O'Brien *et al. BMC Musculoskeletal Disorders* (2025) 26:216
https://doi.org/10.1186/s12891-025-08421-5

BMC Musculoskeletal Disorders

RESEARCH **Open Access**

The well-being of people with anterior cruciate ligament rupture-related post-traumatic osteoarthritis in Aotearoa New Zealand

Daniel O'Brien[1,2*], Martin Rabey[4,5], Duncan Reid[1,2], Richard Ellis[1,2], Tammi Wilson Uluinayau[3] and Jackie L. Whittaker[6,7,8]

Abstract

Background Anterior cruciate ligament (ACL) ruptures are a potent risk factor for post-traumatic knee osteoarthritis (PTOA). Annually, in Aotearoa New Zealand, approximately 2,500 people under the age of 30 undergo ACL reconstruction surgery. Due to the young age of injury and surgery, many develop osteoarthritis before age 50 and have a higher likelihood of requiring total knee replacement compared to the general population. This study aimed to gain insight into the medium- to long-term impacts of ACL rupture on people's well-being in Aotearoa New Zealand, by exploring their lived experiences five or more years post-injury.

Method In this Interpretive Description observational study, we conducted semi-structured interviews with people who had ruptured their ACL and had or were at risk of developing PTOA. Analysis was conducted guided by Braun and Clarke's Reflexive Thematic Analysis.

Findings Twelve people (7 women, median age 49.5 [25–62] years) were interviewed. Three themes were generated from the data: 1) *Nobody Ever Told Me…*, 2) *The Post-Rehabilitation Void*, and 3) *The Elephant in the Room: The Psychosocial Impact*. Participants commonly described fear, grief and long-term psychological impacts, and most reported wanting to know more about the long-term management of their knees.

Conclusion and impact The study highlights opportunities to provide better long-term support and management, improve outcomes, and reduce the burden on these individuals. ACL injury can profoundly impact people's lives in the long term. Better education, support services, and consideration of psychosocial factors are needed. Addressing identified barriers could reduce the individual and socioeconomic burden of PTOA for New Zealanders. Future research involving stakeholders must establish acceptable long-term management programmes tailored to ensure they meet the population's needs and address the unique socioeconomic context and ethnic disparities in Aotearoa New Zealand.

Keywords Anterior cruciate ligament, Knee, Lived experience, Osteoarthritis, Post-traumatic

---

*Correspondence:
Daniel O'Brien
dobrien@aut.ac.nz
Full list of author information is available at the end of the article

Background

Osteoarthritis (OA) treatment and research traditionally target later-stage disease in older adults. To substantially reduce the burden of OA, research and clinical services should focus on prevention and earlier disease stages in younger adults [1]. An anterior cruciate ligament (ACL) rupture is a common injury precipitating knee OA, with up to 75% of people with ACL-deficient knees developing post-traumatic OA within 10 to 20 years (PTOA) [2–5]. People who have an ACL rupture and undergo ACL reconstruction (ACLR) surgery are up to five times more likely to develop PTOA than the comparable non-injured population [6].

In Aotearoa New Zealand (AoNZ), approximately 2,500 people under 30 years have an ACLR each year, which is gradually increasing [7, 8]. Pryymachenko et al. [8] found that Pacific people had the highest incidence rate and costs of ACL injury (per 100,000 people) in AoNZ when compared to other ethnicities (Māori [Indigenous people of AoNZ], New Zealand European, Asian and Other). Moreover, Pryymachenko et al. [8] concluded that ethnic and socioeconomic disparities existed in the management of people with cruciate injury in AoNZ, and future programmes addressing cruciate ligament injury prevention and management should aim to improve equity of access. Given the early age of injury, a majority will exhibit radiological OA before the age of 50 [7] and live longer with the burden of OA than people with non-traumatic OA [9]. In the context of AoNZ, this burden may disproportionally affect Pacific people and those with lower socioeconomic resources. People who have had ACLR are also five times more likely to undergo total knee joint replacement (TKJR) than the general population and to have the TKJR at a younger age than those without ACL injury [4].

The social and financial costs of knee OA and TKJR in AoNZ are considerable [10, 11]. Knee OA healthcare costs are estimated to rise from NZ$199 million (2013) to NZ$370 million (2038), with TJKR increasing from 5070 to 9040 per annum over the same period [11]. Amongst the social costs of knee OA, efficiency and productivity losses were estimated at NZ$1.6 billion in 2018, with approximately 12,400 working-age New Zealanders unemployed due to arthritis [10]. This burden is disproportionally higher for Indigenous, under-represented and marginalised communities [12].

The Accident Compensation Corporation (ACC) creates a unique funding environment in AoNZ [13]. ACC is a state-funded no-fault insurance scheme that funds health and social support for AoNZ residents following accidental injury. ACC does not fund healthcare for conditions that do not result directly from accidental personal injury. Funding for OA treatment is often excluded unless a clear link between the original traumatic event and the subsequent PTOA is established and accepted by ACC. Cover and future treatment options are declined if the link is not accepted. The lack of ACC funding for OA management is a significant barrier to accessing healthcare, such as physiotherapy [14]. This funding dilemma can mean people are supported during initial ACL rehabilitation (all people are entitled to, and most people in AoNZ receive ACC-funded surgical care following ACL injury and subsidised or fully funded rehabilitation for up to 12 months), but longer-term support to prevent or address the early stages of OA is not provided. Furthermore, research shows that some communities (e.g., Māori over 50 years) access ACC-funded care less than others, demonstrating inequity in care delivery [15]. This approach may contribute to the growing burden of OA.

Effective, culturally appropriate management programmes are needed to reduce the impact of ACL rupture and PTOA in AoNZ. In 2022, the OPTIKNEE consensus put forth recommendations aimed at preventing OA after a traumatic knee injury [16]. These recommendations advocate for person-centred education and exercise-therapy targeting self-management, and re-injury and OA risk factors (muscle weakness, inactivity, adiposity). Ideally, care would start within 3-years of injury and continue across the lifespan. Groups in Canada (e.g., Stop OsteoARthitis (SOAR) Program) [17–19], and Australia (e.g., SUpervised exercise-therapy and Patient Education Rehabilitation (SUPER) [20, 21]) are currently testing these recommendations. These programmes promote self-determination, self-management, adherence to appropriate exercise, and healthy lifestyles, potentially improving long-term outcomes and reducing the risk of PTOA after ACL rupture [19]. Implementing a similar programme in AoNZ should not be considered without understanding the bespoke needs of its population, as community-based delivery may be necessary to improve equitable access for Māori and Pacific communities [22]. Currently, the experiences and perspectives of people with ACL rupture-related PTOA in AoNZ are unknown. Understanding these experiences and perspectives is vital for developing an effective management programme bespoke to AoNZ.

Methods

Research question and aim

This research explored the question, "*What are the experiences of people with ACL rupture-related PTOA 5+years post-injury in AoNZ?"* to gain insight into the impacts of the injury and subsequent PTOA on the wellbeing of people living in AoNZ.

Design, setting of study and ethics

This Interpretive Descriptive study was informed by a realist philosophical lens and followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) [23] checklist and reporting guidelines. Interpretive Description was selected because it focuses on capturing a person's perceptions and understandings of health-related experiences and interpreting them to inform clinical understanding [24]. Data were analysed using Reflexive Thematic Analysis, which allows the development of semantic and latent themes and messages within the data, providing a great insight into phenomena [25]. The Auckland University of Technology Ethics Committee approved this research (AUTEC #: 22/257) (Clinical trials number: not applicable).

Participants and recruitment

We aimed to recruit 12–15 people living in AoNZ who experienced a previous ACL rupture and surgical repair 5 + years ago and were living with or at risk of developing PTOA. We believed this number of participants would enable us to capture rich data with the broad range of in-depth experiences needed for the research. Potential participants were recruited via multimedia advertisements (LinkedIn, local sports clubs, e-newsletters and health professional networks), and potential participants who contacted the research officer (MR) by email were provided with participant information before enrolling in the study. To facilitate purposive sampling, potential participants completed a short questionnaire collecting age, gender, geographical area, ethnicity, time since ACL rupture, knee-related symptoms, function and quality of life data (Knee Injury and Osteoarthritis Outcome Score – Physical Short Form (KOOS-PS) [26] and physical activity level ("How much physical activity do you do?" – Low / Medium / High). We intentionally did not make physician-confirmed OA or PTOA diagnosis an inclusion criterion to allow us to recruit the broadest possible range of lived experience. We aimed for equal representation of Māori and Pasifika participants ($n = 4$ of each) to ensure their *voices* and experiences were captured. Participants were excluded if they could not communicate in English, had undergone or were scheduled for TKJR, or were current patients or students of the research team.

Data generation

Participants were encouraged to speak about their lived ACL rupture experience, including treatment and enduring impact, during semi-structured interviews (45–90 min). Interviews were semi-structured to provide flexibility in exploring the participant's narrative and guided by a schedule (Additional File 1) developed from evidence about the lived experience of ACL rupture, PTOA and OA, and the researcher's expertise and lived experience of ACL injury and PTOA (DR). The schedule was reviewed by an external investigator who had lived experience of ACL injury and PTOA experience but changed iteratively in response to participants' stories, for example, by including follow-up questions about participants' psychosocial impacts based on initial interviews. Face-to-face or Zoom® (Zoom®, Zoom Video Communications, San Jose, U.S.) interviews took place between November 2022 and May 2023 and were conducted by MR and/or DOB. Interviews were audio or video recorded and transcribed verbatim. The interviewer(s) wrote summary memos capturing their reflections after each interview, which were included in data synthesis and theme construction. Participants had the opportunity to review the transcript and give feedback on accuracy.

Researcher positionality and paradigm

Interviewers (MR/DOB) were white men from Great Britain (MR) or AoNZ (DOB), experienced health researchers, and registered physiotherapists with extensive knee injury rehabilitation experience. Interviews were conducted using a constructivist lens, acknowledging that the interaction between interviewer and participant generates knowledge, that there are multiple truths or realities, and the goal was not to find "*one truth*" but to capture a diverse spectrum of perspectives on the phenomenon of interest [27]. Subthemes and themes were presented to the broader research team who, while all physiotherapists, brought a range of experiences from international viewpoints, including elite sport (athlete and medical team), lived Māori experience and working extensively with Māori and Pasifika, lived ACL injury and PTOA experience, and rehabilitation of people with ACL-related PTOA and following ACL injury.

Data analysis

Data were analysed using Reflexive Thematic Analysis, which is a flexible approach that enables a rich, detailed, and complex account of the data and inductive linkage of data to themes [28]. To focus on meaning grounded in the data and reduce the researcher's analytic preconceptions, coding was processed from the data as opposed to fitting data into a pre-existing coding framework [28]. Data collection and analysis were carried out concurrently, allowing insights developed during earlier interviews to be checked during later interviews, presenting opportunities to refine the research and reorient the inquiry according to developing insights [27].

Thematic Analysis began with one experienced (DOB) and one novice (MR) qualitative researcher reading and familiarising themselves with the data (transcripts).

Initial codes were independently generated following the recommendations of Terry and Hayfield [25], capturing meaningful data interpretations followed by independent theme and subtheme development through active pattern formation and identification. The purpose was not to identify consensus between participants but reveal all different categories, themes and subthemes. Reflective practice and discussions between the two researchers, and subsequently the research team, occurred during coding and theme development to ensure a deep level of interpretation and that the analysis related to the research question [25].

Results

Twelve people (aged 25–62, 6–30 years post-ACL rupture) participated in the study (see Table 1). Most were women, lived in Auckland, and were either New Zealand European or European. Participants had varied ability levels, and all described their physical activity levels as medium or high. All participants were provided copies of their interview transcripts, but no amendments were requested.

Identified themes

We constructed three themes from the data: 1) *Nobody Ever Told Me…*, 2) *The Post-Rehabilitation Void*, and 3) *The Elephant in the Room: The Psychosocial Impact.*

Table 1 Participant characteristics (*n* = 12)

Age, years: median (IQR) (min, max)		**49.5 (39.0—54.5) (25, 62)**
Gender, women n (%)		7 (58.3)
Lives in n (%)	Major city	9 (75)
	Town	3 (25)
Ethnicity n (%)	NZ European	5 (41.7)
	European	4 (33.3)
	Asian	1 (8.3)
	Māori	1 (8.3)
	Pasifika	1 (8.3)
Years since ACL injury: median (IQR) (min, max)		14.5 (11.0 – 21.0) (6, 30)
Raw KOOS-PS score: median (IQR) (min, max)		6.0 (3.0, 12.5) (0, 17)
KOOS-PS Interval score: median (IQR) (min, max)		75.8 (62.2, 85.2) (53.9, 100.0)
Physical activity level n (%)	High	5 (41.7)
	Medium	7 (58.3)
	Low	0 (0.0)

IQR Inter-quartile range, *NZ* European – New Zealand European, *ACL* Anterior cruciate ligament, KOOS-PS—Knee Injury and Osteoarthritis Outcome Score – Physical Short Form

Nobody ever told me…

This theme reflected participants' perception that, although they were often given some information and advice, key evidence-based details about their injury were either missing or insufficient. The theme comprised four subthemes: 1) Inaccurate acute post-injury information, 2) Inaccurate longer-term management information, 3) Ambiguous ACC involvement, and 4) Development of negative OA perceptions.

Participants received conflicting messages regarding returning to previous (sporting) activities. For example, one participant said, "*I was told if I do gym work on it, there's a potential that I might not need surgery.*" (Participant 3) Conversely, another was told (by a health care practitioner):

> *"You've done your ACL. You can either, and she was quite brutal; she just said, Well, you've got choices. You either dump the sport and wear some sort of truss for the rest of your life or get it operated on. The choice is yours." (Participant 6)*

This person perceived they would be "*a wheelchair invalid*" and that non-surgical management would mean, "At *35, you give up everything.*" (Participant 6) No participants mentioned discussing the likelihood of returning to previous sport levels pre-operatively.

Participants received conflicting messages regarding their longer-term prognosis. There was a common perception that ACL surgery would *fix* the problem: "*I'm pretty sure he* [the surgeon] *said it would be just like normal.*" (Participant 11) Some were told there is "*a high chance that you'll get more arthritis in your knee joint.*" (Participant 5) Participants received messages from healthcare professionals that both general and therapeutic exercise were harmful to their knees:

> *"No ACL, no running, or regarding running, you'll probably end up with osteoarthritis, or, don't do weights - they don't do you any good, or, when I talked to them [the GP, regarding physiotherapy], he said, you might actually be doing more damage than good." (Participant 8)*

Several participants found ACC facilitated their rehabilitation through gym membership and supervised training; however, this was often only offered when requested. Participant 3 said, "*I had to follow up ACC to get the benefits*" and "*People don't know what they can access through ACC.*" It was suggested ACC should be pre-emptive regarding rehabilitation to facilitate improved outcomes: "*As soon as you finish your surgery…there should be someone going—Okay, I've got a local gym for you, and you can meet a physio or trainer.*" (Participant 3).

Participants' negative perceptions of OA appeared influenced by healthcare professionals and ACC:

> *"It's always scary to hear that you've got arthritis" (Participant 5); "I'm [like] this for life then," developed alongside messages received such as, "I didn't have any cartilage whatsoever" and "It's only going to get worse and worse" (Participant 1); "When you've had an ACL repair, that you will end up having a knee replacement…it's almost 100%." (Participant 9)*

Several participants were told to lose weight and take non-steroidal anti-inflammatory medication.

> *"It's arthritis. Deal with it"; "Take it easy. Listen to the joint. Get on a bike. Keep the weight off. Do as much as you can, but listen to your body"; "The advice has…never been, go and see a physio." (Participant 1)*

Regarding ACC and the diagnosis of OA, participants suggested they were concerned "*ACC would turn and say it's a degenerative condition"* and not fund care and that ACC "*just use it to get you off ACC*" (i.e. to stop covering further care). (Participant 2) ACC was also accused of perpetuating a biomedical model of care by discouraging clinicians from "*highlighting the psychosocial factors that are influencing because that immediately, in ACCs eyes, [they] say—Well, this is not our problem*." (Participant 4) Participant 4 also highlighted the absence of a biopsychosocial approach by stating:

> *"Pain can't be explained by the mechanics…look, your MRI of your knee is there. That's one part of the picture. But that's not going to explain how much pain you're in and what you can do." (Participant 4)*

Participant 5 said, "*If you're feeling a bit down…it just tends to affect it…. it just accentuates it*." The conclusion was "*every physio, every doctor, surgeon should be having this view of pain*."

The post-rehabilitation void

This theme was characterised by participants' perception that following post-operative rehabilitation, there was no ongoing, long-term management or guidance. Three subthemes were constructed: 1) No ongoing management following post-operative rehabilitation, 2) The longer-term information void, and 3) Exploring success stories.

Participants perceived that following their post-operative rehabilitation, which was often poorly tailored to their specific (work, sporting, etc.) activities, they were left to manage their knee with no follow-up. "*It's a void now* (after rehabilitation)" (Participant 9) and:

> *"I need to be doing something to maintain. I haven't done anything specific outside of not trying to push it too much and still maintaining some level of activity. But certainly not in terms of strengthening or things that it may need." (Participant 6)*

Some participants welcomed the option of ongoing management.

> *"I would have loved to have a bit more information" (Participant 7): "If I could have taken measures to slow down that process of having it get to where I am now, then…I would have just treated life a bit differently." (Participant 5)*

Optimal mechanisms for accessing longer-term management were unclear. The potential for poor quality, unhelpful and misleading information on the Internet was acknowledged. Regarding accessing more formal healthcare:

> *"What are points that people can engage with support through the lifespan?" and "How do you bring that person to that service or bring that service to that person if they don't know it [exists]?" (Participant 6)*

It was often perceived that people with PTOA following ACL injury did not attempt to re-access healthcare until they had significant deterioration in symptoms, "*You don't really know what access you have outside of if you get injured again. What can you get*?" (Participant 6) Even then, caution was expressed: *"Who would they go to? Because a GP, it's a danger. They would say silly things like—Oh, it's for a knee reconstruction. Or, oh, just don't run."* (Participant 10) Conversely, there was a perception that being able to talk to someone else with PTOA following ACL injury would be helpful, "*An opportunity to feel acknowledged or seen and to share as well*." (Participant 6).

Flexibility of access to care was also crucial:

> *"Do you still have ways of staying engaged, to tap in, tap out when you may need it?"; "What feels right for the person at the stage that they may be at… that they can determine when…something might feel right" because "So many sessions of this [e.g. exercises] may not suit everyone. And I guess it's being able to have the flexibility within a service." (Participant 6)*

Longer-term physiotherapy access appeared important for several participants:

> *"I could Google it up or whatever, how, like what exercises to do, but I think having that someone there is different" (Participant 2); "What I need from*

> *the physio is…guidance and reassurance around getting back to activity, understanding the struggles you might be having and helping you on that journey." (Participant 4)*

Funding longer-term physiotherapy appeared to be a barrier. One participant explained their GP was "*reluctant to put in a referral*" (Participant 2) because of a lack of funding, while the surcharge charged by many practices on top ACC funding prevented others from accessing physiotherapy:

> *"Paying the full prices for physio has always put me off because it wasn't an ACC cover" (Participant 7); "If you're going to see them twice or three times a week, that adds up" (Participant 10); "To me, it was quite a lot [of money] if I was not working." (Participant 2)*

Several participants had a more favourable longer-term outcome than others and seemed to have common characteristics. These participants were highly motivated in their initial post-operative rehabilitation:

> *"The motivation was just playing football. I wanted the knee to be right, and I wanted to play football" (Participant 3); "I worked… I did all the exercises, everything, really tried to strengthen it in that rehab stage. So in my head that's why I'm good now" (Participant 3); "the biggest thing I found was having a really good physio all the way through…he was there to say - Have you done your rehab?" (Participant 10)*

They also reported performing ongoing knee-specific exercises *"I do gym work and focus on the knees"* (Participant 3); *"It definitely just comes down to you as a person keeping up that training and keeping up those sort of movements"* (Participant 7) and ongoing, valued sporting activities (e.g., still playing football aged 62). Those with better outcomes described minimal psychological impact from their injury and strong beliefs that they will not need TKJR, *"It gives me a lot more confidence around my future and knowing I probably won't need be needing a knee replacement."* (Participant 4).

The elephant in the room: the psychosocial impact

This theme was characterised by the significant psychological impact of ACL injury and its sequelae, which often appear unconsidered. Four subthemes were formed: 1) Giving up more than just my sport, 2) Long-term impact of injury, 3) Fear – I don't trust my knee anymore, 4) The absence of a biopsychosocial approach.

Participants commonly described moving from participating in team sports, often involving changes of direction (e.g., football), to individual sports without directional changes (e.g., running). But often, they were giving up more than just their sport. Some described a subsequent further change to lower impact activities:

> *"I've had to adapt to a lot of stuff so I can still exercise, like boxing. Karate has gone. The boxing because there's less impact on the knee. There's no kicking… no twisting. It's just [a] straight-line workout. The running had to go, [replaced with a] push bike." (Participant 8)*

Several participants described this change in sporting activity as having negative psychological influences, possibly because physical activity is a common stress management tool, such as:

> *"All that effort you've put in to get fit - it's just being wasted because of a bloody knee issue - it's just so frustrating" and "When the flare-up came, and I couldn't do it [play football], I was just in a dark place for a while…What can I do going forward?" (Participant 1); "We all have our things that make us happy and when you can't do it that's what brings you down." (Participant 5)*

With this change in activities, several participants described a shift in their identity:

> *"There's nothing social about sitting on a bike by yourself….it's just that team dynamic of training on a Wednesday…being part of that team on a Saturday…That's probably the biggest thing you miss," (Participant 1); "your identity…in that you can't do that thing that you kind of identified with. And then it's like, oh, what does that mean for me now?" (Participant 6); with potential long-term social consequences: "All my social interactions with friends are generally around sport and activity. And not being able to do that leads to a poor quality of life." (Participant 4)*

For some, this was accompanied by a sense of grief. Moreover, alteration in activities was partly driven by beliefs around reducing activity levels and improving prognosis, e.g., "*I want to get the longest amount of time out of this knee before I have to have anything else.*" (Participant 9).

Beyond sports, there were reports of broader psychosocial influences of PTOA following ACL injury, such as:

> *"I got my medical retirement from [work]...that was a depressing part of my life because I really liked working" (Participant 2); "When this happened… I'd actually put an application in for [another physical job]: that took my choice away…this knee decided what I could do," (Participant 8); "You're sort of*

> *coming up with excuses when they say, mum let's go [play]…The first thing you think of is ooh, is my knee going to tolerate that?" (Participant 6)*

While the initial injury takes a split second, the impact is long-lasting. Participants described the moment of injury as life-changing and described rumination such as:

> *"The only thing I quite often think about is - Why did I go in for that tackle in the first place? How different would my life be today, but for that one silly incident?" (Participant 1)*

Participants commonly described a perception that there was a significant delay between injury and diagnosis and that this delay had consequences:

> *"That really annoyed me…the fact that you wasted three months being treated for something that it wasn't" (Participant 1); "If they followed it up in that same week, we'd have got a diagnosis. Would I be in the position I am now, ten years later, if that diagnosis was done in a timely fashion?" (Participant 8)*

For some, the psychological impact persists long term: "*It's hard. It's ten years I've been in pain*," or in response to the follow-up question, "*Have you had similar episodes in the past where you've been affected mentally*?" (Researcher MR), the response was, "*Yeah. All the way through*." (Participant 8).

Participants commonly described various fears. Some described the knee as always being in the back of their mind when doing physical activities: "*little bit of confidence that you don't quite have*" (Participant 4), while others stated, "*I just really don't want to cause any more damage*" (Participant 7) or "*I'm worrying about the cartilage and getting arthritis and things*" (Participant 8), versus not wanting *"to risk going through that same process again"* (Participant 4) through to, *"Will I be able to walk again if something goes wrong?"* (Participant 2).

The absence of a biopsychosocial approach to management from clinicians manifested differently. Participants believed psychological factors should be screened for, discussed, and managed, if necessary, from soon after injury: "*Having a conversation, just knowing that your well-being can be impacted—it's not just a purely physical injury—it might have been helpful*." (Participant 6) One participant said it was suggested they might "*Need to speak to somebody. And me being me was like, no, not really. I think, looking back, it might have not been a bad idea*." (Participant 8) Conversely, messages from clinicians to participants may have had negative psychological impacts, particularly concerning later-stage imaging findings. One participant described being told by a healthcare professional, "*I've just had your MRI scans out again, and I'm surprised you can do as much as you do because your knee's rooted."* (Participant 1). Another stated, "*Getting my MRI result was not helpful in terms of how I thought of my knee. Where it explained some things, but it was depressing at the same time…that was a significant mental toll for me*." (Participant 4).

Discussion

While this study's findings may not surprise those who have experienced ACL injury or those whose role is to support these people, this research is the first to explore the medium—to longer-term impact of ACL injury on New Zealanders. Furthermore, our findings reflect those previously published by Kaur et al. [29] but show that the negative impact of the injury on ability and participation continues to grow for some people. Key findings suggest the injury's effects extend beyond the typical rehabilitation period and that for some, the long-term impact of the injury is life-changing, affecting their sense of identity, social connection, mental well-being, and employability; findings that have been identified elsewhere and mirror those commonly reported by people with OA [29–31]. Participants also alluded to care-delivery factors that could be improved, such as patient education and support. Our findings are similar to research looking at people's acute experience of ACL injury and those with established OA, which arguably sit on the same disease continuum when considered across a person's lifespan [1]. Several key findings merit discussion in the context of the current evidence.

What happens when funding stops?

Our findings identified the unmet need for people with longer-term symptoms following ACL injury in AoNZ. Whilst funding streams in AoNZ see ACC covering a significant proportion of costs during the initial rehabilitation (up to 12 months) post-ACL injury, funding gaps beyond this point have significant consequences. Options for those with continuing symptoms are limited, and participants spoke of challenges accessing ongoing care and support. Abbott et al. [32] highlighted this same problem for New Zealanders needing care for OA, arguing that the care people are waiting for may never be received. From our data, some resources and associated funding are required to fill this population's service/support gap, yet it is still unclear what sort of resource would be most suitable for the AoNZ context.

Knowledge is power: tackling health literacy

Participants needed evidence-based prognostic information about longer-term management of their knees and the possibility of developing OA following injury and surgery [33]. Internationally, evidence-informed decision-making tools have been used to help people navigate treatment planning (e.g., www.aclinjurytreatment.com), but these tools are not commonplace in AoNZ. Our findings are similar to research showing knowledge translation and mobilisation for many people with chronic joint pain is limited [34, 35], and many people have negative perceptions of OA [36]. This highlights the need to provide better education opportunities for these people. Further work is needed to determine acceptable timing and delivery methods of this education for these patients.

Supporting mental, emotional and social well-being

The most strongly supported theme was how ACL injury impacts people's social and mental well-being. While most participants did not overtly speak about it and avoided direct discussion, it was clearly the 'elephant in the room'. However, the finding should not be surprising given the well-established connections between ACL injury [37], OA [38–40] and social and mental well-being [30, 41]. Hence, this must be a key consideration for developing future support strategies for acute recovery, rehabilitation, and life-long knee health [18].

This study has indicated numerous opportunities for better-supporting people following ACL injury, including focusing on life-long knee health and well-being. What remains undetermined is how these opportunities can be integrated early in the rehabilitation journey in a manner acceptable to existing healthcare delivery systems and service providers in AoNZ; hence, future research must explore the experiences and perspectives of critical stakeholders (e.g., funding agencies, family, coaches, clinicians, sporting organisations) to understand the broader context of care for these people.

Strengths and limitations

The key strength of this study was the methodology that enabled a deeper understanding of the experience and impact of ACL injury, giving an appreciation of the injury's psychological and social impact, which may not have otherwise been illuminated. Several limitations merit consideration: Despite our purposeful intention for ethnic representation, the sample was predominately Pākehā (New Zealand European) and European, meaning findings may not resonate with people of different cultures commonly affected by ACL injury in AoNZ (i.e., Māori and Pasifika). All interviews were conducted by DO and/or MR (middle-aged, middle-class, Pākeha/white men); subsequently, the data collected might have been different if other people had conducted the interviews. As a qualitative study, the sample size was intentionally small ($n=12$), so findings should not be considered generalisable.

Recommendations

The current study explored people's experiences in AoNZ following ACL injury and identified barriers to living well post-injury, most notably the gap in resources or services (between ending post-operative rehabilitation and re-entering the healthcare system with symptomatic PTOA) and the psychosocial impact of their knee condition. Several practical and research recommendations can be made from this work. Future health research and service planning should leverage opportunities to manage people following ACL injury over the medium to long term, including their psychological and social factors, to facilitate more favourable long-term outcomes. These services should be purposefully designed by, with and for Māori and Pacific peoples to ensure successful engagement for Māori and Pacific communities [42].

Conclusions

Exploration of people's experience in AoNZ following ACLR identified several barriers to living well post-injury. Many people struggled to return to full function, which affected all aspects of their well-being. We identified a notable gap in resources or services between ending (ACC/private-funded) post-operative rehabilitation and, for some when they re-enter the public health system with symptomatic PTOA. We also identified opportunities for ongoing support that would reduce the long-term burden for these people and the health system. Future research and service planning should leverage these opportunities.

Abbreviations

ACC	Accident compensation corporation
ACL	Anterior cruciate ligament
ACLR	Anterior cruciate ligament rupture
AoNZ	Aotearoa New Zealand
OA	Osteoarthritis
PTOA	Post-traumatic osteoarthritis
SOAR	Stop osteoARthitis
TKJR	Total knee joint replacement

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12891-025-08421-5.

Supplementary Material 1.

Acknowledgements

Not applicable.

Clinical trials number

Not applicable.

Authors' contributions

All authors participated in the literature review, development of the research proposal, development of the participant interview schedule, data analysis, and manuscript preparation. DOB and MR also participated in ethics application, data collection, and transcription..

Funding
Arthritis New Zealand funded this research.
The funding body had no role in the study's design, data collection, analysis, interpretation, or manuscript writing.

Data availability
Data is provided within the manuscript.

Declarations

Ethics approval and consent to participate
The Auckland University of Technology Ethics Committee granted ethics approval (Approval number: 22/257). All participants gave written informed consent.

Consent for publication
Daniel O'Brien, Martin Rabey, Duncan Reid, Richard Ellis, Tammi Wilson Uluinayau, and Jackie L. Whittaker have approved the manuscript and consent to publication.

Competing interests
The authors declare no competing interests.

Author details
[1]School of Clinical Sciences, Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland 0627, New Zealand. [2]Active Living and Rehabilitation Aotearoa (ALARA), Faculty of Health and Environmental Sciences, Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland 0627, New Zealand. [3]Māori Advancement, Faculty of Health and Environmental Sciences, Auckland University of Technology, 90 Akoranga Drive, Northcote, Auckland 0627, New Zealand. [4]School of Allied Health, Curtin University, Kent St., Bentley, WA 6102, Australia. [5]Royal Perth Hospital, Wellington St, Perth, WA 6000, Australia. [6]Department of Physical Therapy, University of British Columbia, 2211 Wesbrook Mall, Vancouver, BC V6T1Z3, Canada. [7]Arthritis Research Canada, 2238 Yukon Street, Vancouver, BC V5Y 3P2, Canada. [8]Centre for Aging SMART, Vancouver, BC, Canada.

Received: 1 November 2024 Accepted: 12 February 2025

References
1. Whittaker JL, Runhaar J, Bierma-Zeinstra S, Roos EM. A lifespan approach to osteoarthritis prevention. Osteoarthritis Cartilage. 2021 ;0(0). Available from: https://www.oarsijournal.com/article/S1063-4584(21)00911-0/fulltext. [cited 2021 Sep 27].
2. Abram SGF, Judge A, Khan T, Beard DJ, Price AJ. Rates of knee arthroplasty in anterior cruciate ligament reconstructed patients: a longitudinal cohort study of 111,212 procedures over 20 years. Acta Orthop. 2019;90(6):568–74.
3. Friel NA, Chu CR. The role of acl injury in the development of posttraumatic knee osteoarthritis. Clin Sports Med. 2013;32(1):1–12.
4. McCammon J, Zhang Y, Prior HJ, Leiter J, MacDonald PB. Incidence of total knee replacement in patients with previous anterior cruciate ligament reconstruction. Clin J Sport Med. 2021;31(6):e442.
5. Stone B, Nugent M, Young SW, Frampton C, Hooper GJ. The lifetime risk of revision following total knee arthroplasty. Bone Jt J. 2022;104-B(2):235–41.
6. Snoeker B, Turkiewicz A, Magnusson K, Frobell R, Yu D, Peat G, et al. Risk of knee osteoarthritis after different types of knee injuries in young adults: a population-based cohort study. Br J Sports Med. 2020;54(12):725–30.
7. Love H, Clatworthy M, Baker D. New Zealand ACL Registry Annual Report 2021. New Zealand: New Zealand ACL Registry Trust; 2021.
8. Pryymachenko Y, Wilson R, Abbott JH. Epidemiology of cruciate ligament injuries in New Zealand: exploring differences by ethnicity and socioeconomic status. Inj Prev. 2022. Available from: https://injuryprevention.bmj.com/content/early/2022/12/22/ip-2022-044761. [cited 2023 Feb 10].
9. Palazzo C, Nguyen C, Lefevre-Colau MM, Rannou F, Poiraudeau S. Risk factors and burden of osteoarthritis. Ann Phys Rehabil Med. 2016;59(3):134–8. https://doi.org/10.1016/j.rehab.2016.01.006.
10. Access Economics. The economic cost of arthritis in New Zealand in 2018: Arthritis New Zealand [Internet]. New Zealand: Delottes; 2018. Available from: https://www.arthritis.org.nz/wp-content/uploads/2018/09/Economic-cost-of-Arthritis-in-New-Zealand-2018.pdf.
11. Wilson R, Abbott JH. The projected burden of knee osteoarthritis in New Zealand: healthcare expenditure and total joint replacement provision. N Z Med J. 2019;132(1503):53–65.
12. Stokes T, Azam M, Noble FD. Multimorbidity in Māori and Pacific patients: cross-sectional study in a Dunedin general practice. J Prim Health Care. 2018;10(1):39–43.
13. O'Brien DW, Pigg W, Ellis R, Baldwin JN, Quicke JG, Evans N, et al. An evidence-informed model of care for people with lower-limb osteoarthritis in New Zealand. N Z J Physiother. 2021;49(1):24–30.
14. Reid D, Potts G, Burnett M, Konings. Physiotherapy management of knee and hip osteoarthritis: a survey of patient and medical practitioners' expectations, experiences and perceptions of effectiveness of treatment. N Z J Physiother. 2014;42(2):118–25.
15. Cavadino A, Ao BT, Kerse N, Kool B, Parsons J, Hikaka J. Ethnic variation in access to publicly funded care for unintentional injuries in older adults in Aotearoa New Zealand: a retrospective study. Inj Prev . 2024. Available from: https://injuryprevention.bmj.com/content/early/2024/05/19/ip-2023-045168. [cited 2024 Aug 24].
16. Whittaker JL, Culvenor AG, Juhl CB, Berg B, Bricca A, Filbay SR, et al. OPTIKNEE 2022: consensus recommendations to optimise knee health after traumatic knee injury to prevent osteoarthritis. Br J Sports Med. 2022;56(24):1393–405.
17. Losciale JM, Truong LK, Zhang K, Silvester-Lee T, Miciak M, Pajkic A, et al. Assessing the efficacy of the Stop OsteoARthritis (SOAR) program: A randomized delayed-controlled trial in persons at increased risk of early onset post-traumatic knee osteoarthritis. Osteoarthritis Cartilage. 2024;32(8):1001–12.
18. Truong LK, Mosewich AD, Miciak M, Gold MV, Li LC, Whittaker JL. "I feel empowered and I have control over the situation and how my knee is in the long-term." A qualitative analysis of the acceptability of a virtual physiotherapist-guided knee health program for persons at risk of knee osteoarthritis. Osteoarthritis Cartilage. 2022;30:S223.
19. Whittaker JL, Truong LK, Losciale JM, Silvester-Lee T, Miciak M, Pajkic A, et al. Efficacy of the SOAR knee health program: protocol for a two-arm stepped-wedge randomized delayed-controlled trial. BMC Musculoskelet Disord. 2022;23(1):85.
20. Culvenor AG, West TJ, Bruder AM, Scholes MJ, Barton CJ, Roos EM, et al. SUpervised exercise-therapy and Patient Education Rehabilitation (SUPER) versus minimal intervention for young adults at risk of knee osteoarthritis after ACL reconstruction: SUPER-Knee randomised controlled trial protocol. BMJ Open. 2023;13(1):e068279.
21. Culvenor AG, West TJ, Bruder AM, Scholes MJ, Barton CJ, Roos EM, et al. Recruitment and baseline characteristics of young adults at risk of early-onset knee osteoarthritis after ACL reconstruction in the SUPER-Knee trial. BMJ Open Sport Exerc Med. 2024;10(2):e001909.
22. Dixon TW, O'Brien DW, Terry G, Baldwin JN, Ruakere T, Mekkelholt T, et al. The Lived Experiences of Ngā Tāne Māori with Hip and Knee Osteoarthritis. N Z J Physiother. 2021;49(3):127–33.
23. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. Int J Qual Health Care. 2007;19(6):349–57.
24. Thorne S. Interpretive Description. Walnut Creek, Calafornia: Left Coast Press; 2008. p. 272.
25. Terry G, Hayfield N. Essentials of Thematic Analysis [Internet]. Washinton, USA: American Psychological Association; 2021. Available from: https://doi.org/10.1037/0000238-000
26. Perruccio AV, Stefan Lohmander L, Canizares M, Tennant A, Hawker GA, Conaghan PG, et al. The development of a short measure of physical function for knee OA KOOS-Physical Function Shortform (KOOS-PS) - an OARSI/OMERACT initiative. Osteoarthritis Cartilage. 2008;16(5):542–50.
27. Hunt MR. Strengths and Challenges in the Use of Interpretive Description: Reflections Arising From a Study of the Moral Experience

of Health Professionals in Humanitarian Work. Qual Health Res. 2009;19(9):1284–92.

28. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101.
29. Kaur M, Ribeiro DC, Theis JC, Webster KE, Sole G. Individuals' experiences of the consequences of anterior cruciate ligament reconstruction surgery. N Z J Physiother. 2019;47(2):76–93.
30. Holm PM, Simonÿ C, Brydegaard NK, Høgsgaard D, Thorborg K, Møller M, et al. An early care void: The injury experience and perceptions of treatment among knee-injured individuals and healthcare professionals – A qualitative interview study. Phys Ther Sport. 2023;1(64):32–40.
31. Little P, Everitt H, Williamson I, Warner G, Moore M, Gould C, et al. Preferences of patients for patient centred approach to consultation in primary care: observational study. BMJ. 2001;322(7284):468.
32. Abbott JH, Keenan R, Billing-Bullen G, Pask A, O'Brien D, Hudson B, et al. Most people waiting for osteoarthritis care never get it – it's time to try a different approach. J Prim Health Care [Internet]. 2022. Available from: https://www.publish.csiro.au/hc/HC22063. [cited 2022 Jun 28].
33. Mullen N, Ashby S, Haskins R, Osmotherly P. The perceptions of individuals with musculoskeletal disorders towards prognosis: An exploratory qualitative study. Musculoskeletal Care. 2023;21(2):527–36.
34. Gay C, Eschalier B, Levyckyj C, Bonnin A, Coudeyre E. Motivators for and barriers to physical activity in people with knee osteoarthritis: a qualitative study. Joint Bone Spine. 2017 [cited 2017 Aug 8]; Available from: http://www.sciencedirect.com/science/article/pii/S1297319X17301409
35. Selten EMH, Vriezekolk JE, Nijhof MW, Schers HJ, van der Meulen-Dilling RG, van der Laan WH, et al. Barriers Impeding the Use of Non-pharmacological, Non-surgical Care in Hip and Knee Osteoarthritis: The Views of General Practitioners, Physical Therapists, and Medical Specialists. J Clin Rheumatol Pract Rep Rheum Musculoskelet Dis. 2017;23(8):405–10. https://doi.org/10.1097/RHU.0000000000000562.
36. Bijsterbosch J, Scharloo M, Visser AW, Watt I, Meulenbelt I, Huizinga TWJ, et al. Illness perceptions in patients with osteoarthritis: Change over time and association with disability. Arthritis Care Res. 2009;61(8):1054–61.
37. Filbay SR, Skou ST, Bullock GS, Le CY, Räisänen AM, Toomey C, et al. Long-term quality of life, work limitation, physical activity, economic cost and disease burden following ACL and meniscal injury: a systematic review and meta-analysis for the OPTIKNEE consensus. Br J Sports Med. 2022;56(24):1465–74.
38. Ackerman IN, Kemp JL, Crossley KM, Culvenor A, Hinman RS. Hip and knee osteoarthritis affects younger people. Too J Orthop Sports Phys Ther. 2017;47(2):67–79.
39. Gignac M a. M, Backman CL, Davis AM, Lacaille D, Mattison CA, Montie P, et al. Understanding social role participation: What matters to people with arthritis? J Rheumatol. 2008;35(8):1655–63.
40. Pedersen MB, Thinggaard P, Geenen R, Rasmussen MU, De Wit M, March L, et al. Biopsychosocial rehabilitation for inflammatory arthritis and osteoarthritis: A systematic review and meta-analysis of randomized trials. Arthritis Care Res. 2021;75(2):423–36. https://doi.org/10.1002/acr.24816.
41. Truong LK, Mosewich AD, Holt CJ, Le CY, Miciak M, Whittaker JL. Psychological, social and contextual factors across recovery stages following a sport-related knee injury: a scoping review. Br J Sports Med. 2020;54(19):1149–56.
42. Maclennan B, Derrett S, Wyeth E. Health-related quality of life 12 years after injury: prevalence and predictors of outcomes in a cohort of injured Māori. Qual Life Res. 2023;32(9):2653–65.

Publisher's Note