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To cite this article: Anthony M. Nasser, Alana B. McCambridge & Arianne P. Verhagen (2024) What influences patient decision making after anterior cruciate ligament injury in Australia; an internet survey, *Physical Therapy Reviews*, 29:1-3, 5-11, DOI: [10.1080/10833196.2024.2362042](https://doi.org/10.1080/10833196.2024.2362042)

To link to this article: <https://doi.org/10.1080/10833196.2024.2362042>



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## What influences patient decision making after anterior cruciate ligament injury in Australia; an internet survey

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### ABSTRACT

**Objectives:** We aimed to understand what influences patient decision-making after ACL rupture.

**Methods:** A survey was carried out online, targeting individuals who had experienced an ACL rupture injury. Outcomes included person(s) who influenced patient decision-making, sources of information used to assist the decision-making process and the main reasons that informed their decision to undergo ACL reconstruction surgery or rehabilitation only.

**Results:** 174 participants (mean age 29.8 years, 53% male) met inclusion criteria, of which 144 (80%) underwent ACL reconstructive surgery and 20 (11%) completed rehabilitation alone. The most common people who influenced decisions were the orthopaedic surgeon for those who had surgery ( $n = 103$ , 84%) and the physiotherapist for those who underwent rehabilitation alone ( $n = 12$ , 75%). The most common reason for choosing ACL reconstructive surgery was to be able to return to sport ( $n = 100$ , 82%), and for rehabilitation alone, it was because they believed it would give the same result as surgical management ( $n = 12$ , 75%). Of those who had surgery, 56% ( $n = 67$ ) received limited to no information on non-surgical management options.

**Conclusions:** Many people in Australia undergo surgical reconstruction for their ACL, with limited awareness of trialling rehabilitation alone. The most influential people in a patient's treatment decision after ACL rupture in Australia are the orthopaedic surgeon and physiotherapist.

### ARTICLE HISTORY

Received 19 September 2022  
Accepted 26 May 2024

### KEYWORDS



knee; ACL; orthopaedics


### Background

Anterior cruciate ligament (ACL) rupture is a prevalent injury that is particularly common in young physically active adults. This injury can have long-term physical and psychological impacts [1]. The incidence of ACL ruptures is estimated to range from 30 to 78 per 100,000 person-years [2] and is commonly experienced in professional baseball and football players [3,4]. As such, sport is the greatest risk factor for ACL rupture, which is further amplified by gender, with women having a four-times higher risk of ACL rupture than men [2,5–7].

According to evidence-based guidelines, ACL rupture can be managed using rehabilitation alone (without surgery), surgical reconstruction with rehabilitation, or rehabilitation followed by delayed surgical reconstruction (as required) [1,8]. Interestingly, evidence suggests surgical reconstruction is not superior to rehabilitation alone for outcomes such as pain, knee function, activity levels, return to sport and quality of life [9–11]. A Cochrane review concluded that there was no difference between surgical and conservative

rehabilitation management options after ACL rupture in patient-reported outcome measures of knee function at two and five years post injury, however the evidence was deemed low-quality [12]. Similarly, a systematic review on surgical versus non-surgical rehabilitation following ACL rupture, including randomized controlled trials (RCT) and cohort studies, found that the cohort studies suggested surgery was superior for patient outcomes, however this was not supported by the findings in the two RCTs [13]. Early versus delayed reconstructive surgery after ACL rupture has been explored in two systematic reviews with 303 and 576 included patients, respectively [14,15]. Both reviews found no statistical or clinically meaningful difference regarding the incidence of meniscal tears, chondral lesions, infection, graft rupture or functional outcomes. There is also no increase in the risk of radiographic knee osteoarthritis after surgical reconstruction of the ACL [9–11] and there is insufficient evidence to determine if the incidence of new meniscal tears is lower if an ACL injury is treated with surgery compared to rehabilitation only [16].

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/10833196.2024.2362042>.

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Despite evidence suggesting similar results between the management options, ACL surgery rates are high, with Australia having the highest incidence of ACL reconstruction surgery worldwide [1,17–19]. It is currently unknown why so many Australians are opting to undergo ACL surgery as opposed to rehabilitation alone given current evidence-based guidelines. Therefore, the purpose of this study is to better understand who and what resources influence a patient's treatment decision following ACL rupture. Our aims are i) to understand who influences a patient's decision to undergo ACL reconstruction vs rehabilitation alone and ii) to determine the sources of information patients utilise when deciding to undergo ACL reconstruction vs non-surgical rehabilitation. The findings from this research may provide a starting point for future educational interventions.

## Method

### Design and ethics

The study was an anonymous online survey. Ethical approval was received from the University of Technology low-risk ethics committee (REF: 19-3-763). The Checklist for Reporting Results of Internet E-Surveys was used to guide the reporting of results [20].

### Procedure

Qualtrics (version XM) was used to design and deliver the survey online. Following pilot testing the survey was advertised using social media and was available to participants for six weeks in 2019. The survey contained a total of 26 items and was presented to participants online with one question per page. No incentives were given to responders for completing the survey. Responders could revise their answers to questions by utilising the back keyboard button before survey submission. Survey responses were recorded anonymously.

### Study population

Participants over the age of 18 were eligible to participate if they self-identified as having a previous ACL rupture that was diagnosed by a health professional, whilst living in Australia, and were able to complete the online survey in English. Participants with multiple ACL ruptures were asked to answer questions about their most recent ACL injury. No information was gathered on other injuries that may have occurred (e.g. concurrent meniscal or MCL injury).

### Survey

The survey consisted of demographic questions (e.g. gender, level of activity, time since injury), questions

about the choice of treatment (surgery, rehabilitation only or rehabilitation with optional/delayed surgery), symptoms/complaints after rupture (e.g. instability, pain), the people that influenced their treatment decision (e.g. surgeon, physiotherapist, coach, family), where they obtained the information to make an informed treatment decision (e.g. word of mouth, online webpages), and if they were satisfied with their decision. Detailed information was presented to participants before informed consent was gained, which included information on the length of the survey, the purpose of the study and information on the investigators. The online survey took approximately 5–10 min to complete. The survey questions can be found in [Appendix 1 \(Supplementary Material\)](#). Questions presented to participants varied depending on their management option (e.g. surgical intervention or rehabilitation alone).

### Analysis

The survey responses were exported to SPSS. Data are reported as frequencies and percentages for the total number of responses obtained for each question. Partially completed surveys were included in the analysis.

## Results

### Study population

Of the 187 participants that consented to the study, 13 were excluded as they did not meet the inclusion criteria. The first question was answered by 174 participants, with 82% (142/174) of participants completing the survey in full. Most participants (mean age  $29.8 \pm SD 8.4$  years, 53% male) had ruptured their ACL less than one year ago, played sport at a club competition level, and were moderately active at work at the time of injury (see [Table 1](#)). The most common treatment chosen by participants was surgical reconstruction (144/179), with a minority opting for rehabilitation alone (20/179), trialing rehabilitation alone with the option to have surgery later (12/179) or having no treatment (2/179) (see [Table 1](#)).

### Surgery

Of the 144 participants who had ACL reconstructive surgery, data regarding time elapsed since surgery was recorded by 135/144 (84%) of total responders. 48/135 (36%) had their surgery less than one year ago, 33/135 (24%) between one and two years ago, 33/135 (24%) between two and five years ago, 13/135 (10%) between 5–10 years ago, and 8/135 participants (6%) had surgery greater than 10 years ago. Return to pre-injury level of sport was self-reported to have been achieved in 53/124 participants (43%),

**Table 1.** Participant demographics.

Variable	Number of Responses (% of responses*)
Consented to the study	187
Rupture confirmed by health prof	184/186 (99%)
Rupture confirmed with imaging	171/179 (96%)
<b>Time since rupture (n = 179)</b>	
< 1 year ago	66 (37%)
1 - 2 years ago	43 (24%)
2 - 5 years ago	44 (25%)
5- 10 years ago	18 (10%)
> 10 years ago	8 (4%)
<b>ACL management (n = 179)</b>	
ACL reconstructive surgery	144 (80%)
Rehabilitation alone	20 (11%)
First rehabilitation, maybe surgery later	12 (7%)
No treatment	3 (2%)
<b>Location of ACL surgery in Australia (n = 138)</b>	
New South Wales	98 (71%)
Queensland	6 (4%)
Western Australia	5 (4%)
South Australia	5 (4%)
Victoria	12 (9%)
Australian Capital Territory	1 (1%)
<b>Mean age in years (SD) (n = 142)</b>	<b>29.8 (8.4)</b>
<b>Gender (n = 142)</b>	
Male	75 (53%)
Female	67 (47%)
<b>Previous level of sport (n = 142)</b>	
Recreational level	32 (23%)
Club level	59 (42%)
Competitive level	39 (27%)
Professional level	5 (4%)
I was not playing sport	7 (5%)
<b>Previous activity level of work (n = 142)</b>	
Inactive	46 (32%)
Moderately active	70 (49%)
Highly active	26 (18%)

\*Total number of responses differ per question, rounded to nearest whole number.

with 20/124 (16%) unable to return to pre-injury level sport due to ACL injury, 9/124 (7%) were unable to return due to other reasons, and 42/124 (34%) participants had not yet returned as they were less than one-year post-surgery.

Of the 144 participants who underwent surgery, data regarding the type of treatments recommended were recorded by 124/144 (86%) of total responders. 74/124 (60%) stated surgical reconstruction was the only option recommended to them and 13/124 (11%) were not aware that non-surgical management was an option. In contrast, 32 (26%) participants stated that they were given the option to trial rehabilitation alone for their injury, but they did not wish to, and just 5/124 (4%) reported that a trial of rehabilitation was recommended to them before making the decision to undergo surgical reconstruction.

Of the participants who underwent surgery ( $n = 32$ ), but were given the option to trial rehabilitation alone, the mean age was 31.96 (55% females). Activity level of these participants was self-reported as highly active by 14% of participants, moderately active by 48% and as inactive by 38%. The mean age of respondents who received no or limited information about non-surgical management was 27.7 years (54% were male). Activity level was described as highly active by 4%, moderately active

by 73% and inactive by 23%. Four participants had previously trialled rehabilitation before their ACL reconstruction surgery, with two participants trialling rehabilitation for between one and three months, and the other participants trialling rehabilitation for between three and six months or greater than six months.

Of 144 participants who underwent surgery, data regarding the amount of information received was recorded by 120 (83%) of total responders. Most participants who underwent surgery received either no or limited information on non-surgical management (67/120, 56%), however 38 (32%) of these participants stated they did not want to receive any more information on non-surgical treatment options. There were 20/120 (17%) participants who received some information on non-surgical treatment options but would have liked to have received more information to help make an informed decision, and 33/120 (28%) participants reported that received adequate information to make an informed decision. Overall, 101/120 (84%) participants who had surgery felt sufficiently involved in their treatment decision, with 13/120 (13%) reporting they felt somewhat involved, and 4/120 (3%) did not feel sufficiently involved in the decision-making process. Most participants 61/69 (88%) stated they would find it useful to access online information written by academics and clinicians on treatment options for ACL injuries. A small portion of participants 8/69 (12%) stated they would not find this useful.

### Rehabilitation only

Twenty participants underwent rehabilitation alone. Return to pre-injury level of sport had been achieved by 6/16 (38%), not yet achieved by 3/16 (19%) participants as they were still <1-year post rupture, and not achieved in 6/16 (38%) due to their ACL injury or for other reasons (6/16, 38%). A structured rehabilitation program was provided by a health practitioner in 12/16 (75%) participants who opted for non-surgical management.

### Influencers

Participants identified the main people who influenced their decision for their treatment choice and the resources used to assist with their decision-making (see Table 2). The most common person of influence for those who opted for surgical management was the orthopaedic surgeon 103/122 (84%), in contrast to the physiotherapist 12/16 (75%) in those who opted for rehabilitation only (Table 2).

For participants who underwent ACL reconstructive surgery the two most common resources participants used to assist their decision were talking

**Table 2.** Influencers on treatment decision.

People that influenced treatment decision <sup>1</sup>	Surgery n (%) of respondents	Rehabilitation alone n (%) of respondents
Orthopaedic surgeon	103 (84%)	7 (44%)
Physiotherapist	60 (49%)	12 (75%)
Friend or family member	50 (41%)	2 (13%)
General practitioner or sports medicine physician	41 (34%)	2 (13%)
Sport coach	10 (8%)	3 (10%)
Other:	8 (7%)	3 (10%)
• Personal choice	8	1
• Exercise Physiologist		1
Resources that assisted treatment decision <sup>1</sup>	Surgery n (%) of respondents	Rehabilitation alone n (%) of respondents
Talking with others who chose surgery after ACL rupture	78 (64%)	9 (56%)
Talking with others who chose rehabilitation alone after ACL rupture	20 (16%)	6 (38%)
Internet searches	73 (60%)	9 (56%)
Pamphlets provided by a health professional	30 (25%)	2 (13%)
No resources	11 (9%)	
Other:	11 (9%)	2 (13%)
• Personal experience	5	
• Professional opinion	3	1
• No time to seek other resources	1	
• Scientific literature	1	1
• Family experience	1	

<sup>1</sup>Participants could select multiple options.

with others who chose surgery after an ACL rupture 78/122 (64%), followed by internet searches 73/122 (60%). The most common resources participants used who had rehabilitation alone were the same, with talking with others who chose surgery after an ACL rupture 9/16 (56%) and internet searches 9/16 (56%). The main reason(s) that influenced treatment decisions was the ability to return to sport for those who underwent surgery, or their belief that they would get a similar result compared to surgery for those who chose rehabilitation alone (see Table 3).

## Discussion

### Main findings

We found that in people who underwent ACL reconstruction surgery, the main person perceived to influence their decision were orthopaedic surgeons. In contrast, the most common person who influenced those who opted for rehabilitation alone were physiotherapists. However, as very few people in our survey managed their ACL rupture with rehabilitation alone, caution is recommended when interpreting these results. More than half of patients who had surgical reconstruction reported that surgical reconstruction was the only option recommended to them. We found that people utilised information from a variety of sources to assist their decisions on treatment, with talking with others who had undergone ACL reconstructive surgery and internet searches being the most common. The most common reason for opting for surgery was to return to sport, whereas the most common reason for choosing rehabilitation alone was the thought that it would achieve a similar result as surgery. Participants who had an ACL reconstruction that received information about non-surgical management were older, less active

and more often female, compared to those who received no information.

### Comparison with other studies

Australia has the highest rate of ACL reconstructive surgery worldwide [1,17], which places a significant economic burden on the healthcare system [18]. It is unclear as to why Australia has such high rates of ACL reconstructive surgery given that current evidence does not indicate surgical management is superior to rehabilitation alone [12]. Understanding who is influencing a person's decision to opt for surgery and which sources of information they are using to inform their decision is a critical step in understanding the reason for such trends. We found that healthcare professionals (physiotherapists and orthopaedic surgeons) were the most likely to influence patient decision-making. This suggests that these professionals, as well as the patients themselves, should be key targets for potential interventions aimed at changing health practices for ACL rupture management.

A survey conducted in Sweden examined the perceptions of patient involvement in decision-making following ACL injury, as reported by patients, orthopaedic surgeons and physiotherapists [21]. The study found that a smaller proportion of patients who opted for non-ACL reconstruction (16/24 (67%)) rated their involvement as 'high' compared to those who underwent ACL reconstruction (68/70 (97%)) [21]. In contrast, orthopaedic surgeons consistently rated patient involvement as 'high' in both groups (26/26 (100%) for non-ACL reconstruction and 68/69 (99%) for ACL reconstruction), while physiotherapists showed lower ratings for patient involvement in the non-ACL reconstruction group (20/26 (77%) for non-ACL reconstruction and 61/65

**Table 3.** Main reason(s) for treatment decision.

Surgery <sup>1</sup>	n (%) of respondents
To return to sport	100 (82%)
Fear of further damage	47 (39%)
To alleviate the symptoms (e.g. pain, instability)	41 (34%)
Difficulties performing daily physical activities outside of sport	41 (34%)
Increased risk of osteoarthritis	20 (16%)
Other	6 (5%)
• Able to play with children	3
• Peace of mind	1
• Multi-ligament injury	1
• Previous ACL-rupture without surgery	1
<b>Rehabilitation alone<sup>1</sup></b>	
Believed that non-surgical treatment would give a similar result	12 (75%)
Costs associated with surgery	7 (44%)
Unable to take time off work	6 (38%)
Fear of further damaging knee with surgery (e.g. increased risk of osteoarthritis)	4 (25%)
Fear of the complications of surgery	4 (25%)
Other	2 (13%)
• Delayed diagnosis	1
• Fear of rehabilitation after surgery	1

<sup>1</sup>Participants could select multiple options.

(94%) for ACL reconstruction) [21]. These results highlight discrepancies in perceived patient involvement, particularly for those who do not undergo surgical reconstruction, and together with our results emphasise the need for further exploration in patient-centred decision-making processes following ACL injury.

Ideally, a shared decision-making process is recommended following ACL rupture that considers patient and health care practitioner preferences, combined with current evidence [1]. It is critical that the health practitioner's advice is based on best-evidence recommendations and is not biased toward a particular treatment strategy. Furthermore, rehabilitation alone has been suggested to be worth trialling for patients in the initial stages after injury, particularly as surgery can then be delayed and performed later if indicated (e.g. ongoing functional instability) [1,21]. However, in our study, 56% of participants stated they were given none to limited information on non-surgical management options. Similar to our findings in Australia, other studies conducted in New Zealand [22] and Greece [23] have found ACL management practices are not always aligned with contemporary scientific evidence and guidelines. Healthcare professionals must deliver best practice advice, which considers all management options, to ensure patients can make an informed treatment decision.

ACL surgery has been historically favoured for those who want to return to sports where the stability of the knee is challenged, and most participants in our study chose surgery for this reason. Current evidence suggests that only 42% of non-professional athletes return to competitive sport following ACL reconstruction surgery [24]. Therefore, information such as this must be presented to patients to allow

them to be aware of what is known about ACL rupture recovery from research. Evidence-based information could be provided to people after ACL rupture on the internet or *via* pamphlets provided by health care professionals. As apart from talking with others who had experienced ACL rupture, our study found that internet searches and pamphlets were used by a significant portion of participants. Given that it has been found that most online information on ACL rupture management is not aligned with the best available evidence, resources should be directed to create online sources with patients that reflect current best practice.

### Limitations

A minority of participants that completed the survey chose rehabilitation alone, therefore the reasons to opt for non-surgical management as opposed to surgery could not be well evaluated. There were also 18% of participants who did not complete the survey in full, and the recall period for the majority of participants was > 1 year ago. Most of the patients who completed the survey were from New South Wales (71%). Consequently, the results may not be representative of the rest of Australia. Most of the participants sustained an ACL injury within the previous 5 years 153/179 (86%). As a limited number of participants were injured longer than 5 years ago, we are unable to tell if recommendations and resources given to participants have changed over time.

### Implications

As the key influencers following ACL rupture injuries were orthopaedic surgeons and physiotherapists, these people are of importance when changing the healthcare practice towards more evidence-based and economical management of ACL rupture. Information pamphlets and online webpages could be developed explaining the advantages and disadvantages of either surgical or conservative management options, as well as providing information on trialling rehabilitation first before opting for surgery. These resources could be utilised by health professionals (i.e. orthopaedic surgeons, physiotherapists) as aids to facilitate the discussion on treatment options. In addition, as many people talked with others about their experience of ACL reconstructive surgery or non-surgical rehabilitation, the resources could include interviews or personal stories of those who had opted for either management option. These resources could then be used to provide unbiased, evidence-based information on all available treatment options for patients to facilitate informed decision-making. Further research should

investigate patient and therapist perspectives on decision-making after ACL rupture, as both patient preferences and clinician expertise are components of an evidence-based treatment approach. Furthermore, understanding if people after ACL rupture have incorrect beliefs about their injury and subsequent recovery, and if they do are educational interventions able to change these beliefs would be of relevance to the field.

## Conclusion

Most people in Australia opt for reconstructive surgery after an ACL rupture, and many did not receive any information about non-surgical treatment options. Health professionals (orthopaedic surgeons and physiotherapists) seem to be the key people who influence treatment decisions following ACL rupture. The key resources used to assist decision-making were talking with others and internet searches, regardless of treatment option.

## Disclosure statement

No potential conflict of interest was reported by the authors.

## Funding

The author(s) reported there is no funding associated with the work featured in this article.

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