n (%)		Community type, n (%)	
City	29 (49.1)	City	12 (54.5)
Town	25 (42.4)	Town	8 (36.4)
Rural area	5 (8.5)	Rural area	1 (4.5)

Notes: n, number; SD, standard deviation; *More than one option possible

Table 2: Families' perceived environmental barriers, frequency and magnitude (n = 59)

Environment context (10 items)	Number affected (%)	Frequency				Magnitude	
		Daily	Weekly	Monthly	< Monthly	Little problem	Big problem
Natural environment: temperature, terrain	47 (79.7)	19 (32.2)	10 (16.9)	6 (10.2)	12 (20.3)	26 (44.1)	21 (35.6)
Child's surroundings: noise, crowd	43 (72.9)	5 (8.5)	12 (20.3)	5 (8.5)	21 (35.6)	35 (59.3)	8 (13.6)
Information format	30 (50.8)	9 (15.2)	3 (5.1)	8 (13.6)	10 (16.9)	22 (37.3)	8 (13.6)
Healthcare services	34 (57.6)	2 (3.4)	2 (3.4)	11 (18.6)	19 (32.2)	19 (32.2)	15 (25.4)
Assistance at school	42 (71.2)	17 (28.8)	7 (11.9)	3 (5.1)	15 (25.4)	27 (45.8)	15 (25.4)
Others' attitudes	45 (76.3)	5 (8.5)	9 (15.2)	10 (16.9)	21 (35.6)	32 (54.2)	13 (22.03)
Support and encouragement	35 (59.3)	4 (6.8)	10 (16.9)	7 (11.9)	14 (23.7)	21 (35.6)	14 (23.7)
Discrimination	40 (67.8)	2 (3.4)	7 (11.8)	11 (18.6)	20 (33.9)	22 (37.3)	18 (30.5)
Community services and programmes	36 (61.0)	2 (3.4)	12 (20.3)	5 (8.5)	17 (28.8)	21 (35.6)	15 (25.4)
Education programmes and policies	34 (57.6)	6 (10.2)	9 (15.2)	4 (6.8)	15 (25.4)	14 (23.7)	20 (33.9)

Table 3: Main categories from inductive analysis

(1) Main category and (2) subcategory	Participant ID	Supporting quotes
(1) Limited community programmes/teams (2) Teams not available	Parent #20	We do think as he gets older that we probably do want to put him into some sort of sport but with other kids it really is quite hard because he's so... He sort of doesn't really fit in either world. Because of the way his legs are, he can't really compete in anything in the able bodied world. Yeah, so something like kayaking because you don't need your legs. Anyway, he can compete fairly but even in T-ball he won't be able to run. He can't play soccer or any of those things but then the disabled sports are really disabled so they're like, I've looked into the tennis but it's in wheel, a lot of its in wheelchairs... So it's like really disabled kids or completely able bodied. Like we've spent a lot of time going into the disabled world to see if we can find kids like [child's name] and its very rare that... So there's lots of kids who have like cerebral palsy and things like that who have the same sort of physical ability but cognitively they're not right so it's very hard. He sort of doesn't fit anywhere. But we'll find something one day. But he also doesn't think there's anything wrong with him. Like he knows there is. It's not that he's in denial but he just does everything... But then I think the thing is it's like they can't really develop teams for kids like [child's name] because there's not enough of them. Because in a city, like even though we're in Auckland which is a bigger city, there's still… Like 'cause we've been to two or three of these events where there's all the kids pool from all over Auckland. And all the physiotherapists try and get them together but there's still hardly any.

(1) Main category and (2) subcategory	Participant ID	Supporting quotes
(2) Lack of information and lack of programmes for children with impairments	Parent #14	I don't know, because... I mean they (disability organisation), haven't mentioned anything. I mean the, the stuff that [child's name] does is sort of individual. So yeah archery, swimming, cycling... on his own modified bike... um, and that's all stuff that we've instigated... there's nothing we have been told about anything... we are completely unaware of whether there's any team sports in Wellington or not. You know he's pretty busy, but we've never been told about any, any, any team sports that he could participate in... ...yeah. Because through Parafed there's team sports but I think it's sort of more targeted to older groups... We would find something which I will be able to do, which I will take an interest in it.
	Child #14 (11 years)	I used to play Boccia … people with cerebral palsy version of Boccia and I did enjoy it, but we just run out of time, yeah. And also one of the reasons why we stopped going to that was because it was mainly adults, and there weren't many children... was a real shame.
	Parent #9	I personally don't feel there is a whole lot out there for our kids so I work at trying to make things happen. A lot of what is out there is not well publicised. With a huge population of Auckland I am often surprised how little other kids get involved. I am sure there are a number of different reasons. I have always assumed [child's name] can participate in what interests him, and work out a way to make it possible. Still wish there would be more wheelchair sports events.
	Parent #9	So a lot of his activities, you know he's very out there but, in some respects, he's still a little too young to really get into somewhere, like wheelchair rugby for example. I mean he's just a little too small to be able to activate and get involved so as he gets older, when he gets to 10 or 12 years old… but even basketball, he's active in basketball but unfortunately there's no league his age, and so the juniors which are typically 14 and up, he can't throw the ball high enough but he goes and he participates in it um 'cause he's a good defensive player kind of thing so, again, activity levels for his age are just scarce.
	Parent #10	There is not a lot for wheelchair people in general because there are not many wheelchair people so they can't have a team or anything as such, because they wouldn't have enough to form a team. So if there was, I think he would have good go at it if they had wheelchair sports. Or just say if it was sports but I don't think there would be enough children or even adults for that matter to fill the team or warrant that, which is a shame.
	Parent #15	I really like the idea of having him [child] as part of a team, but I can also see that that can be quite hard. I guess coming home from football was often, oh [elder brother's name] how many goals have you scored today? And [child's name] was, I remember the day when he was saying, mum, mum, I almost got the ball today. And that can be a bit of a hard, you know if you always feel that you can't quite keep up. In terms of that actually you know it would be fantastic if we could find a football team with other kids that had similar issues, you know that would be the ideal.
	Parent #5	He like, [child's name] gives anything a go... and to the best of his ability but um, yeah there's not, I think down here we're limited and I mean we'll look into it as he gets older, but there's not a lot of opportunities for um people in wheelchairs to do like sporting activities. Like you know bigger centres would have the wheelchair basketball and things like that. But there's nothing like that for children. There are no opportunities and we just keep having to say wait until you get older. I know they have an adult's wheelchair basketball...

(1) Main category and (2) subcategory	Participant ID	Supporting quotes
(2) Lack of disability sports in rural areas	Parent #3	Rural living has plusses, e.g. good local school, friends. But would often like to live nearer to city for sports, library, swimming etc and to do things with other kids with similar ability. For example, netball etc. can be challenging when [he] can't use one arm very well.
	Parent #5	But yeah I think being in a smaller town that we are a wee bit limited when it comes to children's activities.
(2) Lack of indoor sports	Parent #17	In winter, nothing. Every day here in the home… she may get cold. Winter not too much to do. We stay at home, and summer [child's name] goes to park and beaches, sometimes swimming and sometimes tramping, so winter not much watching TV, cooking. In summer it is nice. It's very different.
(1) School physical education not inclusive (2) Competitive nature of school sports	Parent #4	As they grow, it is harder to fit in. Sometimes joining in a team was a bit too complicated because they have to totally alter stuff to fit her in so it's kind of slightly… When she was little, she used to play tee ball with the kids at (previous) school. Like they used to include her. But they don't do it at schools in Gore. Now she is big and the sports teams are way more competitive. So they are hard to totally change what they are doing so that she can join in.
	Parent #21	She basically tries to give everything a go so... She hasn't played sports for school since primary school. Three or four years ago now. You don't play in any sports teams do you [child's name]? 'Cause they're too fast for you now... [Child's name] is only doing swimming due to the invite by Paralympics. She isn't doing anything else. As far as other sports for her, we haven't found anything where she would feel included. When she was younger, she tried for soccer but the school she was in was not very inclusive and only ever picked players so they would win. She did play hockey in years 5 and 6 as her dad was the coach (although other kids still wouldn't pass the ball to her).
	Parent #5	When he was smaller, he used to participate more in things like cricket and that at school. He wanted to play cricket but as the kids get older, they do get more competitive and I don't want them to be nasty to [child's name] because he's not as able as them. So that's probably one of my big reasons for not letting [child's name] try and do competitive sports.
	Child #2 (12 years)	Um, basically, it's just like stuff about the disability, like PE, it's like all running based and, basically, at school I don't like PE. I mean I just like don't enjoy it because like they don't like do the kind of sports that I do, like… they do like running-based sports and you know that's obviously not the best thing for me so yeah.
(2) Lack of support for adapted sports in physical education	Parent #9	It's a struggle for, I think, schools when they only have one or two or three, or a small group of children who can't participate, and you know the teachers aren't educated in this sort of stuff and they don't have experience with, it's a struggle… Um, we like the school because of the culture of the school and kind of teaching methodologies but when it comes to some of the physical type things, they struggle to understand just the subtleties of the child with physical disabilities.

(1) Main category and (2) subcategory	Participant ID	Supporting quotes
	Parent #17	Normally [child's name] can walk short distances. She normally uses a wheelchair for long distances. But in school [child's name] plays just [a] short time with her friends walking. But playing this is the most difficult activity for her. We told the teachers and explained that [child's name] needs to be involved in physical activities but the teacher does not have time may be not enough time to supervise [child's name] activities. I think.
(2) Adapted sports can bring the best out of a child with impairment	Parent #20	For all the kids like [child's name] the school sports things, the big school athletics days… they never can compete really... We go to quite a lot of the disabled sports things that they put on like the events around. That was one put on at [school's name] wasn't it? And you (child) won the best tennis player. So it's great, they can go and compete, and because he's actually very limited in his disability compared to most of the kids there, you clean them up don't you? You always win heaps.
(2) Attitude of other children at school	Parent #17	Sometimes [child's name] is not happy and sad. My friend today did not play with me. Sometimes she feels different. Very different. Why I can't walk fast? A lot of question we can't response everything (sic). It is too hard for her, too hard for us.
	Parent #8	So when you say friends, can I say [child's name] that you don't have a large number of friends… that's a difficult part at school and I think part of that is because of the differences he shows whilst at school. I think that does actually isolate… children that are a little bit different… yeah to some degree because it's easier for a child to go and play with someone that's, can do everything than someone that maybe doesn't look good at what they do.
(1) Inaccessible neighbourhood (2) Inaccessible homes of friends	Parent #4	We got (a friend in neighbourhood). She used to go down (to her friend's place in the neighbourhood) every day and the mum had to set up the couch and stereo and stuff in the garage. They used to go down there in the garage because she can't just go to someone's house, because she can't get inside. So because most houses aren't wheelchair friendly we had to put the wooden piece on the front, so that we can get her. So of course most kids' houses aren't wheelchair friendly she can't just go to someone's house. So it's a more complicated when they can't just go somewhere. Houses aren't wheelchair friendly, so we need to be choosy and it requires lot of preparation.
(2) Inaccessible community pool	Parent #4	We are just waiting for [name of the facility] to get a better change table for the pool. Because her change table is only as this big [gesticulating] so you put her on it and her head touches the end and her legs will hang off the other end so it's not the best.
(2) Inaccessible play equipment in a park	Child #6 (11 years)	Playing on the monkey bar is a bit hard sometimes. I can't really swing on from one side to the other.
(2) Lack of play areas	Child #9w	I… sometimes I play with the next-door neighbour. Yeah, 'cause both of us, he's about a year younger… just hang around and... it's pretty safe back here so we just go back and forth between the houses, there's nowhere else really to go.

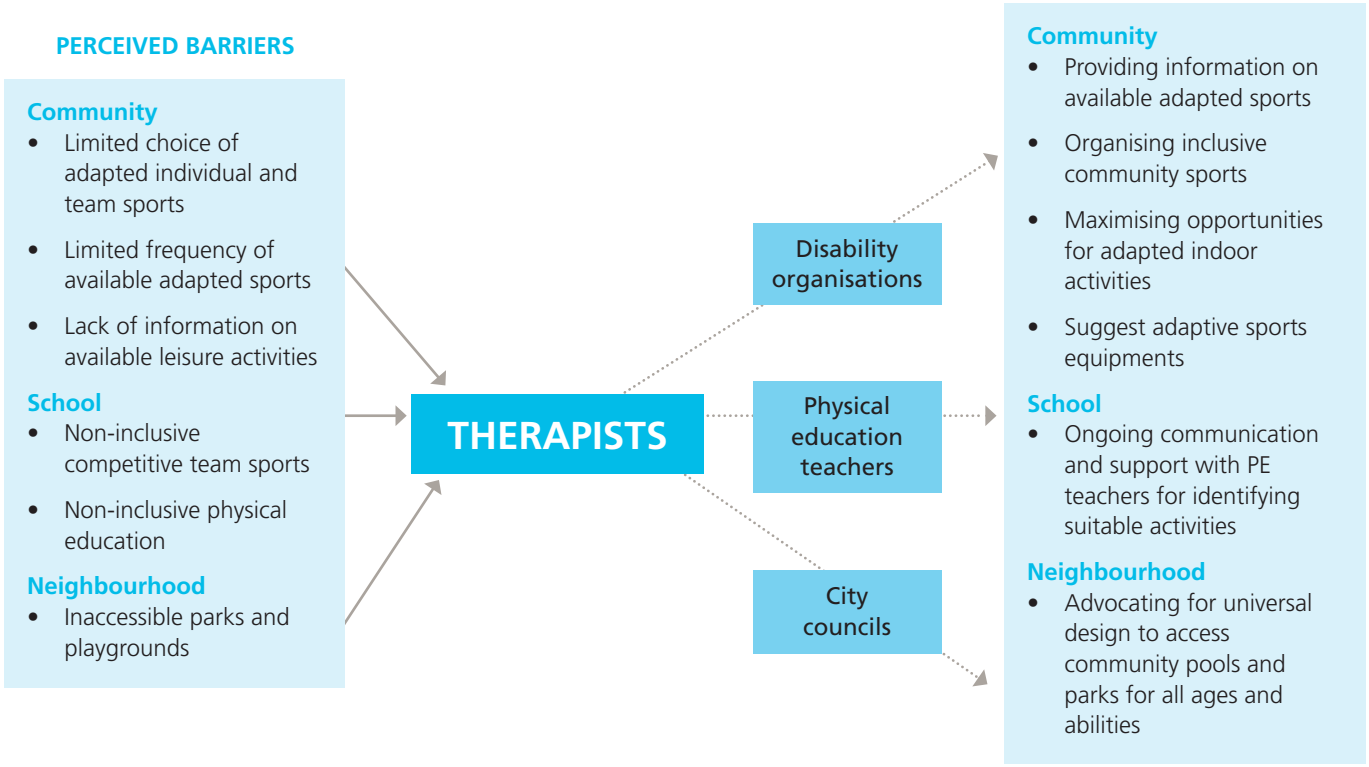

Figure 1: Perceived environmental barriers and the potential role of physiotherapists and occupational therapists in addressing those barriers to maximise leisure opportunities for children with movement impairments in Aotearoa/New Zealand

Community

Lack of community programmes including adapted sports was reported as a barrier by 61% of families. From the qualitative data, parents in many regions expressed dissatisfaction with the limited availability and suitability of community-based adapted sports for their children. In addition, while some children were able to participate in adapted sports, which they enjoyed, these were available only in a few places and mainly on an infrequent basis. For example, Sanitarium's Weet-Bix Kids TRYathlon (an inclusive, modified sport consisting of swimming, running and biking) is conducted in 18 different regions of Aotearoa/New Zealand, but available only once a year in a particular region. Furthermore, adapted sports programmes for children conducted by some regional disability organisations, such as the Halberg AllSports Sundays sports programme and Parafed Canterbury-Junior Sports Club, were only available on a weekly basis.

In regions where adapted sports were available, parents reported that many adapted sports were mostly tailored to children with severe impairments (for example, wheelchair basketball and wheelchair rugby), and therefore younger children or older children with what may be perceived as more "minor" impairments (for example, amputations) missed out. As a parent of a child expressed:

He sort of doesn't really fit in either world… So it's like really disabled kids or completely able bodied. Like we've spent a lot of time going into the disabled world to see if we can find kids like [child's name] and it's very rare. (Parent #20)

In particular, for children with minimal movement impairment, participation in team sports was challenging, as they neither fitted into wheelchair groups nor fitted into teams of able-bodied peers. A parent elucidated:

I really like the idea of having him [child] as part of a team, but I can also see that that can be quite hard... I remember the day when he was saying, mum, mum, I almost got the ball today. And that can be a bit of a hard, you know if you always feel that you can't quite keep up. In terms of that actually you know it would be fantastic if I could find a football team with other kids that had similar issues, you know that would be the ideal. (Parent #15)

While most parents felt that it would be more ideal if their children could play team sports with children of similar movement abilities, they also described the difficulties associated with trying to compose teams of children with similar movement abilities because, for example, there were too few children in their area who used a wheelchair.

It was parents of children living in rural areas or small towns who most significantly felt that there were few organised recreational opportunities available for their child, although this concern was also reported by parents in the bigger centres. A parent living in a rural area explained the drawback of limited adapted sports in a rural setting:

Rural living has plusses e.g. good local school, friends. But would often like to live nearer to city for sports, library, swimming etc and to do things with other kids with similar

ability. For example, netball etc. can be challenging when [he] can't use one arm very well. (Parent #3)

Even if adapted community programmes were available, a lack of information about these community programmes and a lack of suitable transport were frequently reported as barriers. Parents also recommended the need for "publicising" the existing adapted community programmes. Lack of information regarding leisure activities was identified as a barrier by 51% of families from the survey data. Parents explained that they had to search a number of websites of disability organisations to explore the opportunities available in their community.

Thus, children were restricted in their choice of adapted activities, even though they could perform and enjoy such activities. The difficulty in keeping up with peers and/or the competitive nature of many able-bodied sports teams resulted in children in our study preferring individual rather than team sports or free play activity, such as going to a park.

School environment

The survey data identified lack of assistance at school (71%) and inadequate education policies for inclusion of all children in school activities (58%) as barriers. This result was supported by findings from the interviews. Both parents and children reported that school physical education (PE) at all ages was not inclusive for children with impairments. Furthermore, they reported that although children were mostly included in school sports when they were younger, this became far less as they got older and team sports became more competitive. For example, a parent of a teenage child expressed that her child *"hasn't played sports for school since primary school"*. Similarly, a child who used a prosthetic lower limb explained:

… basically, at school I don't like PE. I mean I just don't like enjoy it because like they don't like do the kind of sports that I do, like… they do like running-based sports and you know that's obviously like not the best thing for me so yeah. (Child #2, 12 years)

Parents were of the opinion that PE teachers were not supported enough to be able to adapt sports based on children's abilities. They acknowledged it was a "constant struggle" for PE teachers to organise team sports for only a few children with impairments. In some cases, parents reported the PE teachers might not have time to supervise their children individually whilst participating in an activity that was different to what the rest of the class was doing. As one parent explained,

She normally uses a wheelchair for long distances. But in school [child's name] plays just [a] short time with her friends by walking. But playing this is the most difficult activity for her. We told the teachers and explained that [child's name] needs to be involved in physical activities but the teacher does not have enough time to supervise child's name] [different] activities. I think. (Parent #17)

Neighbourhood

In the survey data, 80% of the families identified the natural environment, including terrain and temperature, as a major barrier. In addition, homes of friends in the neighbourhood that were not easily accessible were perceived as a challenge for children to develop and/or establish friendships. Parents explained how they had to carefully choose leisure environments that were accessible for their children. A parent described how her daughter used to visit and be included in a leisure activity with a friend through the friend's parent's adaptation of their home environment. She also explained that this had come to an end because the family had moved neighbourhoods so that the two friends were no longer able to get together.

She used to go down (to her friend's place in the neighbourhood) every day and the mum had set up the couch and stereo and stuff in the garage. They used to go down there in the garage because she can't just go to someone's house, because she can't get inside... So of course most kids' houses aren't wheelchair friendly... So it's a more complicated when they can't just go somewhere. (Parent #4)

In addition, neighbourhood environments, such as community pools, parks and natural terrains, were reported to be not easily accessible, and families often identified this as restricting the options of leisure environments available for their children. For example, a parent explained that they did not take their child to a community pool due to an inaccessible changing table:

We are just waiting for [name of the facility] to get a better change table for the pool. Because her change table is only as this big [gesticulating] so you put her on it and her head touches the end and her legs will hang off the other end so it's not the best. (Parent #4)

Although parents were aware of a number of leisure environments, such as bush walks or bike tracks, they reported that many were not suitable for independent wheelchair users.

So yeah, I'll show you his hand cycle, it's out in the garage, that's it… so the running bit is the struggle, mostly because a lot of the courses are like this, they're across grass so this is the one thing we're still figuring out with him. (Parent #9)

In regions where adapted community sports were not available, children often relied on free play in the neighbourhood parks and playgrounds. A child explained:

I… sometimes I play with the next-door neighbour. Yeah, 'cause both of us, he's about a year younger… just hang around and... it's pretty safe back here so we just go back and forth between the houses, there's nowhere else really to go... (Child #9)

A child who used a wheelchair explained that although his motorised wheelchair was a way to get around with friends when outside, it was not suitable for playing games or sports as it lacked agility. Frequent breakdowns and heaviness of the wheelchair were also considered barriers. Some parents of children who used a motorised wheelchair emphasised the importance of indoor play areas as free play outdoors was not possible in rainy/cold weather, especially when children wore orthotics or orthotic shoes that would have to be removed when wet.

DISCUSSION

This mixed method study explored environmental factors influencing leisure participation of children with movement impairments in Aotearoa/New Zealand, using survey and in-depth individual interviews. The overarching finding from the study suggests a disparity between a child's ability and existing leisure activity opportunities in various settings, particularly with increasing age. Examples were given of limited tailoring of community-based programmes, non-inclusive school-based PE programmes and inaccessible neighbourhood environments.

Lack of adapted inclusive community sports/events and the lack of information regarding available activities were identified as a major concern for families who lived in sparsely populated areas, had older children or had children with minor impairments. A previous study undertaken in Aotearoa/New Zealand, which examined 32 children with cerebral palsy using the adult version CHIEF questionnaire, identified 56% of children had barriers related to community services. In particular, the inability to participate in sports and afterschool activities were reported as major obstacles that could be related to lack of funding for additional equipment and poor structural design of pavements, playgrounds and stairs (Vogts, Mackey, Ameratunga, & Stott, 2010). Indeed, studies in other parts of the world have also identified a lack of adapted and/or inclusive community programmes, a lack of information about programmes, the competitiveness of programmes and a lack of skilled instructors as barriers (Bedell et al., 2013; Columna, Pyfer, & Senne, 2011; Jones, 2003). While a lack of adapted sports was a major concern, difficulty forming teams of children with similar movement abilities in a geographically distinct area because of the small population size in Aotearoa/New Zealand was highlighted by participants in our study as the reason why children often pursued non-team leisure activities. In particular, in our study, it was the older children who experienced more exclusion than younger children, possibly because their able-bodied peers became more competitive as they got older while their own movement limitations restricted their ability to manage the increasing complexity of leisure activities. A study of parents of children with developmental coordination disorder found similar barriers with the increasing age of their children (Missiuna, Moll, King, King, & Law, 2007). This particular study identified that although younger children may have problems with play activities, such as riding a bicycle, as they aged, they experienced increased difficulty keeping up with their peers, which had the potential to lead to emotional problems, such as low self-esteem, in later childhood.

To improve participation of children with movement impairments and their families in community-based leisure activities, a combined effort from therapists and community service providers could be helpful. Therapists could take a more proactive role in providing information and suggesting suitable inclusive activities available within the community, depending on individual need of the child and the family preferences. Such action has been a recommendation from studies undertaken in other countries (Majnemer, 2009; Palisano et al., 2012; Shimmell et al., 2013). In Aotearoa/New Zealand, adaptive and inclusive sports events are mainly provided by disability organisations at regional and national levels. These organisations depend on volunteers to conduct adapted programmes, and therapists could team with these organisations to help and support leisure activities of children with movement impairments. In addition, therapists could liaise with community service providers to further develop adapted sports to facilitate the choice of team sports for children with similar movement abilities. Such teams would be ideal for children's participation and enjoyment. However, in communities where there are insufficient numbers of children to form a team (a common scenario in sparsely populated countries such as Aotearoa/New Zealand), an adaptive non-competitive sport, which could include both adults and children, is a possible solution. Indeed, a variety of adapted sports that cater to children with different abilities and promotes their confidence and enjoyment can act as a facilitator to physical activity (Verschuren, Wiart, Hermans, & Ketelaar, 2012). Given the lack of adapted team sports in some regions, it would seem useful for therapists to proactively explore and promote the availability of adaptive individualised activities that could be performed in groups, such as swimming karate, and dancing.

Although there are various national networks for children with impairments in Aotearoa/New Zealand. such as the Halberg Foundation, the Cerebral Palsy Society of New Zealand and the Muscular Dystrophy Association of New Zealand, the opportunities for leisure activities provided by them are limited in terms of frequency and their availability in different regions. Finding and collating information through a number of disability organisation's websites about leisure opportunities that would suit the interest and ability of their child was considered a difficult process by the parents in our study. Thus, physiotherapists could actively collaborate with regional disability organisations in their work area to collect and keep updated information on available leisure opportunities, and suggest activities that might be suitable for children they work with. Instead of individual websites, a national website that collates information from various organisations and lists all the activities available in different regions would make it easier to share information, thereby supporting families to support their child to become involved in activities. When the opportunity to participate in an appropriate adaptive sport in the community is available, transporting children to such events may need to be provided. This is especially necessary to support parents who do not have an appropriate vehicle to accommodate their child's adaptive equipment, such as a motorised wheelchair, and parents who have to support other children to attend different sporting activities. However, these services require additional funding.

The lack of assistance at school and the attitudes of other children coupled with the competitive nature of team sports in schools resulted in inadequate inclusion of children with movement impairments in PE at school. Specifically, children with mild and moderate impairments who did not receive funding for a teacher aide or therapist support faced difficulty playing team sports as they could not keep up with their peers.

Similar findings were supported by a city-based Aotearoa/New Zealand study conducted by Vogts et al. (2010) who identified 72% of children had barriers related to attitudes of others at school and 56% had barriers related to inadequate support at school. In particular, others' attitudes, such as lack of understanding about a child's limitations and inadequate teacher aide hours, were reported as major obstacles at school. Non-inclusive PE at school could restrict teamwork and lunchtime play activities, during which friendships could be built and then strengthened. Lack of adaptation to physical activities performed at school could lead children to not being accepted by peers, and this could affect the self-esteem of a child (Missiuna et al., 2007). Further, friendships at school naturally open up opportunities for social and play activities after school, for example sleepovers, friends visiting and birthday parties. Thus, it would seem important to have inclusive PE classes in the school setting as well as other opportunities for children to make and sustain friendships.

In Aotearoa/New Zealand, children with severe impairments are supported at school through the Ongoing Resourcing Scheme or the Physical Disability Service, which provide teacher aide hours and therapist support from physiotherapists and occupational therapists. Depending on the funding, therapists visit these children on a consultative basis or termly visit (term on, term off basis) and provide ideas for parents, teachers and teacher aides to facilitate activities. Therapists could proactively update themselves with various modified sports developed for children with impairments, and play an active role in planning a suitable adapted, inclusive activity for an individual child, and liaise with PE teachers and teacher aides to support physical activity. However, providing access to support staff with training in inclusive PE for children with all levels of impairments might require funding from the Ministry of Education. Further research on how the health and physical education curriculum is put into practice, and the challenges involved, could improve the physical activity of children with impairments at school. Carter et al. (2014) suggested that if adapted, inclusive sports, such as wheelchair sports, were available to all children, this could then help able-bodied children to understand the challenges faced by children with movement impairments, and to learn that even though people are different, they can be respected for this and can be valued for their contributions.

Inaccessible leisure environments were perceived as a barrier, and families avoided taking their children to such environments. This finding concurs with a recent evaluation study of 21 neighbourhood parks and playgrounds in a city region in New Zealand, which found none of the parks evaluated met national/international standards for playground design (Perry et al., 2018). Interestingly, only a third of the parks had accessible routes to ground level play components and only four had an accessible route to elevated play equipment, thus limiting the usability of the parks for children with impairments (Perry et al., 2018). If park environments were designed to meet the needs of users of all ages and abilities, then this may provide positive health benefits by maximising park-based physical activity, particularly for children with impairments (Saitta, Devan, Boland, & Perry, 2019). Indeed, an inaccessible environment has been reported as the most frequently encountered barrier to participation by children with movement impairments in the international literature (Colver et al., 2012; Law, Petrenchik, King, & Hurley, 2007; Shields, Synnot, & Barr, 2012).

Therapists could provide information on accessible and inclusive leisure environments suitable for the child's impairment and their family in their neighbourhood. Furthermore, therapists in collaboration with Accessibility Advisory Groups of city councils could advocate for modifications to playgrounds and park equipment to improve their accessibility and usability. Providing interventions in the form of task training for improving skills required for mastery within the natural environment, such as negotiating uneven terrain in a wheelchair, could be helpful (Palisano et al., 2012). For children with severe impairments, exploring options for technology-based adaptive interactive games, such as video games that incorporate physical activity for children, could be a possible option to promote leisure activity for these children. Furthermore, development and provision of equipment, such as light-weight and agile motorised wheelchairs, would result in easier handling by children during sporting and leisure activities, and therefore be more favorable to facilitating inclusion of such children.

Lastly, to maximise the opportunities for leisure activities of children, a proactive and collaborative approach will be required from many individuals (including physiotherapists) and from organisations, such as councils, sports bodies, schools and non-governmental organisations. There is a need to provide services and advocate for children, so that those who live with impairments and who currently experience inequity of access to leisure activities, can be fully included in society and take part in activities that they enjoy.

CONCLUSION

Currently, there is a disparity between the needs of children with impairments and the leisure opportunities provided at school, in the community and in neighbourhoods in Aotearoa/New Zealand. Participation in leisure activities for these children could be improved with increased opportunities for adapted sports and community programmes. On one hand, health professionals, such as physiotherapists and occupational therapists, may need to be more proactive in discovering and developing strategies to minimise the barriers to participation in leisure activities for the children and their families to whom they provide services. On the other hand, community sport and recreational providers could help by addressing the availability, opportunities and options for leisure activities suitable for children with variable levels of movement impairment. To maximise the benefits of leisure-based physical activity, concerted efforts are required among health professionals, including physiotherapists, PE teachers, disability organisations and local policymakers, in creating adaptive/inclusive leisure activity programmes for children of all ages and abilities at school, and in the local neighbourhood and wider community.

KEY POINTS

1. There is a mismatch between the needs of children with impairments and their leisure activity requirements and the opportunities provided in the community, at school and in neighbourhood environments in Aotearoa/New Zealand.
2. Therapists could play an important role by tailoring activities for children, based on their abilities and preferences as well as recommending child-friendly, accessible leisure environments in the community.
3. Concerted efforts are required between health professionals, including physiotherapists, PE teachers, disability organisations and local policymakers, in creating adaptive/inclusive leisure activity programmes for children of all ages and abilities at school, and in the local neighbourhood and wider community.

DISCLOSURES

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PERMISSIONS

This study was approved by the University of Otago Human Ethics (Health) Committee (ref: 12/314 and 13/132).

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Attitudes and beliefs towards physical activity participation in individuals with below-knee amputation

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ABSTRACT

An amputation causes irreversible life-changing impairments as well as physical and mental changes. Individuals with an amputation face major challenges in terms of physical function, affecting activities of daily living and participation in regular physical activity. Exploring the views of individuals with a below-knee amputation towards physical activity is necessary for broadening understanding of perceptions, including motivations and barriers. Participants were recruited from respondents who had completed a survey that explored physical activity in people with a below-knee amputation. Semi-structured interviews conducted via telephone were audio-recorded and analysed using the general inductive approach. Seven individuals with a below-knee amputation were included in this study. Two broad categories were identified: *personal factors* and *support factors*. Within these categories four subcategories arose: *attitudes*, *health*, *social support*, *environment* and *services*. We found that both internal and external factors influence the perceptions of individuals with an amputation towards physical activity. These factors also largely interacted with each other. In addition, current and previous activity levels influenced views towards physical activity. Behaviour change interventions, such as motivational interviewing, may improve physical activity participation of individuals with a below-knee amputation.

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Key Words: Attitude, Beliefs, Below-knee Amputation, Exercise, Qualitative Research

INTRODUCTION

Physical activity positively enhances the health and well-being of all individuals (Bize, Johnson, & Plotnikoff, 2007; Haskell et al., 2007). Physical activity is defined as "any bodily movement that results in an increase in energy expenditure" (Caspersen, Powell, & Christenson, 1985, p. 126), and thus includes incidental and intentional activities, such as work, sports and home-related activities that result in energy expenditure. It is associated with a wide range of health benefits, such as prevention of chronic diseases, and improvement in cardiovascular and psychological functioning (Bragaru et al., 2013). Regular participation in physical activity has also been shown to improve overall well-being and quality of life in the general population (Bize et al., 2007), particularly when minimum recommended intensity and frequency guidelines are met (World Health Organisation, 2010). However, due to a number of personal, social and environmental factors, 60% of the general population in New Zealand and comparable Western countries are physically inactive (Giles-Corti & Donovan, 2002; Seefeldt, Malina, & Clark, 2002), resulting in an estimated five million deaths per year (Sallis et al., 2016).

Individuals with a physical disability may have additional physical, social and psychological challenges that inhibit regular intentional and incidental physical activity participation (Rimmer & Marques, 2012; Rimmer, Riley, Wang, Rauworth, & Jurkowski, 2004). Lower limb amputation causes a permanent physical disability, which can negatively impact psychosocial functioning and mental health (Bragaru, Dekker, Geertzen, & Dijkstra, 2011; Da Silva, Rizzo, Gutierres Filho, Ramos & Deans, 2011; Vissers et al., 2008). In addition, physical disability factors, such as postural and gait asymmetries (Gaunaurd, Gailey, Hafner, Gomez-Marin, & Kirk-Sanchez, 2011), and the increased metabolic

cost of walking (Nolan & Lees, 2000; Waters & Mulroy, 1999), may present as significant barriers to engagement in physical activity. However, the benefits of physical activity in this specific population include a range of physical and psychological factors, such as increased cardiopulmonary function, reduced stress and depression, and improved body image (Bragaru et al., 2011; Tatar, 2010; Wetterhahn, Hanson, & Levy, 2002). Despite these benefits, the number of adults with amputations who engage in regular physical activity is less than half of age-matched adults with intact lower limbs (Kars, Hofman, Geertzen, Pepping, & Dekker, 2009).

In New Zealand, one in 1,000 people have an amputation, and reportedly, the most common causes of amputation are dysvascular (52%) and traumatic (31%) (New Zealand Artificial Limb Service, 2018). Recent findings from a national cross-sectional survey of adults with a below-knee amputation in New Zealand suggest that individuals with an amputation perceived physical activity participation as having positive benefits (Jayakaran, Perry, & Hale, 2018), as measured by the Exercise Benefits and Barriers Scale (Sechrist, Walker, & Pender, 1987). However, this perception did not positively correlate with reported physical activity levels. There is currently no New Zealand specific research on why individuals with an amputation may engage less in physical activity, and there is a need to explore the perspectives of individuals with an amputation in New Zealand, which may be unique. Therefore, the aim of this study was to explore the attitudes of individuals with a below-knee amputation towards physical activity.

METHODS

Study design

This study used a qualitative design, which included individual, semi-structured interviews of the participants. Ethical approval was obtained from the University of Otago Human (Health) Ethics Committee (ref: H14/121), and all participants provided written informed consent prior to participation.

Participants

Participants were recruited from a cohort of individuals who had earlier completed a survey (conducted between May 2015 and December 2015) and indicated that they would be interested in being contacted for an interview (Jayakaran et al., 2018). Individuals aged 40 years and over with a below-knee amputation due to a trauma or a dysvascular condition were included in the study. Individuals who had received an amputation more than a year ago and were using a lower limb prosthesis to assist with the performance of daily functional activities were also included. Participants were excluded if they had a history of trauma, fracture or surgeries to the lower limb within the past year.

Procedures

Participants were initially contacted by telephone and asked whether they were interested in participating in the study. Those that agreed were forwarded the information sheet and written consent form via email or post with a return envelope. Once written informed consent had been obtained, dates and times for the individual, semi-structured telephone interviews were scheduled. Participants were not compensated for their involvement in the study.

A semi-structured interview guide (Appendix 1) was developed by members of the research team. The guide consisted of eight main topic categories, with related sub-questions. The guide followed a similar structure to that used by Bragaru et al. (2013), with the interview starting with an informal conversation about the participant's age, occupation and amputation characteristics. Participants were then asked if they had questions and wished to continue further. Following this, participants were asked questions relating to their perception of their own health and activity. All questions were open-ended to encourage free-flowing conversation based around health; physical activity; and physical activity facilitators, barriers, and support. Where necessary, prompts were used to elicit a more detailed response. If participants strayed too far from the topic, the interviewer used the guide to start a new topic and to steer them back to the core of the discussion. To ensure that the interview questions/prompts followed a logical order, the interview guide was trialled once with an adult aged over 60 years who had initially been non-weight bearing and then partially weight bearing on the right leg for over 10 months. Following the trial interview, the guide was adapted and improved in order to best collect unanticipated meanings and attitudes of the individuals (Bragaru et al., 2013).

All interviews were conducted in English and were recorded with a mobile device. The duration of each interview ranged from 20 to 40 minutes. To ensure validity of results, one interviewer conducted all interviews (MK). Other team members were present during the interview to take notes of key concepts and, if needed, prompt interviewer on topics (Kallio, Pietilä, Johnson, & Kangasniemi, 2016). All interviews were transcribed verbatim and recordings were destroyed after transcription. Participants were coded P1 to P7 and with either a "T" for traumatic amputation or "D" for dysvascular amputation.

Analysis

The transcribed raw data were analysed following the general inductive approach (Thomas, 2006) and coded for key ideas relating to the research objective. This approach provides a systematic procedure for the analysis of qualitative data to discover valid and reliable findings, particularly when researchers are unfamiliar with any of the traditional approaches to qualitative analysis (Thomas, 2006). Independent parallel coding was undertaken to ensure trustworthiness of the coding (Figure 1). The transcripts were read thoroughly, four times each, and then coded for the key ideas that were identified in the text. A Microsoft Excel spreadsheet was used to record the key ideas with supporting quotes. These ideas were then further grouped to create major themes. Alterations were made to the spreadsheet as needed during team meetings/discussions. The major themes were identified from the combination of key ideas that had similar overall concepts. Finally, the themes were further grouped into broader categories according to overarching similarities relating to either personal factors or support factors. These themes were discussed within the team to ensure the relevance to key research objectives. Member checks were completed with research participants to ensure that the derivation of themes was representative of their beliefs towards physical activity.

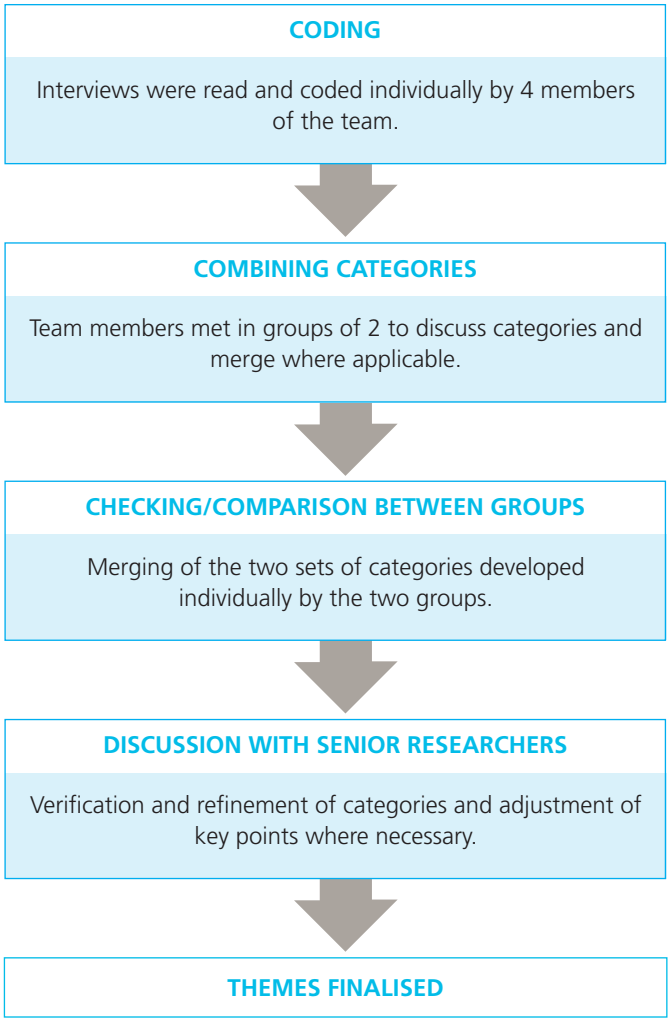

Figure 1: Flow diagram of data deduction and analysis process

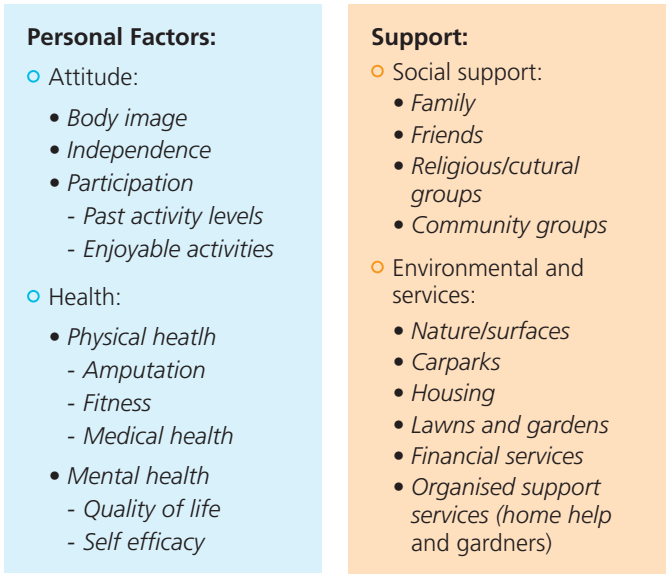

Figure 2: Individual items that influenced participants' views of physical activity

RESULTS

A total of 25 individuals who met the inclusion criteria were approached, and seven of these participated in this study (dysvascular n = 2, traumatic n = 5). The mean age of participants was 65 (standard deviation 8) years (Table 1). A top-down approach was used when deducing the themes from the interviews. The important emerging ideas from the interviews were organised into four major themes: *attitude, health*, *social support* and *environment/services*. These themes were further identified into two categories: *personal factors* and *external factors* (Figure 2). The themes identified in this study gave a deeper understanding towards the positive and negative attitudes relating to physical activity participation. The supporting quotes for the major themes are detailed in Appendix 2.

Table 1: Participants demographic information (n = 7)

Participant	Sex	Age (years)	Cause of amputation
P1	Male	62	Traumatic
P2	Male	75	Traumatic
P3	Male	58	Traumatic
P4	Male	64	Traumatic
P5	Male	58	Traumatic
P6	Male	60	Dysvascular
P7	Male	79	Dysvascular

Personal factors

Attitude: Five of the seven participants felt that being physically active allowed them to be seen by others and themselves as the same person they were before losing their limb. They did not feel nor want to be seen differently, as P3T said: "*... to prove to people that ... my leg doesn't disadvantage me ... I pushed myself to prove that I was the same bloke that I was beforehand.*" For these participants, physical activity participation meant that others may not see them as a person with a disability, as they were still free to do things independently for themselves.

For many participants, being active was ingrained in their personality, and it was a part of who they were. Maintaining an active lifestyle post-amputation enhanced their self-efficacy and positively reinforced being active throughout their life. Certain activities, such as fishing, gardening and, for one participant, regular work, enabled them to feel like the same person they were prior to their amputation. It helped them regain their self-identity and sense of self. In order to remain active, one participant discussed how their mindset allowed them to continue with their activities: "*I don't um dwell on having lost a leg and I still do what I want to do.*" (P3T)

However, two participants had opposing views on remaining physically active due to personal barriers. These individuals felt they had lost their sense of self, had increased reliance on others and could not participate in physical activity. These participants also felt that even their daily tasks were extremely challenging.

While they valued physical activity, they did not see themselves as capable of it. For example: "*It's torture, I can't do it. I can't do any physical activity at all … I can hardly walk, I fall over a lot*" (P7D).

Health: This theme includes both physical and mental health. For five of the participants, physical activity was seen as a positive health behaviour, with a number of positive health benefits. These participants identified that a motivator for physical activity was physical benefits and believed that these benefits included weight loss; lowered resting heart rate, blood cholesterol and blood pressure; and improved mobility and fitness. For example, one participant said: "*Yeah that's the full exercise I do to keep my fitness up*" (P6D). Two participants also discussed improvement in their quality of life. For example: "*If I want a better quality of life, nobody is going to give that to me, I have to do that myself*" (P6D). Physical activity participation was perceived by four participants to improve mental health by enhancing a positive attitude following an amputation.

Despite these views, three participants stated that their current or ongoing poor health limited their ability to participate in physical activity. All participants in this study identified that the biggest barrier to physical activity participation was the issues following the amputation, such as phantom pain, stump pain associated with the prosthesis, loss of balance and other co-morbidities. For example, one participant said: "*The stump gets sore, that's what would stop me*" (P4T).

External factors

Social support: All seven participants found that adequate social support networks encouraged them to participate in physical activity. Social support enhanced participants' ability to cope with potential barriers preventing physical activity and improved their participation in daily activities. Social support networks included family, friends, community groups and employers which enabled the continuation of enjoyable activities and everyday tasks. For example: "*I can still get out there and fish because I got friends that take me out fishing*" (P6D). Family members often arose as a key support network: "*My wife will take my arm, just for balance, just in case someone bumps into me*" (P3T). This illustrates the importance for individuals with an amputation to feel supported.

Two participants felt that inadequate social support networks led to a reduction in their ability to cope with physical activity in the community or home. One participant, who was a keen fisherman and owned a boat but could no longer balance to safely steer it. They discussed how lack of social support affected his participation in this hobby, stating: "*I sort of don't have anybody with a boat to go out with...*" (P4T). While another suggested that additional support was necessary for resuming their previous leisure activities: "*Nobody caters for the disabled … once you get out of hospital you never see anybody … you're sort of left to your own devices*" (P2T).

Environment and services: A number of individuals found a way to adapt their environment to suit their needs. One participant acknowledged their own limitations, but also actively problem solved so they could complete daily activities: "*I have to use a shower stool all the time. I find it a bit safer, you don't slip over*" (P2T). Other participants acknowledged that certain services enabled their participation in enjoyable activities: "*The library down here has been adapted so that there is no limitation. I can just wheel in and the door opens and I go and read my reading*" (P6D). Services such as transportation, financial aid, rehabilitation and personal services enabled some participants to remain active in their environments. For example: "*I use a disability sticker on the car so I park as close as I can...when I go shopping*" (P4T). This suggests that this participant was then able to walk a more manageable distance, thereby increasing their physical activity.

A few participants found that services provided to them were inadequate and proved to be a limiting factor towards achieving physical activity. One participant stated that some routes/paths prevented them from being mobile in the community: "*I find soft sand and gravel a bit of a bugger to walk in and up and down hills*" (P2T). However, other participants persevered within the limitations of the environment, even if it meant they had to be extra vigilant to prevent a fall: "*Definitely got to be careful of footpaths, especially if it's raining, it's slippery*" (P4T).

Lack of services, such as public transport, indirectly limited participants' ability to engage in activity: "*Lack of transport; I just can't really get around*" (P5T). Finances also had an indirect effect on the ability of participants to remain physically active: "*I haven't got a whole lot of finances, by the time you pay your bills and everything, you haven't really got a lot left to do anything*" (P5T).

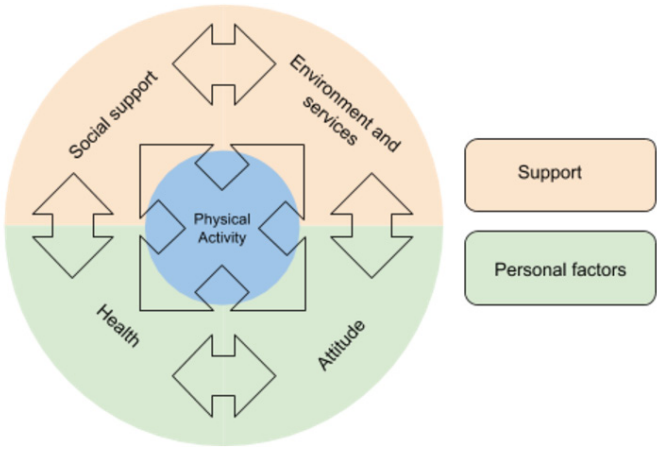

Figure 3: Illustration of major theme interactions

Theme interaction

An overview of theme interactions is illustrated in Figure 3. It shows that the main themes cannot be considered separately due to their close relationship with one another – they all had an impact on the views of physical activity. Many interactions between the four main themes were observed during our analysis. For example, one participant mentioned his passion for gardening and that he liked to be out in the garden alone, but he was unable to dig up the garden, and so his family would help him with this. This shows the complex relationship between his beliefs, values and attitude in wanting to be independent in physical activity of personal meaning to him, while admitting the need for support from family due to his physical limitations: "*I'm passionate about gardening and I can still do those things… [though] I need somebody around me to dig the garden up and so forth*" (P6D).

Member checks

In order to ensure interpretations made from our analysis of the data were accurate, a summary of our key findings and figures were sent to all study participants. Of the two participants who replied, both agreed strongly with the findings. One participant highlighted the importance of fortnightly visits with his facilitator, motivating him to achieve physical activity goals that had been previously set, which emphasised the importance of having someone to share goals with. The other participant said: "*There is no single thing that could be improved to benefit all amputees*" (P3T). This participant also said his age at amputation was a key factor for him, an idea not previously mentioned in this study: "*I had the advantage of still being a young man with the desire to achieve a normal life when I lost my leg*" (P3T).

DISCUSSION

The purpose of this study was to better appreciate the perceptions towards physical activity of individuals with a lower limb amputation. We found common attitudes about physical activity were determined by both personal and external factors, such as individual beliefs and values, and the environment respectively. These factors have been understood to contribute both positively and negatively towards the views of individuals with an amputation on physical activity.

Further, we also identified an interaction between the four themes. Similar to the findings of the current study, Lui and Hui (2009) identified interactions between personal factors, disability and health, and the environment for individuals with physical disabilities. An individual's attitude towards physical activity could be influenced by their health, including their self-efficacy and locus of control beliefs; the support they have around them; and their environment (Castellani, Ianni, Ricca, Mannucci, & Rotella, 2003; Woodard & Berry, 2001). This suggests that in order to alter views about physical activity it is necessary to understand how these other factors influence attitudes towards physical activity. Participants of the current study mentioned the need for support from others in order to participate in physical activities and described how their social support networks also helped them maintain their independence. This finding identifies a link between physical activity, social support and a general attitude towards physical activity participation.

It was apparent in our study that the participants who were active pre-amputation often remained active post-amputation (Bragaru et al., 2013). The participants who were active when interviewed had positive attitudes towards physical activity. Conversely, participants who viewed themselves as inactive believed physical activity to be impossible and, as a result, were unlikely to change their behaviours even though they acknowledged that physical activity might be of benefit to their long-term health. Physical activity can include a range of activities, and the current study adopted the broader definition of physical activity, which can range from low-intensity walking to high-intensity, vigorous activity. Previous research investigating chronic conditions identified individuals as the main facilitator or manager for their long-term care (Clark, Gong, & Kaciroti, 2014). Reportedly, individuals with asthma were more likely to use corticosteroid inhalers if they saw these as beneficial within the self-management of their condition. Similarly, able-bodied and physically disabled participants who valued the benefits of physical activity were more likely to use physical activity participation as a self-management strategy for health (Giles-Corti & Donovan, 2002) and their condition (Allender, Cowburn, & Foster, 2006), respectively.

Participants in the current study were solely responsible for the amount of physical activity they undertook to manage their physical and mental health. Some of the participants discussed the perceived health benefits that physical activity had afforded them as a reason for their continued participation. However, unlike previous findings (Allender et al., 2006; Giles-Corti & Donovan, 2002), the participants who deemed themselves inactive were also aware of the benefits of physical activity. While they did not undervalue physical activity participation, they perceived it as impossible due to their condition or personal circumstances. Brawley, Rejeski, and King (2003) found that factors such as perceived poor health and pain relating to their comorbidities inhibited the ability of the individuals in their study to be active.

Self-efficacy is a determinant in participation of regular, intentional and structured physical activity in a clinical population (Castellani et al., 2003; Woodard & Berry, 2001). Participants of the current study who perceived themselves as physically active appeared to have fewer barriers when engaging in physical activity. The decision to engage in regular physical activity participation was positively reinforced via improved quality of life and socialisation. Additionally, these participants perceived that decreased physical activity would result in negative consequences. Therefore, strategies to overcome this may benefit long-term improvement of physical activity in individuals with an amputation. Kirk, MacMillan, and Webster (2010) reported that individuals with type-2 diabetes mellitus and/or cardio-vascular diseases who have progressed to higher stages of behaviour change reported higher levels of physical activity and self-efficacy. Although individuals with an amputation may have different challenges, the relationship between the trans-theoretical model of change and physical activity participation may be true for the amputation population. Motivational interviewing could be a tool clinicians use as it is designed to find a constructive way to elicit behaviour change within the individual (Miller & Rollnick, 2013). Both the trans-theoretical model of change and motivational interviewing could be used as tools to facilitate behaviour change about physical activity and improve activity levels for individuals with an amputation.

As far as we are aware, this is the first qualitative study to explore the attitudes and beliefs towards physical activity in persons living in New Zealand with a below-knee amputation. This means that qualitative data and results derived from the study are more of a representation of individuals with a below-knee amputation in New Zealand. Our results may differ from findings in other countries due to alternate cultural beliefs (Brink, 2001). Our research is important as it can help to inform clinicians of the perceptions of individuals with a below-knee amputation towards physical activity, and offer potential strategies to effectively motivate patients to engage in physical activity (Öhman, 2005).

Member checks were performed in order to improve trustworthiness and credibility of collected data (Öhman, 2005). Independent parallel coding was performed in order to account for different interpretations of data, and enhance consistency in the data analysis process (Thomas, 2006).

All participants interviewed in the study were males, and the views of females in physical activity participation is not known. While, this is a limitation of the findings, it should be noted that amputations are typically more prevalent in the male population (Sarvestani & Azam, 2013).

The current study included participants with dysvascular and trauma amputations, which are the primary aetiologies of amputation in New Zealand. The beliefs and attitudes of individuals with a dysvascular amputation may be different from that of individuals with a traumatic amputation. The current study was not able to differentiate this due to a small sample size. Future research should build on the current findings and explore any differences between the aetiologies.

Other potential limitations include lack of interviewer experience. While the quality of the data can be dependent on the researcher's skill and experience (Öhman, 2005), we performed a trial interview and three interviews with an experienced qualitative researcher as a support person. The interview guide also helped minimise this limitation by promoting consistency with the interviews.

CONCLUSION

All relationships between themes, identified from our interviews, had both positive and negative aspects. Despite identifying multiple different themes, we found that there was significant interdependence between themes for participants. We found that those individuals who could still participate in physical activity had more positive views relating to physical activity and could more readily find solutions to barriers. Conversely, participants who found day-to-day living difficult were less likely to remain active, and identified more barriers (and fewer strategies) which prevented them from participating in physical activity. Another key finding was that participants who expressed a positive view on physical activity participation may be at a higher stage of behaviour change readiness compared to those who perceive more barriers in physical activity participation. Behaviour change interventions, such as motivational interviewing targeting self-efficacy of individuals or collaborative goal setting may improve the physical activity participation of individuals with a below-knee amputation.

KEY POINTS

1. Individuals who participated in physical activity had more positive views towards overcoming their barriers.
2. Individuals with a positive view on physical activity participation may be at a higher stage of behaviour change readiness compared to those who perceive more barriers in physical activity participation.
3. Behaviour change interventions, such as motivational interviewing targeting self-efficacy of individuals or a collaborative goal setting, may improve the physical activity participation of individuals with a below-knee amputation.

DISCLOSURES

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

PERMISSIONS

This study was approved by the University of Otago Human Ethics (Health) Committee (ref: H14/121).

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Appendix 1

SEMI-STRUCTURED INTERVIEW GUIDE

Major questions

1. How would you describe your own health at the moment?
2. Tell us about how you manage your own health at the moment?
3. What kind of things affect your ability to manage your own health and activity level?
    a) How confident do you feel in your abilities to manage your activity levels by yourself?
4. What does physical activity mean to you?
    a) Why is it important?
    b) How do you think your physical activity at the moment impacts on your ability to perform everyday tasks?
5. Tell us about your physical activity?
    a) What benefits have you received from being physically active? (such as mental, physical, social)
6. What things encourage you to be active?
    a) What things prevent you from being active right now (such as societal, personal)?
    b) How do facilities enable or prevent you from being active (such as taxis, foot paths, transport, infrastructure, finances)?
7. What type of support do you receive to aid you in being active (such as family or community or government agencies?)
8. How confident do you feel doing physical activity?

Probing questions

1. You mentioned … how did you feel about that? Could you tell me a little more?
2. How do you deal with that? What kind of things do you do to get around that?
3. Why is that important to you?
4. Please explain further.
5. Can you give us an example of that? When did you experience this?

Appendix 2

SUPPORTING QUOTES FOR MAJOR THEMES

Attitude

P6D

- That's [physical activity] my freedom you know, it still means that I've got my, my freedom…
- And you know when I'm out there on the water, just to be out of the house. You know it gives you … in my mind I'm like, look aye I'm still able to do these things
- Like I said, doing my gardening outside, I can do that because I am doing it.
- I don't want anybody to do that for me.
- I am passionate about fishing, I'm passionate about gardening and I can still do those things.

P3T

- I don't feel I need any support.
- You're certainly not going to let anyone judge you as, you know, as disabled or crippled.
- There is nothing that I want to do that I'm prevented from doing.
- I can go out and spend all day in the garden, I can go shopping with my wife, I can do things you know that still makes me feel good.

P4T

- I'm not young but I don't want to walk around with a stick. I'd rather walk myself.
- The last four or five years I have been fine on my own… I haven't needed any help.
- It's good to find an exercise you enjoy.

P2T

- Well you try and do everything yourself… You're very independent.

P7D

- I work on the attitude that I can do anything at all that hasn't been proved to me that I can't do it. Some things take a lot longer than they used too, but I persevere.
- Well, I'd like to be able to live a normal life! But I can't anymore.
- No, I have to have the wife to help me.

P5T

- I used to have home help and I used to have people do my shopping for me, but I can manage that on my own now.
- Like I say, I live alone and no one else is gonna do anything else for me. Gotta do it myself.

Health

P4T

- ... You get enough problems with life, aches and pains, without adding unfit ...
- But glad I did [keep active] cos you know you can't stop the rest of your life because you have an accident... It's a bit of a hindrance but hey, got to get on with life don't ya.
- I think exercises is important, you know, especially when you get to my age.
- I think it's important to keep as fit as you can.
- I'm pretty chuffed about that. Yeah so. Umm I'm in excellent health.
- … It's hard to exercise with a disability.
- My stump stops me.
- It's bad enough trying to find a job at that age without a disability, but with a disability, it's hugely against ya.

P6D

- I've got to keep my mind you know, alive and active instead of dwelling on the meanest things in life you know, the things that I can't do.
- I mean it helps you keep a positive attitude to life.
- ... because my picture of diabetic is an obese person, a sickly person, who's not active and doesn't work and all of that.
- You know I'm still, I'm still doing a lot of physical things.
- I need those exercises to be where I am today.

P3T

- Benefits [of physical activity]? Look I feel better about myself, I don't, um, dwell on having lost a leg.
- Can only walk maybe 50m at a quick rate before I've got to stop and relax my stump inside the leg.

P2T

- Try and walk around as much as I can.
- I think you've got to keep fit… you've got to keep mobile.
- You know I trip over a fair bit now, just you know you catch your foot on something and go … ass over kite.
- I can't walk a long way or for a long time, only about half a K [kilometre] would sort of pull me up, I'd have to stop.

P7D

- I can hardly walk, I fall over a lot… If it involves standing up, I fall over.
- I've got virtually no balance at all.
- My complete lack of any balance. My lack of any strength.

P5T

- Like I say, I can only get out once a week, so I don't really know, I guess I feel a bit better once I'm out.
- I do the vacuuming, mop the floor. Getting around the house is fine, it's just going out anywhere is hard.

Social support

P4T

- I have a lot of friends who are interested in the same sort of things which is good.
- We talk about things and upcoming events and that, so yeah, I enjoy that very much.
- I sort of don't have anybody with a boat to go out with (insufficient social support).
- Not so much now but I did when I first had my accident, yeah, they all came round.
- Just being there.
- You know it's nice to have your family around and that.

P6D

- As long as I'm not by myself, you know as long as I'm with family members.
- I need somebody around me to dig the garden up and so forth.
- But I think my own church group, you know because my church, they have activities which, you know, you can go there and have a chat.
- I can't do that so they have to do that, they do that for me.
- I can still get out there and fish because I got friends that take me out fishing.
- in the morning I can't dress myself properly (insufficient social support).

P7D

- We go out together, take a picnic lunch and go out to spots that lookout over the beach and that sort of thing.
- But I did get very lonely – and we've got a fairly good marriage I think.
- Both my wife and I have mobility scooters.
- Well it keeps the mind active for one uhh and I'm a fairly sociable person and I do enjoy the interaction with other people.
- No, I have to have the wife to help me.

P2T

- Oh, heavy lifting and stuff like that I have to get my son around to help me.
- Nobody caters for the disabled (insufficient social support).
- Once you get out of hospital you never see anybody (insufficient social support).
- You're sort of left to your own devices (insufficient social support).
- Well if you look around there's not a lot of help round (insufficient social support).

P3T

- My wife will take my arm, just for balance, just in case someone bumps into me.

P5T

- Like I say, I live alone and no one else is gonna do anything else for me. Gotta do it myself.
- I was pretty scared because I'm on my own I haven't really got any family or anything like that I just live alone.
- Like I said, I'm housebound all the time.
- I've got no way of getting around you see.
- Well I guess lack of transport, I just can't really get around.

Environment and services

P4T

- Yeah when the weathers nice, it's nice to get up early, the early sunrise.
- I got a left-hand accelerator fitted onto the car because I can't use the right one.
- I use a disability sticker on the car so I park as close as I can to the um when I go shopping.
- I don't feel quite so umm what's the word? ... Confident, on wet, wet tiles or um, footpaths.
- Definitely got to be careful of footpaths, especially if it's raining, it's slippery
- They're pretty well situated [disability parks], there's quite enough of them
- So, you've got to pay to be in the park, that's what annoys you when you get people park in them.
- Used to have a caregiver but she's passed away.
- They made sure the house was wheelchair compatible, did the bathroom and put a lift, out the back so I could umm, get the wheelchair in the house,

P6D

- When I'm out there on the water, just to be out of the house.
- I've got an elevator outside my house to be able to get in and out of the house.
- The shower is changed; you know I don't have a bathtub where I can wheel the wheelchair inside the shower.
- We don't go anywhere that doesn't handle disabled people.

P2T

- I'm finding the steps to become a bit of a hazard (insufficient support).
- I like a handrail when I'm going up and down steps.
- But if I asked them to put a ramp in, they would. She's told me that.
- I have to use a shower stool all the time. I find it a bit safer, you don't slip over.
- I put handrails in my shower. Things like that.
- But I would like to see more disabled facilities in the likes of motels and resorts and things like that (insufficient support).
- When they build houses, it should be compulsory to put a handrail in the shower. And anti-slip floors (insufficient support).
- You know for trimming branches and that but you don't get any assistance with that (insufficient support).

P5T

- Uhh physiotherapists, they got me a cane but it's not very good so I still use the crutch.
- I can do the shopping then catch a taxi home.
- Lack of transport I just can't really get around (insufficient support).
- It's so hard for me to actually do anything, because I have to walk. I've got no way of getting around you see (insufficient support).
- I tried to get a car, but my finances [inaudible] and couldn't get support to get a car. If I have to get anywhere, my neighbours will give me a lift (insufficient support).

P7D

- Both my wife and I have mobility scooters and I get around a lot and travel around a lot on this.
- I've got a big one [mobility scooter] and I'm a fairly big guy myself and I do a lot of miles.
- We were going down there and they really put it out for us, they went and took us around and didn't cost us anything.
- You can get – well tourists can – get mobility scooters for free supplied by the council.
- I find that uhh I am restricted by the council gates and fences and such, where they put things in front of anybody on a scooter (insufficient support).
- Because there's no cover on the scooter and if it's raining, I get drenched (insufficient support).
- [The Lions Club] they went and took us around and didn't cost us anything.

P3T

- Limb service supplied me with legs whenever I've needed it.