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Comparative effect of two educational videos on self-efficacy and kinesiophobia in people with knee osteoarthritis: An online randomised controlled trial

Introduction

Knee osteoarthritis (OA) is highly prevalent, with pain and its management being the primary concerns for most people with the condition [1]. Symptoms are best managed through lifestyle behaviours including strengthening exercise, physical activity and weight loss (if indicated) [2, 3]. For example, recent guidelines report exercise as being "appropriate for use by the majority of patients in nearly any scenario and deemed safe for use in conjunction with first line and second line treatments" p.1582 [2]. International data show that patient engagement with these self-management behaviours is low [4, 5]. Knowledge and beliefs about OA and its management influence behavioural intentions, including treatment choices [6, 7, 8]. Thus, education that promotes accurate patient beliefs about treatment options and empowers people to choose wisely according to their needs and circumstances is important to facilitate desirable lifestyle behaviours [3]. Education formats such as videos, booklets or webpages are low-cost scalable interventions and have the potential to be designed in a manner that could shift behavioural intentions towards effective self-management in people with knee OA. Education is also recommended as a core treatment [2, 3], but the lack of RCT data supporting this recommendation has been highlighted [2].

In healthcare, education messaging may be based on a biomedical model of health with a 'disease' and 'impairment' discourse, or alternatively, can utilise an 'empowerment' and 'participatory' dialogue [9, 10]. The disease and impairment approach assumes that patients' knowledge and understanding should

align with that of the healthcare provider, thus education focusses on what has gone wrong with the 'body as a machine' [10]. In contrast, the empowerment and participatory approach views the patient as having different knowledge needs to the healthcare provider and enables people to actively participate in healthy behaviours. The International Classification of Functioning, Disability and Health framework considers the goal of healthcare to be optimisation of participation, rather than amelioration of disease and its associated impairments [11]. Thus, for people with OA, the empowerment and participatory approach considers the body as 'healthy' if it is functioning well, rather than being unhealthy because of joint damage [10]and education helps people to know what to do to manage their symptoms, but not necessarily why.

Research suggests that OA education focussing on the pathophysiology, and on medications, rest and surgery as the only effective treatments, can promote fear and activity avoidance in people with OA [6, 8]. This may in turn contribute to psychological distress and fatalism [1, 12]. Recent qualitative studies have investigated education based on an empowerment and participatory discourse for people with OA. Addressing misbeliefs and shifting focus away from joint damage and towards empowering people to self-care, provided hope, changed the way they felt, and motivated them to be more physically active [13, 14]. In addition, a cohort study found improvements in self-efficacy, fear of movement and OA knowledge with this education approach [15].

The aim of this study was to compare the effects of two knee OA educational videos on psychological-cognitive outcomes in people with knee pain in a robust randomised controlled trial (RCT). The primary hypotheses were that an educational video based on an empowerment and participatory discourse would lead to increased self-efficacy for managing OA pain and reduced kinesiophobia compared to an educational video based on a disease and impairment discourse.

Methods

Design

An online two-arm, parallel groups, superiority RCT was conducted (ClinicalTrials.gov NCT05156216, ethics approval 2021-22707-23540-5). The trial was inadvertently retrospectively registered; however, the study was fully and transparently conducted according to the prospectively written trial protocol. A detailed explanation of the circumstances leading to retrospective registration is provided in Appendix A, along with the a priori trial protocol. All participants provided informed consent. The study was designed in accordance with SPIRIT guidelines for RCT protocols [16] and is reported according to the CONSORT guidelines [17].

Participants

People with symptoms consistent with a clinical diagnosis of knee OA [3] were recruited via a consumer network for digital survey-based research (Cint Pty Ltd, Stockholm, Sweden). Eligibility criteria included: i) in Australia; ii) aged 45 years or over; iii) experienced activity-related knee pain during the previous three months or told by a health professional that they have knee OA; iv) no hip/knee joint replacement; v) not scheduled/referred to see an orthopaedic surgeon or on a waiting list for hip/knee joint replacement; vi) no systemic arthritis or not have morning stiffness lasting longer than 30 minutes; vii) no health condition making them unable to walk; viii) not seen a health professional for treatment of their knee pain during the previous three months; and ix) could understand English.

Procedures

The trial was delivered via an online survey (Qualtrics, Provo, UT, USA) and Vimeo (Vimeo Inc, NYC, USA) video-sharing platform. Volunteers completed online screening with eligible participants provided with an information sheet and consent provided digitally. Demographic information was collected, followed by baseline assessment of primary and secondary outcomes. Participants were then randomly allocated (1:1) using the randomiser function in Qualtrics (set to 'evenly present elements') and presented with an embedded video. Participants were asked to watch the video to the end before progressing to the post-intervention assessment. Participants were unable to progress past the video before 12 minutes had elapsed to increase likelihood of watching the video.

Blinding

Limited disclosure was used to blind participants, who are considered the assessors given outcome measurements were self-reported. Participants were informed that the trial aimed to assess knee OA educational video but details about the educational content/video designs and the study hypotheses were not disclosed. Data were analysed by the biostatistician while blind to group label.

Interventions

Both videos (Table 1) were of the same duration, included almost the same informational topics (although not identical information nor the same level of detail within the topics) and were branded as a University of Melbourne resource. Content in both videos was based on current evidence and clinical practice guideline recommendations. The key differences in the experimental video were the absence of

imagery and descriptions related to structural joint changes, careful choice of words to focus on health rather than disease, and statements to empower viewers to make decisions themselves, in addition to advice on what to do. The experimental video also incorporated the consumer voice and experience. In pilot testing, the perceived quality of the videos was rated by two, similar five-member consumer panels (Appendix B). Each panel rated one video for aesthetics and information quality using a scoring proforma adapted from the Mobile Application Rating Scale [18]. Total scores were comparable for the two videos (Table 1).

Control video (disease and impairment discourse)

The control video was created by the research team for this study based on information contained in freely available knee OA written information resources from a credible patient advocacy organisation (Musculoskeletal Australia, msk.org.au). The video contained animated text and still diagrams, figures and photographic images, with information conveyed predominantly via voice-over. Content reflected typical education about knee OA [19, 20]; provided as biomedically based-information and utilising pathoanatomical approaches to explaining OA and its management [6, 8, 12, 21, 22].

Experimental video (empowerment and participatory discourse)

The experimental video was developed by the research team and is freely available online (https://vimeo.com/573794719)[23]. It was previously qualitatively evaluated [14] with further details in Appendix C. Briefly, the video incorporated contemporary recommendations for education for people with knee OA, common barriers to lifestyle behaviours among people with knee OA, adult learning

principles, and health behaviour change theory. The video combined animated and still diagrams and figures plus approximately 50 seconds of footage of real people talking about their OA experiences.

Outcome measures and follow-up

Co-primary outcomes were: i) self-efficacy for managing OA pain, measured via Arthritis Self-Efficacy Scale - pain subscale (ASES-Pain; five items measured via numerical rating scales; score range 0-10; higher score = greater self-efficacy) [24]; and ii) kinesiophobia via Brief Fear of Movement Scale for OA (BFMS; six items measured via Likert scales; score range 6-24; higher scores = greater fear) [25]. Both measures were developed for people with lower limb OA, and have demonstrated acceptable validity and reliability [24, 25, 26].

Secondary outcomes included:

i) The Credibility/Expectancy Questionnaire [27] was adapted to measure expectations about participants' knee OA prognosis and the perceived effect of physical activity [28]. Two domains were measured: i) 'credibility' of physical activity being an effective treatment for reducing pain (Part 1; three items rated on numerical rating scales; score range 3-27; higher score = greater credibility) and ii) 'expectancy' of achieving reduced pain (Part 2; two items rated on numerical rating scales; score range 2-18; higher score = greater expectancy).

ii) Perceived importance of being physically active was measured by rating the level of agreement with four statements (5-level Likert scale "Strongly disagree" to "Strongly agree"; two items reverse scored; scores across four items averaged; score range 1-5; higher scores = greater importance). Items were 1. "*Physical activity should be avoided because of my knee*", 2. "*Being physically active won't change*

things for my knee", 3. "*Physical activity will help my knee quite a bit*", 4. "*It is important for my knee to do as much physical activity as I can*".

iii) Motivation to be physically active was measured via: "*How motivated are you to be physically active (e.g., walk, run, swim, cycle, dance, exercise, etc) even when you are feeling knee pain?*", on a scale from 0 ("Not at all motivated") to 10 ("Very motivated").

iv) Knee OA knowledge and beliefs were measured via the Knee OsteoArthritis Knowledge Scale (KOAKS; 11 items; 5-level Likert scales from "false" to "true"; six items reverse scored; score range 11-55; higher score = better knowledge) [29, 30].

v) Hopefulness was measured via "*How much have your feelings of hope for the future changed since watching the video?*"; rated on 5-level Likert scale from "Much less hopeful" to "Much more hopeful" dichotomised to more ("somewhat more" or "much more") or less hopeful.

vi) 'Level of concern' was measured via "*How concerned are you about your knee pain?*" and scored on a 5-point Likert scale (response options "Not at all concerned" to "Extremely concerned").

vii) Perceived need for surgery was measured via "*How likely do you think you are of needing knee replacement surgery in the future?*" and scored on a 5-point Likert scale (response options from "Very unlikely to need surgery" to "Very likely to need surgery").

Process measures included group-level analytics from the video-hosting platform (number of views and finishes, average time and percentage of video played), and four questions immediately following the video to determine: i) whether participants could see and hear the video (yes/no), ii) whether participants had previously seen the video (yes/no), iii) how many times participants viewed the video , and iv) level of satisfaction that the video met their information needs (five response options from "Very unsatisfied" to "Very satisfied"). Lastly, an optional free-text question: "*If you were to think of one word*

to describe how you feel after watching the video, what would it be?", was asked for the purpose of generating a word cloud for each group.

Sample size

A total sample size of 516 (258 per group) was required to detect a minimum difference of 0.4 units between groups in change in self-efficacy with 80% power and alpha of 0.05 split between two co-primary outcomes. This assumes a standard deviation of 1.6 units [15, 31], a conservative correlation of 0.4 [31] between baseline and post-intervention score and no attrition based on prior experience. This sample size is sufficient to detect a minimum difference between groups of 0.8 in kinesiophobia (co-primary) with 80% power assuming a standard deviation of 3.3 and a correlation between baseline and post-intervention of 0.4 [15, 31]. These differences equate to a small effect size of 0.25. As the minimum clinically important differences (MCID) in the co-primary outcomes are unknown; we felt a small generic effect size upon which to power the study, was appropriate for our brief, low-cost intervention.

Statistical analysis

The biostatistician analysed data according to the pre-specified Statistical Analysis Plan (http://go.unimelb.edu.au/84ki) using Stata version 16.1 (StataCorp LLC, College Station, TX, USA). Descriptive data are presented by group. Comparative analyses between groups were performed using intention-to-treat according to randomised group, irrespective of intervention adherence. Multiple imputation was conducted using chained equations as >5% of both primary outcomes post-intervention was missing. Data were imputed for each intervention group separately using predictive mean matching with five nearest neighbours, with ten imputed datasets created. Imputation models included all

outcomes at both baseline and post-intervention, where applicable, age, gender, body mass index, education, geographical location, employment status, duration of symptoms, ethnicity, personal relevance and pain during walking. Estimates from imputed datasets were combined using Rubin's rules [32]. Characteristics for those with and without post-intervention primary outcomes were compared and complete-case analyses were conducted to assess the sensitivity of findings to missing data assumptions.

For primary and continuous secondary outcomes, separate linear regression models were used to estimate the between-group mean (95% confidence interval, CI) difference in change scores, adjusted for the outcome at baseline. Standard diagnostic plots were used to check model assumptions.

For the binary secondary outcome ('hopefulness'), groups were compared using logistic regression followed by estimation of the marginal predicted risk of hopefulness for each educational video intervention group [33, 34, 35]. Results are reported as risk differences and risk ratios, with corresponding 95% CIs. For ordinal secondary outcomes, ordinal logistic regression models were fitted, adjusted for the outcome at baseline where applicable. Proportional odds was assessed using the Brant test [36] with multinomial regression used if proportional odds could not be assumed. Results are reported as odds ratios, or relative risk ratios, with corresponding 95% CIs.

Results

Of 3007 volunteers during 1-17 November 2021, 589 were eligible and randomised (Figure 1). Participants were, on average, 56.4 years old and two thirds were female. Baseline characteristics between groups were similar, except for some differences in pain duration (Table 2). Ninety-three

percent of participants completed both post-intervention co-primary outcomes with the remaining participants voluntarily exiting the survey between completion of baseline outcomes and commencement of post-intervention outcomes. Those completing the study were more likely male (35% vs. 21%), tertiary educated (52% vs. 31%) and concerned about their knee problem at baseline (20% vs. 10% reported quite to extremely concerned), than those not completing (Appendix D).

Primary outcomes

Primary outcomes are presented in Table 3. Post-intervention, the experimental group had greater improvements in self-efficacy for managing OA pain (mean difference 0.4 [95% CI 0.2, 0.6] units, p<0.001) and greater reductions in fear of movement (1.6 [95% CI 1.1, 2.0] units, p<0.001) than control.

Secondary outcomes

Continuous outcomes are presented in Table 3. The experimental group had greater improvements than the control group in Part 1 and Part 2 of the Credibility/Expectancy Questionnaire (mean between-group differences in change of 1.8 [95% CI 1.2, 2.3, p<0.001] and 1.2 [95% CI 0.8, 1.5, p<0.001] units respectively). The experimental group also had greater increases in beliefs about the importance of physical activity (0.2 units [95% CI 0.1, 0.3, p=0.001]), in motivation to be physically active (0.9 units [95% CI 0.6, 1.2, p<0.001]) and in knee OA knowledge (7.7 points [95% CI 6.8, 8.6, p<0.001]).

Binary and ordinal outcomes are provided in Table 4. No difference in change in hopefulness was detected between groups post-intervention. Post-intervention, relative risk ratios comparing the control group to the experimental group increased with increasing level of concern. For example, the relative

risk ratio for 'very or extremely' concerned compared to 'not at all' was 8.45 [95% CI 2.09, 34.15, p = 0.003]. This means that the expected risk of having the highest level of concern was greater for participants in the control group than the experimental group. Post-intervention, the odds of being more likely to perceive surgery will be needed were higher in the control group than the experimental group (odds ratio 3.18 [95% CI 2.26, 4.47, p<0.001]). The findings from complete case analyses were similar (Appendices E and F).

Process evaluation

According to self-report, no participants had seen their allocated video prior to this study and compliance with intervention protocol was high (Table 5). There was no difference in satisfaction between groups (Table 5). Analytics suggested similar view patterns between groups (Table 5). Two word-clouds were created to summarise how participants felt after watching their video (Figure 2). The most frequently reported three words from the experimental group were: hopeful (n=45), informed (n=27), then relieved (n=19); and from the control group were: informed (n=73), hopeful (n=35), then optimistic (n=11).

Discussion

This RCT evaluated two educational videos for people with knee OA. Both videos included evidence-based information and highlighted the importance of physical activity, exercise and weight loss, but differed according to the language and communication style used. The control video utilised a disease and impairment discourse, which is typical of traditional biomedical educational approaches [19, 20]. In contrast, the experimental video utilised an empowerment and participatory discourse. Our findings

showed that the experimental video resulted in greater positive shifts in almost all psychological-cognitive outcomes compared to control.

Education of patients with knee OA is considered fundamental to best practice management [2, 3, 37], yet there is scarce research to direct the design and delivery of this education [2]. Several recent studies detail the negative consequences of using biomedical language to describe and explain health conditions [1, 6, 38, 39, 40, 41]. Some diagnostic labels instil fear, heighten illness beliefs and behaviours, and reduce active participation in care [42, 43]. Using medical or 'precise' terminology may increase perceived severity of the condition and increase preference for passive or more invasive treatments [38, 44, 45]. Our findings support those of the emerging research in this area. For example, a systematic review of RCTs of hypothetical scenarios for low-risk, screening-detected conditions showed that simply changing the words used to label a condition to less medicalised terminology leads to reduced anxiety and increased active participation in self-care [45]. Furthermore, novel educational programs such as pain neuroscience education (which explains pain in terms of the physiological and psychological processes), and pain coping skills training (a form of cognitive-behavioural therapy), are effective in trials for improving psychological outcomes such as pain coping and catastrophizing in people with musculoskeletal conditions [46, 47, 48]. Our RCT is novel in that we simply redesigned the educational approach, by substituting a disease and impairment discourse for an empowerment and participatory discourse.

The experimental video improved self-efficacy for managing OA pain and kinesiophobia more than the control video. Self-efficacy is considered fundamental for effective chronic disease self-management [49] and greater self-efficacy is related to higher physical activity levels in people with OA [50, 51]. Improvements in pain self-efficacy may boost self-management practices and engagement in positive

lifestyle behaviours for people with knee OA, which may eventually reduce symptoms and enhance well-being. Kinesiophobia is the fear that physical movement will exacerbate pain by worsening the damage [52]. Higher levels of kinesiophobia are linked to lower physical activity levels in people with knee OA [53, 54]. People who are fearful of activity because of their beliefs about the causes of their pain are less likely to engage in the very treatments that can alleviate symptoms and preserve joint functioning [55]. According to the fear-avoidance model, fear is increased by heightened negative emotion and hypervigilance to symptoms [56]. For people with knee OA, shifting the OA narrative away from 'wear and tear' and towards 'motion is lotion' directly attempts to address movement avoidance behaviours. In addition, the promotion of more positive emotions through the design features and content of the experimental video may counter some negativity and thereby reduce fear. The MCID for both the self-efficacy and kinesiophobia measures is currently unknown [57]. However, these findings may be interpreted as being important since the pre-specified effect size, which assumed a small difference could translate to an important benefit over time, was exceeded.

Our secondary outcomes also showed benefits of the experimental video. Expectations about treatment response have a powerful association with treatment choices and outcomes [58, 59]. Negative expectations for future pain and prognosis, including that worsening and surgery are inevitable, are common among people with knee OA [1, 6, 60]. Although both videos addressed these misconceptions, the experimental video delivered the relevant information with positivity rather than simply presenting 'information facts'. Expectations of safety and benefit from physical activity were strongly emphasised. The significantly greater increase in scores on the Credibility/Expectancy Questionnaire for the experimental group suggest the goal of increasing positive expectation about prognosis and physical activity benefits was achieved, which has potential to increase uptake of evidence-based interventions.

The experimental video led to greater improvements in OA knowledge and perceived importance of physical activity than the control video. Better knee OA knowledge and appreciating the importance of physical activity for managing OA symptoms is associated with higher participation in effective self-management behaviours including exercise [61]. These findings of greater improvements in knowledge are consistent with a previous pilot study that similarly compared standard education with education addressing common unhelpful beliefs about knee OA via information booklets [30]. Our study also demonstrated increased personal motivation to be physically active. According to the Information-Motivation-Behavioural skills model of behaviour change [62], having the motivation to change is an essential determinant of behaviour that is independent of knowledge. This finding further supports greater potential for people to become more physically active following education with an empowerment approach.

Previous studies investigating stand-alone education have generally found limited direct translation of psychological-cognitive improvements to pain and function outcomes [63, 64]. Behaviour change theory tells us that it takes more than just knowledge, self-efficacy and motivation for behaviour to change [65], and the intention-behaviour gap is a recognised problem [66]. Thus, it is unrealistic to expect our short video to directly change behaviours or improve clinical outcomes such as pain. Future research should determine whether the benefits of education based on empowerment and participatory discourse can be combined with other interventions, such as support from a healthcare professional or environmental restructuring (e.g., better access to exercise opportunities), to achieve the behavioural changes that should help improve health outcomes.

Our study did not find between-group difference regarding feelings of hope for the future. Only 36 (13%) and 43 (16%) people in the experimental and control groups respectively did *not* feel more

hopeful post-intervention. Thus, this measure may not be adequately discriminatory. However, the high levels of hopefulness in both groups, and similar satisfaction scores, highlights that education based on evidence-based biomedical information that explains the OA pathophysiology of the disease (e.g., control video) is also well received by people with knee OA.

Strengths and limitations

Our study sample comprised mostly educated, urban, Australians, thus findings cannot necessarily be generalised to all people with knee OA. However, the disease profile of our sample is indicative of people who present to primary care for management of knee OA and thus represent the target group for education. The findings also cannot be generalised to people who self-reported inability to walk, including inability to walk because of knee OA. However, we would not expect this short video about knee OA to be an appropriate stand-alone intervention for people with longstanding severe pain and psychological distress, so exclusion of people unable to walk, potentially because of knee OA, is appropriate in the context of this study. Our internally-valid study design provides confidence that our findings are robust, however, the lack of longer-term follow-up limits the clinical practice recommendations that can be made from these findings.

Conclusion and clinical implications

An educational video based on an empowerment and participatory discourse improved pain self-efficacy, and reduced kinesiophobia in people with knee OA more than a video based on a disease and impairment discourse. Differences between groups were small to moderate and it is unknown if effects persist beyond the same day or translate into effective self-management behaviours. However, given

the intervention was low cost, and scalable (only 12-minutes long), greater consideration to the discourse within educational material for knee OA is advocated. Our study has immediate relevance for people with knee OA and clinicians. The experimental video is available for free on the internet (https://vimeo.com/573794719). Clinicians may use the video to supplement in-person discussions. Clinicians may also consider the language and discourse of other materials they provide to patients, although research evaluating longer-term impacts is necessary.

Competing interests

None of the investigator team have any financial or other competing interests to declare.

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Author contributions

TE contributed to conception and design, interpretation of the findings, drafting of the article, final approval of the article, obtaining of funding, administration of the trial and overall project, development of the interventions and collection and assembly of data. TE takes responsibility for the integrity of the work as a whole, from inception to finished article.

FM and KEL contributed to conception and design, statistical expertise, analysis of the data, critical revision of the article for important intellectual content, and final approval of the article.
KLB and RSH contributed to conception and design, interpretation of the data, critical revision of the article for important intellectual content, final approval of the article, obtaining funding, and logistic support.

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Data sharing

Data may be made available from Dr Thorlene Egerton, upon reasonable request from individual researchers and with a legally binding data sharing agreement.

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Figure legends

Figure 1. Study flow chart

Figure 2. Word-clouds created from the words written by participants from A) experimental group and B) control group, in answer to the question: "If you were to think of one word to describe how you feel after watching the video, what would it be?"

Tables

Table 1. Key components and differences across the two video interventions.

	Experimental video [23]	Control video
Discourse	Focus on empowerment and participation	Provides disease and impairment-based information and advice
Information based on high-quality evidence	Yes	Yes
Information content Notes: 1. Differences between the videos in topics covered are consistent with holistic versus pathoanatomical approach 2. Some topics (*italics*) are mentioned but not explained in detail	Diagnosis Recommended treatment includes: – Exercise – *Weight management* – *Medicines* – *TENS* – *Surgery* – *Canes/walking sticks* Other considerations: – *Sleep* – Mood[a] – Fatigue[a]	Disease process[a] Diagnosis Recommended treatment includes: – Exercise – Weight management – Medicines – TENS – Surgery – Canes/walking aids Other considerations: – *Sleep*
Duration	12 minutes	12 minutes
Education theory	Constructivism	Cognitivism
Health Behaviour Change theory	Social-cognitive theory Information-Motivation-Behavioural skills model	Nil (apart from information provision)
Other design features	Branded as University of Melbourne Background music and tone of voice was utilised to help regulate emotions	Branded as University of Melbourne
Aesthetics[b], (0-10)	Average 9.0	Average 7.4
Information quality[b], (0-10)	Average 8.4	Average 9.8
Estimated video script readability[c]	13-14 year old level (Flesch Reading Ease = 74.8, Flesch Kincaid grade level = 7.0, Simple Measure of Gobbledygook = 6.5)	16-17 year old level (Flesch Reading Ease = 56, Flesch Kincaid grade level = 10.6, Simple Measure of Gobbledygook = 9.8)

[a] Topics where there were clear differences between videos

[b] Rated by 5-member consumer panels (Appendix B).

[c] WebFX readability test tools [webfx.com/]

Table 2. Baseline characteristics of participants by group, reported as mean (standard deviation) unless otherwise stated.

	Experimental [n=296]	**Control [n=293[a]]**
Age (years), median (IQR)	55 (50-62)	54 (50-61)
Gender, n (%)		
Male	96 (32.4)	103 (35.2)
Female	198 (66.9)	190 (64.8)
Other/Prefer not to say	2 (0.7)	0 (0.0)
Non-binary	0 (0.0)	0 (0.0)
State/territory (population as at 30/06/2021), n (%)		
Australian Capital Territory (432K)	7 (2.4)	3 (1.0)
New South Wales (8,189K)	80 (27.0)	73 (24.9)
Northern Territory (246K)	1 (0.3)	2 (0.7)
Queensland (5,221K)	76 (25.7)	79 (27.0)
South Australia (1,773K)	21 (7.1)	32 (10.9)
Tasmania (542K)	8 (2.7)	5 (1.7)
Victoria (6,649K)	70 (23.6)	70 (23.9)
Western Australia (2,682K)	33 (11.1)	29 (9.9)
Geographical location[b], n (%)		
Major city	209 (70.6)	213 (72.9)
Inner regional	65 (22.0)	54 (18.5)
Outer regional	21 (7.1)	23 (7.9)
Remote	0 (0.0)	2 (0.7)
Very remote	1 (0.3)	0 (0.0)
Height (m)	1.68 (0.11)	1.69 (0.12)
Weight (kg)	81.6 (20.1)	83.8 (21.7)
Body mass index (kg/m^2)	29.0 (7.0)	29.6 (7.9)
Level of education, n (%)		
Less than 3 years of secondary education (high school)	12 (4.1)	15 (5.1)
3 or more years of secondary education (high school)	53 (17.9)	54 (18.4)
Some education beyond high school (e.g., trade/technical/vocational training)	76 (25.7)	80 (27.3)
Completed tertiary education (college or university)	155 (52.4)	144 (49.1)
Current employment situation, n (%)		
Unemployed or not paid employment	39 (13.2)	46 (15.7)

Retired (not due to health reasons)	73 (24.7)	50 (17.1)
Unable to work due to health reasons	20 (6.8)	20 (6.8)
Paid work part time	71 (24.0)	73 (24.9)
Paid work full time	93 (31.4)	104 (35.5)
Ethnicity, n (%)		
Australian/New Zealander	234 (79.1)	217 (74.1)
Aboriginal and Torres Strait Islander	2 (0.7)	3 (1.0)
European	34 (11.5)	46 (15.7)
Asian	18 (6.1)	18 (6.1)
Other Oceanian	1 (0.3)	0 (0.0)
North African & Middle Eastern	1 (0.3)	2 (0.7)
Sub-Saharan African	2 (0.7)	2 (0.7)
North American	2 (0.7)	3 (1.0)
South American	0 (0.0)	1 (0.3)
Other	2 (0.7)	1 (0.3)
Pain severity during walking[c]	3.5 (2.1)	3.4 (1.9)
Pain duration, n (%)		
<1 year	67 (22.6)	69 (23.5)
1 to <2 years	62 (20.9)	81 (27.6)
2 to <5 years	82 (27.7)	54 (18.4)
5 to <10 years	38 (12.8)	41 (14.0)
10 to <15 years	22 (7.4)	12 (4.1)
15 to <20 years	10 (3.4)	13 (4.4)
>20 years	15 (5.1)	23 (7.8)
Where received OA information[d], n (%)		
No information received	100 (33.8)	101 (34.5)
GP or family doctor	91 (30.7)	78 (26.6)
Orthopaedic surgeon	18 (6.1)	9 (3.1)
Another doctor (such as sports doctor or rheumatologist)	10 (3.4)	7 (2.4)
Nurse	8 (2.7)	8 (2.7)
Physiotherapist	30 (10.1)	30 (10.2)
Osteopath	8 (2.7)	9 (3.1)
Chiropractor	10 (3.4)	12 (4.1)
OA rehabilitation programme	3 (1.0)	0 (0.0)
Arthritis educator	1 (0.3)	1 (0.3)
Arthritis support group	1 (0.3)	0 (0.0)
Other people with OA	35 (11.8)	37 (12.6)
Family or friends	85 (28.7)	73 (24.9)
Internet/website	70 (23.6)	73 (24.9)
Television	17 (5.7)	31 (10.6)
Information booklets	19 (6.4)	10 (3.4)

Training as a health professional	6 (2.0)	2 (0.7)
Other media	1 (0.3)	0 (0.0)
Other health professional	1 (0.3)	2 (0.7)
Personal relevance of OA education[e], n (%)		
Not at all relevant	15 (5.1)	17 (5.8)
A little bit relevant	118 (39.9)	112 (38.2)
Quite relevant	101 (34.1)	89 (30.4)
Very relevant	48 (16.2)	56 (19.1)
Extremely relevant	14 (4.7)	19 (6.5)

[a] n=292 for geographical location so percentage was calculated among only those with complete data for this variable.

[b] Classified using the Australian Standard Geographical Classification (ASGC) Remoteness Structure.

[c] Question asked participant to rate the "average amount of pain felt during walking over the PAST WEEK in your most painful knee" on a numerical rating scale (range 0-10, where 0=no pain and 10=worst pain possible).

[d] "Where have you previously learned about osteoarthritis?" Multiple options could be selected.

[e] Question asked participant to rate "How relevant do you think education about knee osteoarthritis is to you at this time?".

IQR: interquartile range (25^{th} to 75^{th} percentile); OA: osteoarthritis; GP: general practitioner.

Table 3. Summary measures and estimated mean difference in change [95% CI] for each continuous outcome within and between groups, using multiply imputed data. Baseline and post-intervention mean and standard deviations are based on complete case data.

	Baseline, mean (SD)		Post-intervention, mean (SD)		Within-group change[a], mean (SD)		Between-group difference in change (n=589[b])	
	Experimental (n=296)	**Control (n=293)**	**Experimental (n=274)**	**Control (n=273[c])**	**Experimental (n=296)**	**Control (n=293[d])**	**Mean[e] [95% CI]**	**P-value**
Primary outcomes								
Self-efficacy for managing OA pain (ASES-Pain)	6.7 (1.8)	6.9 (1.7)	8.4 (1.6)	8.0 (1.5)	1.7 (1.7)	1.1 (1.4)	0.4 [0.2, 0.6]	<0.001
Kinesiophobia (BFMS)	13.6 (2.8)	13.7 (3.0)	10.6 (3.1)	12.2 (3.1)	3.0 (2.9)	1.5 (2.7)	1.6 [1.1, 2.0]	<0.001
Secondary outcomes								
Credibility/Expectancy Questionnaire[f]:								
Part 1 Credibility	16.6 (4.5)	16.9 (5.1)	22.4 (4.2)	20.8 (4.6)	5.8 (4.4)	3.9 (4.0)	1.8 [2.3, 1.2]	<0.001
Part 2 Expectancy	10.9 (2.8)	11.1 (3.1)	14.8 (2.5)	13.8 (2.8)	4.0 (2.9)	2.7 (2.5)	1.2 [0.8, 1.5]	<0.001
Importance of physical activity[g]	3.7 (0.7)	3.7 (0.8)	4.5 (0.6)	4.3 (0.7)	0.8 (0.7)	0.6 (0.8)	0.2 [0.1, 0.3]	0.001
Motivation to be physically active (NRS)	5.5 (2.5)	6.0 (2.7)	7.7 (2.1)	7.1 (2.3)	2.2 (2.3)	1.1 (2.0)	0.9 [0.6, 1.2]	<0.001
Knee OA knowledge (KOAKS)	33.7 (4.0)	33.5 (4.1)	49.0 (6.0)	41.2 (5.8)	15.3 (6.3)	7.7 (5.6)	7.7 [6.8, 8.6]	<0.001

[a] Within-group change was calculated as post-intervention minus baseline for all continuous outcomes, except kinesiophobia where the within-group change was calculated as baseline minus post-intervention, so that positive values indicate improvement.
[b] n=587 for Credibility/Expectancy Questionnaire part 1 and part 2, importance of physical activity, and motivation to be physically active.
[C] n = 271 for Credibility/Expectancy Questionnaire part 1 and part 2, importance of physical activity, and motivation to be physically active.
[d] n=291 for Credibility/Expectancy Questionnaire part 1 and part 2, importance of physical activity, and motivation to be physically active.
[e] Positive values favour experimental group; mean (95% CI) difference in change between groups, adjusted for the outcome at baseline, estimated using separate regression models for each outcome.

[f] Credibility/Expectancy Questionnaire, Part 1 Credibility: credibility of physical activity being an effective treatment for reducing pain (range 3 to 27 with higher scores indicating higher credibility) and Part 2 Expectancy: expectation of achieving reduced pain (range 2 to 18 with higher scores indicating greater expectations).
[g] Importance of physical activity – 4 items (range 1 to 5 with higher scores indicating more importance).
SD: standard deviation; CI: confidence interval; OA: osteoarthritis; ASES-Pain: Arthritis Self-efficacy Scale - pain subscale (range 0 to 10 with higher scores indicating greater self-efficacy); BFMS: Brief Fear of Movement Scale for OA (range 6 to 24 with higher scores indicating greater fear); NRS: numerical rating scale (range 0 to 10 with higher scores indicating greater motivation); KOAKS: Knee OsteoArthritis Knowledge Scale (range 11 to 55 with higher scores indicating better knowledge).

Table 4. Relative risks [95% CI], risk differences [95% CI] or odds ratios [95% CI] for binary/ordinal outcomes as appropriate between groups, using multiply imputed data. Counts and proportions based on complete case data.

	Baseline, counts (proportions)		**Post-intervention, counts (proportions)**		**Between-group (n=589)**			
	Experimental (n=296[a])	**Control (n=293)**	**Experimental (n=274)**	**Control (n=273[b])**	**Relative risk[c] [95% CI]**	**P-value**	**Risk difference[d] [95% CI]**	**P-value**
Perception of feeling somewhat or much more hopeful[e]			238 (86.9)	230 (84.2)	0.97 [0.90, 1.04]	0.359	-0.03 [-0.09, 0.03]	0.358
					Relative risk ratio[f] [95% CI]	**P-value**	**Odds ratio[g] [95% CI]**	**P-value**
Level of concern:[h]								
Not at all	57 (19.3)	48 (16.4)	128 (46.7)	63 (23.1)	REFERENCE			
A little	183 (61.8)	187 (63.8)	117 (42.7)	168 (61.5)	3.46 [2.32, 5.17]	<0.001		
Quite	41 (13.9)	39 (13.3)	22 (8.0)	30 (11.0)	4.67 [2.24, 9.73]	<0.001		
Very or extremely	15 (5.1)	19 (6.5)	7 (2.6)	12 (4.4)	8.45 [2.09, 34.15]	0.003		
Perceived personal likelihood of ever needing knee replacement surgery:							3.18 [2.26, 4.47]	<0.001
Very unlikely	31 (10.5)	27 (9.2)	142 (51.8)	76 (28.1)				
Unlikely	87 (29.4)	81 (27.6)	77 (28.1)	97 (35.9)				
Neutral	116 (39.2)	128 (43.7)	41 (15.0)	71 (26.3)				

Likely	50 (16.9)	47 (16.0)	10 (3.6)	21 (7.8)
Very likely	12 (4.1)	10 (3.4)	4 (1.5)	5 (1.9)

[a] n=295 for perceived personal likelihood of ever needing knee replacement surgery.
[b] n=270 for perceived personal likelihood of ever needing knee replacement surgery.
[c] Relative risk < 1 favours the experimental group.
[d] Risk difference < 0 favours the experimental group.
[e] Logistic regression model fitted, unadjusted.
[f] Multinomial regression models fitted as proportional odds could not be assumed. Relative risk ratios > 1 indicate higher levels of concern in the control group compared to the experimental group.
[g] Ordinal logistic regression model fitted assuming proportional odds. Odds ratios > 1 indicate higher odds of the control group being more likely to perceive needing surgery compared to the experimental group.
[h] Question asked: "How concerned are you about your knee problem?" Very and extremely concerned categories collapsed together due to small numbers.
CI: confidence interval.

Table 5. Process measures by group presented as n (%) unless otherwise indicated. Odds ratio [95% CI] for satisfaction between groups, using multiply imputed data.

	Experimental (n=296[a])	Control (n=293[b])	Odds ratio[c] [95% CI]	P-value
Video sharing platform analytics[d]:				
Video views	289 (97.6)	278 (94.9)		
Video finishes	219 (74.0)	247 (84.3)		
Proportion of video played, mean	95%	94%		
Time played (minutes), mean	11.5	11.6		
Self-reported (questionnaire) data:				
Could see *but not hear* video	1 (0.3)	2 (0.7)		
Did *not* watch video all the way through	1 (0.3)	0 (0.0)		
Satisfaction that video met information needs:			1.16 [0.83, 1.63]	0.387
Very unsatisfied	16 (5.8)	22 (8.1)		
Moderately unsatisfied	2 (0.7)	5 (1.8)		
Neutral	14 (5.1)	7 (2.6)		
Moderately satisfied	83 (30.3)	68 (24.9)		
Very satisfied	159 (58.0)	171 (62.6)		

[a] n = 274 for satisfaction that video met information needs
[b] n = 273 for satisfaction that video met information needs
[c] n = 589. Ordinal logistic regression model fitted as proportional odds could be assumed. Odds ratio > 1 indicate higher odds of increased satisfaction in the control group compared to the experimental group.
[d] Analytics were sourced from the video sharing platform and interpretation should be with caution. E.g., Stopping the video during the final credits means the view is not counted as a "finish".
CI = confidence interval.