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Evaluation of the usability of and engagement with an osteoarthritis e-learning program developed for healthcare professionals

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ABSTRACT

Objective: This study aimed to describe the development and evaluation of an OA eLearning program for healthcare professionals. The evaluation objectives were to measure the usability of, and engagement with, this program and assess the perceived feasibility, acceptability, appropriateness and user satisfaction among OA healthcare professionals.

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eLearning
Health professional education
Best-evidence care
Guideline-concordant care

Methods: A feasibility study was conducted, involving registered healthcare professionals, who regularly manage people with OA. Following baseline questionnaires, participants were asked to complete at least four OA eLearning modules over 10 weeks, followed by a 23-item evaluation questionnaire. The primary outcomes were usability and engagement with the OA eLearning program. Secondary outcomes included feasibility, acceptability, appropriateness, and satisfaction.
Results: The 31 eligible participants reflected a broad range of professional experiences, nationalities and settings. Program usability, engagement with content, navigation, presentation and overall satisfaction were rated as either very good or good by at least 84% of participants. Participants considered the program to be acceptable, feasible, and appropriate, with some areas for improvement in navigating the program.
Conclusions: The OA eLearning program shows promise in supporting healthcare professionals to deliver evidence-based care. While the findings from this study will inform a randomised trial, the OA eLearning program is well positioned to enhance clinical education and practice.

1. Introduction

Osteoarthritis (OA) clinical practice guidelines recommend education, exercise and physical activity, and weight management as first-line treatments [1]. Yet, implementation of these core OA recommendations in clinical practice remains suboptimal [1]. First-line treatments are underused, while medication prescription rates and referrals for joint replacement surgery remain high [2,3]. A major barrier for implementation of recommended OA care is the variability in healthcare professionals' confidence and knowledge, as well as their perceived lack of skills to deliver recommended care [4–8]. Limited awareness and uptake of clinical guidelines, along with outdated beliefs about exercise and physical activity for OA, further influence care delivery [7–9].To improve OA care, guideline-informed implementation strategies are needed to address these gaps to support healthcare professionals' knowledge and skills [10–15].

eLearning offers a scalable and flexible way to support the implementation of evidence-based OA management [12]. Existing OA e-learning programs improve healthcare professionals' confidence, knowledge, and delivery of guideline-informed care. These programs also report high acceptability and feasibility across disciplines [16–19]. However, most existing OA eLearning programs focus on single professions, specific components of care, or are constrained to jurisdictional boundaries leaving a gap in comprehensive, multidisciplinary training that is transferable across countries (notwithstanding language barriers). This study aimed to bridge gap by evaluating a broad, capability-based OA eLearning program designed for diverse healthcare professionals. This is important because many healthcare professionals still report low confidence in delivering guideline-recommended OA care and identify structural barriers in doing so [12]. While Arthritis Training Learning and up-Skilling (ATLAS) was developed in Australia, it is not limited to the Australian context and is demonstrating transferable potential across countries, as monitored through ongoing evaluation. This represents a key point of difference from other OA eLearning programs.

This paper focuses on the development and evaluation of an OA eLearning program. The OA eLearning program was developed in collaboration with the Osteoarthritis Research Society International Joint Effort Initiative (OARSI JEI) [20]. The Joint Effort Initiative is an international consortium of clinicians, researchers, consumers and consumer organisations with a shared vision of improving the international implementation of OA management programs. The development of the OA eLearning program aligns with a top Joint Effort Initiative research priority to develop and evaluate training and education for healthcare professionals delivering OA care [9,20].

Structurally, the OA eLearning program formed part of the broader ATLAS program, which was developed between 2020 and 2024, supported by funding from the Australian Government. The ATLAS program was created in response to the Australian National Strategic Action Plan for Arthritis [21] to enhance healthcare professionals' competencies in arthritis care, including specific competencies in OA and rheumatoid arthritis (RA) [22]. The OA eLearning program includes shared content with the RA eLearning program. This shared content forms the four-module *Arthritis Essentials* credential within ATLAS. The OA-specific and shared modules were launched on a test site and presented collectively as the OA eLearning program.

This study aimed to develop and evaluate an OA eLearning program for healthcare professionals. The study objectives were to describe the development of the OA eLearning program, evaluate the usability of and engagement with this program (primary outcomes), and assess the feasibility, acceptability, appropriateness and user satisfaction (secondary outcomes) among healthcare professionals who care for people living with OA.

2. Methods

This feasibility study consists of two parts; (1) development of the OA content to form the OA eLearning program and (2) evaluation of the OA eLearning program informing future evaluation via a randomised controlled trial (RCT). Ethics approval was obtained from The University of Sydney Human Research Ethics Committee (2023/683). This feasibility study is reported following the STROBE guidelines [23]and the Checklist for Reporting Results of Internet E-Surveys [24].

2.1. Development of the OA eLearning program

The development of the OA eLearning program was guided by recommendations from the Global Independent Commission on the Education of Healthcare Professionals in the 21st Century [25]. The OA content was developed using the OA core capabilities framework by international OA experts identified by the team [26], and then published as a training manual for healthcare professionals [27]. The Theoretical Domains Framework further informed the development of the OA eLearning program content, with practical strategies presented to assist healthcare professionals address implementation barriers [28]. The training manual content was used to inform the development of interactive eLearning modules, which were then integrated into an online Learning Management System (LMS). Twelve modules of the OA eLearning program were produced and hosted on an online LMS. The OA eLearning program is self-paced, flexible and non-sequential, enabling healthcare professionals across diverse professional disciplines to choose content that is clinically relevant to them, and fit their learning around their busy patient loads. It incorporates interactive activities, case studies, multimedia and downloadable resources. The OA eLearning modules were produced in collaboration with colleagues who developed the RA content, with the shared *Arthritis Essentials* modules co-developed as part of the broader ATLAS program (Fig. 1). This required systematic coordination between teams, including unified visual design standards, consistent navigation patterns, and aligned assessment approaches. A comprehensive overview of the development process is outlined in Supplementary Table 1.

2.2. Evaluation design

This feasibility study was based on the Kirkpatrick Evaluation Model and the implementation evaluation framework by Proctor et al. [29,30]. The first level of the Kirkpatrick Evaluation Model, evaluated the '*reaction*' of healthcare professionals to the OA eLearning program, by assessing the usability, engagement, feasibility, acceptability, appropriateness, uptake, patterns of use and participant satisfaction [31–33].

2.2.1. Participants and setting

Eligible participants were registered healthcare professionals. Participants from any disciplines, clinical settings and countries, if they cared for people with OA within their scope of practice, had internet access and a smart device (laptop, tablet, mobile phone), and could read and understand English were eligible. Study recruitment was via invitations sent to the investigator team's clinical and professional networks, and through an online social media campaign. A general invitation was also shared via broader stakeholder networks. Recruitment strategies aimed to reduce selection bias by engaging participants from diverse clinical settings.

2.2.2. Exposure

The modules were selected by the learner based on their self-identified learning needs and interests which is consistent with the adult learning theory used to design ATLAS [34].All participants were required to complete a minimum of four out of the 12 modules (which represented 4 h of eLearning) of their own choice in the OA eLearning program to be included in the evaluation. This method aimed to balance usability with participant experience, enabling manageable engagement with the OA eLearning program while assessing key outcomes. Participants were provided certificates of completion which contribute to Continued Professional Development hours for healthcare professional registration. Additionally, all participants were provided a small gift card reimbursement ($50AUD).

2.2.3. Data collection

The study was administered online by researchers from The University of Sydney. Study applicants were emailed a link to complete the online consent form and screening questions. A baseline survey then collected participant demographics and professional information. Participants were screened and enrolled if they met inclusion criteria and then were provided a secure link to register with the LMS to complete the OA eLearning modules over a 10-week period.

2.2.4. Outcome measures

The evaluation outcomes were self-reported and measured at 10 weeks from enrolment in the OA eLearning Program. Participants were asked to complete a questionnaire consisting of 23 questions, which took approximately 15 min to complete.

2.2.5. Primary outcomes

The primary outcomes were usability of, and engagement with, the OA eLearning program, measured using the Enlight tool [33]. The Enlight tool was originally developed to assess usability and engagement in web-based e-health interventions. The tool was adapted for this study to evaluate the usability and engagement of the eLearning program, and has previously demonstrated adequate reliability and validity in measuring these outcomes in a similar contexts [33]. The Enlight tool sub-scale items were usability (navigation, learnability, ease of use), visual design (aesthetics, layout, size), and engagement (content presentation, interactive, captivating) and were measured on a 5-point Likert scale (1 = very poor to 5 = very good).

2.2.6. Secondary outcomes

Secondary outcomes were assessed using the implementation outcome measurement tools, the *Feasibility of Intervention Measure, Acceptability of Intervention Measure* and the *Intervention Appropriateness Measure* to *assess* of the content in the context of implementation potential [31]. Satisfaction with the OA eLearning program was also

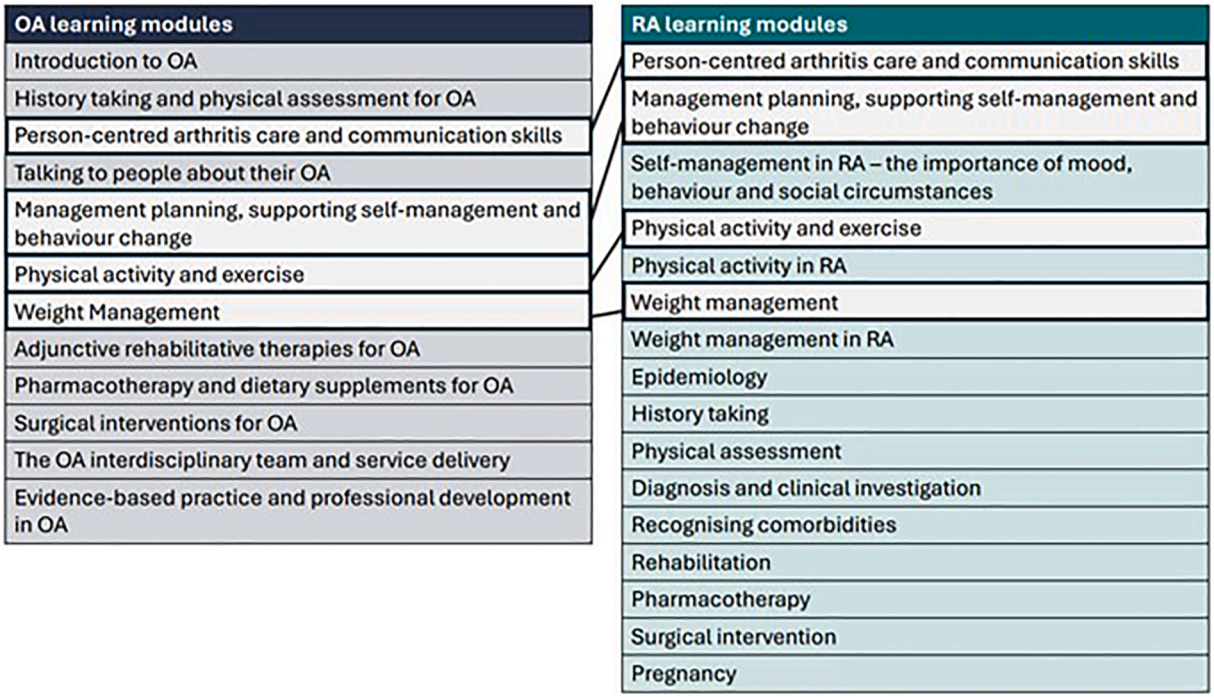

Fig. 1. The OA eLearning Program Modules within the broader ATLAS program The OA eLearning modules in the context of the ATLAS program. The OA specific modules are highlighted in blue and the RA specific modules are highlighted green. Shared modules with the RA eLearning Program are shown in white representing 'arthritis essentials' modules.

assessed using 5-point Likert scales (1 = completely disagree to 5 = completely agree) [32]. All outcome measures used in the study were validated tools, to reduce measurement bias and ensure reliability of the findings. Optional open-ended questions were also asked to gain further insights from the survey respondents. Additionally, uptake metrics including enrolment and participation, usage patterns, and completion rates were tracked through the LMS platform.

2.2.7. Sample size

There is no accepted method of calculating a sample size for this type of feasibility study. The recruitment target was based on an audit study of pilot and feasibility of trials registered in the UK Clinical Research Network database, which indicated a median sample size of 30 was required [35].A sample size of 40 participants was planned to accommodate the likelihood of participant attrition.

2.2.8. Data analysis

Participant demographics and professional characteristics provided at baseline were analysed using descriptive statistics. Primary and secondary outcome data were summarised using descriptive statistics reporting median and interquartile ranges. Text responses to open-ended questions were collated, synthesised and summarised to provide context to the survey responses.

3. Results

Fig. 2 illustrates the flow of participants through the study. Between March and May 2024, 450 responses were received to the online recruitment campaign, with 436 completing the screening process. Of these, 48 participants met the eligibility criteria for inclusion. Through a process of manual screening, 18 did not meet the inclusion criteria of being a healthcare professional, and 370 imposter participants were identified and excluded. Imposter participants were identified as study applicants who misrepresented their identity, qualifications and eligibility criteria. Responses that contained obvious inaccuracies or inconsistencies, such as unrealistic years of experience, mismatched degrees or qualifications, were flagged during manual screening. In addition, checks against healthcare professional registration databases were conducted to authenticate participants' professional status. Participants who failed these validation steps were subsequently excluded.

3.1. Participant demographics and characteristics

Participant demographics and characteristics are summarised in Table 1. Of the 31 participants who completed the four OA eLearning program modules and evaluation survey, most were female (58%), based in Australia (55%), English-speaking (84%), and were

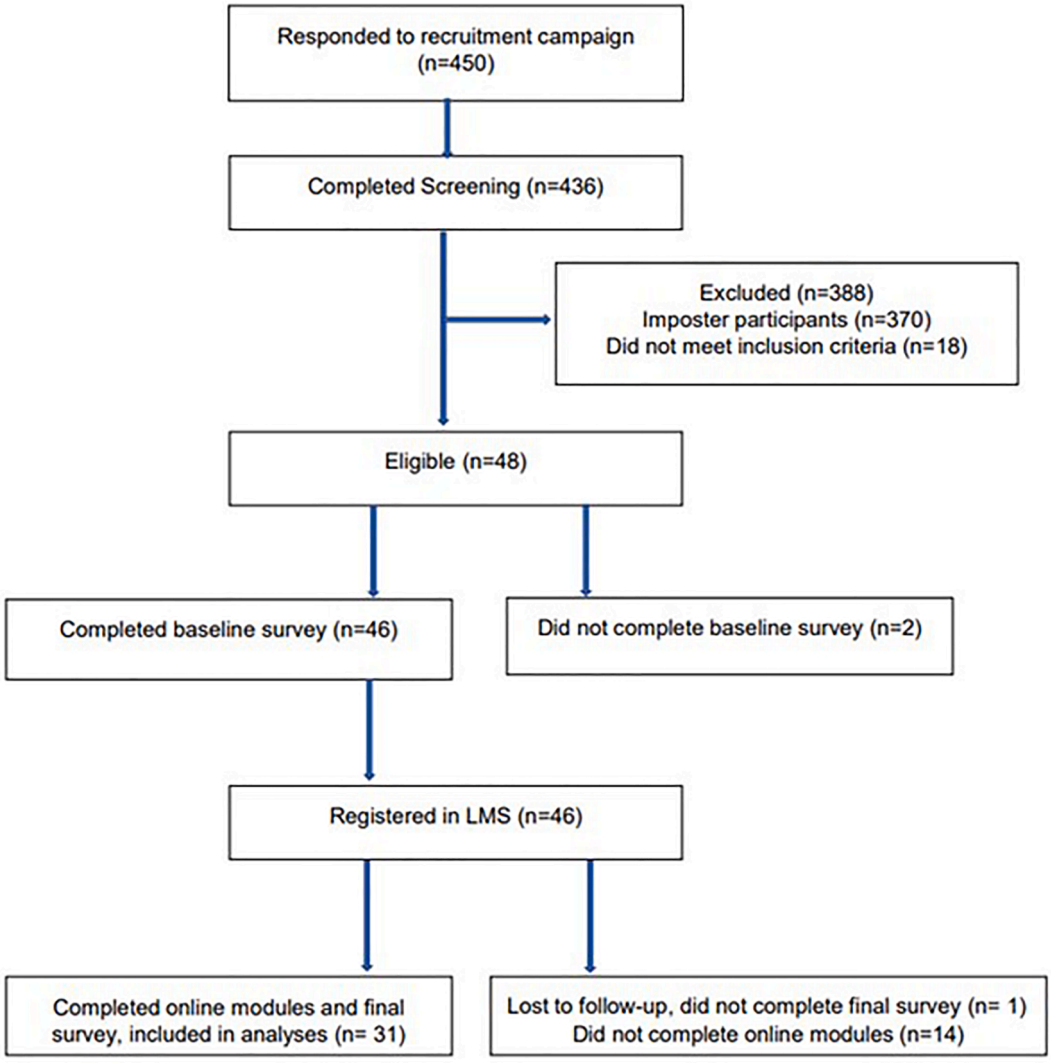

Fig. 2. Study recruitment flowchart This figure demonstrates the flow of participants through the study.

physiotherapists (42%) and osteopaths (23%). Participants represented a wide range of professional experience, from 0 to 2 years (13%) to over 16 years (29%). Nearly 40% held a master's degree, and most worked in a private practice setting (61%). The characteristics of the 15 participants who did not complete the four modules and evaluation survey were similar, except that more than half reported they worked in public hospital settings (60%).

3.2. Usability

Usability and navigation were rated highly overall (Table 2). Navigation was rated 'Good' (32%) or 'Very Good' (52%), with 16% rating it 'Fair'. Visual design was positively received, with 65% rating the layout 'Very Good', and learnability was rated 'Very Good' by 71% of respondents. Free-text comments on ease of use and navigation were more diverse, with some participants noting difficulties.

3.3. Engagement

The survey ratings for engagement were positive overall, with content presentation and interactivity rated 'Good' and 'Very Good' (87%). While participants appreciated the interactive features, some suggested adding more videos and real-world examples. Overall satisfaction with the eLearning program was rated as Very Good' or 'Good' by 96% of participants (Table 2).

3.4. Feasibility, acceptability and appropriateness of implementation of the OA eLearning program

A summary of the feasibility, acceptability and appropriateness of the OA eLearning program is provided in Table 3. Overall, participants found the OA eLearning program to be feasible for implementation in practice. The OA eLearning program was also considered acceptable and appropriate. The text responses further reinforce the acceptability of the OA eLearning program, with participants finding the content enjoyable to work through and expressing a willingness to promote it among colleagues. In response to the appropriateness and applicability questions, participants cited the relevance of the content aiding clinical practice.

Table 1
Demographic and professional characteristics of participants.

Characteristic	Completed modules and final survey ($n = 31$) (%)	Did not complete modules and final survey ($n = 15$) (%)
Age		
20–25 years	3 (10)	3 (20)
26–30 years	9 (29)	0
31–35 years	2 (7)	2 (13)
36–40 years	7 (22)	2 (13)
41–45 years	6 (19)	2 (13)
46–50 years	4 (13)	1 (7)
>50	0	5 (33)
Sex		
Male	13 (42)	7 (47)
Female	18 (58)	8 (53)
Country of residence		
Australia	17 (54)	9 (60)
Ireland	1 (3)	0
New Zealand	6 (19)	5 (33)
United Kingdom	2 (7)	0
United States	4 (13)	1 (7)
China	1 (3)	0
Ethnicity		
African American	5 (16)	0
Asian	7 (23)	2 (13)
Indigenous (including Aboriginal, Torres Strait Islander, Māori)	2 (7)	0
White	16 (52)	13 (87)
Other	1 (3)	0
First language spoken		
English	26 (84)	15 (100)
Mandarin	3 (10)	0
Spanish	1 (3)	0
Tamil	1 (3)	0
Professional discipline		
General practitioner/medical doctor	4 (13)	1 (7)
Rheumatologist	4 (13)	2 (13)
Orthopaedic surgeon	2 (7)	0
Nurse	1 (3)	2 (13)
Physiotherapist/physical therapist	13 (42)	8 (53)
Osteopath	7 (23)	2 (13)
Chiropractor	1 (3)	0
Podiatrist	1 (3)	0
Years in professional practice		
0–2 years	4 (13)	3 (20)
3–5 years	8 (26)	1 (7)
6–10 years	5 (16)	4 (27)
11–15 years	5 (16)	1 (7)
>16 years	9 (29)	6 (40)
Highest educational qualification(s)		
Bachelor degree	5 (16)	3 (20)
Bachelor degree with honours	5 (16)	2 (13)
Post graduate certificate or diploma	4 (13)	1 (7)
Masters	12 (39)	5 (33)
PhD	5 (16)	4 (27)
Health practice setting		
Private hospital	2 (7)	3 (20)
Public hospital	2 (7)	9 (60)
Private practice	18 (58)	5 (33)
Rehabilitation facility	1 (3)	1 (7)
Community health centre	4 (13)	2 (13)
University clinic	6 (19)	0
Research institute clinic	4 (13)	0
Prior experience managing people with osteoarthritis		
No	1 (3)	1 (7)
Yes	30 (97)3	14 (93)
Prior experience developing chronic disease management plans		
No	1 (3)	1 (7)
Yes	23	14 (93)
Unsure	7	0

This table summarizes the demographic and professional characteristics of participants (N = 31). And the participants who did not complete the modules and final survey (n = 15) Data include age, sex, country of residence, ethnicity, first language, professional discipline, years in practice, highest qualification, practice setting, and experience with osteoarthritis and chronic disease management. Frequencies and percentages are reported for each category. Percentages may not total 100% due to rounding due to small sample size.

3.5. Patterns of use and completion rates

Participants accessed the eLearning program most commonly via a laptop (58%) or desktop computer (48%). Over half (55%) completed at least the minimum required four modules, with 13% completing five modules and another 13% completing six or more modules. Six participants (19%) completed all 12 modules within the OA eLearning program.

Completion rates varied between modules. Modules relating to core recommendations for OA had higher completion than those focused on pharmacotherapy or adjunctive therapies. The 'Person-centred care and communication' module had the greatest engagement, followed by the 'History taking and physical assessment' and 'Weight management' modules. However, some modules like 'Pharmacotherapy and dietary supplements' and 'The interdisciplinary team and service delivery' had

Table 2
Usability, Engagement of the OA eLearning Program.

Usability of the Program (Enlight Survey)	1 = Very Poor n (%)	2 = Poor n (%)	3 = Fair n (%)	4 = Good n (%)	5 = Very Good n (%)	Median score (IQR)
Navigation	–	–	5 (16)	10 (32)	16 (51)	4.0 (3.0–4.0)
Learnability	–	–	1 (3)	8 (3)	22 (71)	4.0 (3.0–4.0)
Ease of use	–	–	1 (3)	16 (52)	14 (45)	3.0 (3.0–4.0)
Usability text responses						
Positive feedback:						
• The program is easy to use and navigate (participants 19, 96, 437).						
• *"it was easy to navigate through the site and it was really engaging"* (participant 19)						
• *"The case studies and patient videos were very useful in seeing the impact on the patients and hear their story"* (participant 278)						
• *"easy to navigate. different types of interaction kept my interest. very clinical. clear communication. I like that you can see progress on the side bar"* (participant 437)						
Areas for improvement:						
• Navigation issues. Problems returning to the playlist, (participants 277, 247, 391, 439, 450), confusing interface on some devices (participant 247).						
• *"It wasn't overly easy to see what you had and hadn't done. Sometimes it was easy to skip part of a module and not easy to go back (menu didn't work well on my Samsung tablet) and if you open some resources, it's hard to go back without closing the window and going back into the module"* (participant 247)						
• *"I had trouble keeping track of the modules that I had completed and finding the playlist once a module was completed"* (participant 439)						
• *"Navigating back to the full playlist is not intuitive … it would be more intuitive to have a button on this final page that has a link that says something along the lines of "Return to the full … playlist"* (participant 277)						
Visual design (Enlight Survey)	**1 = very poor n (%)**	**2 = poor n (%)**	**3 = Fair n (%)**	**4 = Good n (%)**	**5 = very Good n (%)**	**Median score (IQR)**
Aesthetics	–	–	1 (3)	15 (48)	15 (48)	3.0 (3.0–4.0)
Layout	–	–	3 (10)	8 (3)	20 (65)	4.0 (3.0–4.0)
Size (font/buttons/menus)	–	–	3 (10)	11 (36)	17 (55)	4.0 (3.0–4.0)
Visual design text responses						
Positive feedback:						
• High-quality and clear design (participants 15, 19, 35, 96, 280, 437, 447).						
• Effective use of colour to distinguish modules (participant 35).						
Areas for improvement:						
• Better visual indicators for module completion, improvement of 'click-to-expand' features (participants 316, 392).						
• *"it would be great if the information stays on the page even when the mouse is not hovered above the button/sign after the first attempt"* (participant *392)*						
Engagement (Enlight Survey)	**1 = very poor n (%)**	**2 = poor n (%)**	**3 = Fair n (%)**	**4 = Good n (%)**	**5 = very Good n (%)**	**Median score (IQR)**
Content presentation (video/audio/text/graphics)	–	–	4 (13)	10 (32)	17 (55)	4.0 (3.0–4.0)
Interactive	–	–	2 (7)	17 (55)	12 (39)	3.0 (3.0–4.0)
Not Irritating	–	–	2 (7)	13 (42)	16 (52)	4.0 (3.0–4.0)
Captivating	–	–	3 (10)	19 (61)	9 (29)	3.0 (3.0–4.0)
Satisfaction	–	–	1 (3)	15 (48)	15 (48)	3.0 (3.0–4.0)
Engagement text responses						
Positive feedback:						
The ATLAS e-learning program offers a variety of learning modalities, such as video, audio and interactive games, to meet the needs of different learners and increase usability and engagement" (participant 337).						
Areas for improvement:						
Nil provided						

This table presents participant ratings of the usability, visual design, and engagement of the OA eLearning program, assessed 10 weeks post-intervention. Items were rated on a 5-point Likert scale (1 = Very Poor to 5 = Very Good), with higher scores indicating more favourable responses. Median scores and interquartile ranges (IQR) are reported for each domain. Qualitative feedback is included to illustrate positive aspects and areas for improvement in navigation, design, and engagement features.

lower engagement. Several modules also had partial completions, most notably the 'Person-centred care and communication' module (Table 4). Module completion by professional discipline is presented in Supplementary Table 2.

4. Discussion

4.1. Usability, engagement and satisfaction

Healthcare professionals generally found the OA eLearning program useable and engaging, though some reported difficulties navigating the LMS, highlighting an opportunity to optimise user experience considerations as the ATLAS platform evolves. This is consistent with previous research, showing that LMS navigation strongly influences perceived usability of online interfaces [36]. Despite these user experience issues, participants found the OA eLearning program to be interactive and satisfactory, suggesting that improved navigation and enhanced interactivity may further optimise the learning experience, making it more intuitive and efficient for users.

Engagement was highest for the *Arthritis Essentials* modules, with more variable engagement with the treatment-specific modules. This may suggest that healthcare professionals engage with eLearning selectively, prioritising content that aligns with their individual learning needs, preferences, and scope of practice. Prior literature supports this individualised approach, noting that flexible access and self-directed progression are valued by busy healthcare professionals [37].

Table 3
Feasibility, Acceptability and Appropriateness of implementation of the OA eLearning Program.

Feasibility of implementation of the program Feasibility of Intervention Measure (FIM)	Completely Disagree n (%)	Disagree n (%)	Neither Agree nor Disagree n (%)	Agree n (%)	Completely Agree n (%)	Median score (IQR)
The OA eLearning program seems implementable	–	–		15 (48)	16 (52)	5.0 (4.0–5.0)
The OA eLearning program seems possible	–	–	1 (3)	14 (45)	16 (52)	5.0 (4.0–5.0)
The OA eLearning program seems doable	–	1 (3)	1 (3)	14 (45)	15 (48)	4.0 (4.0–5.0)
Feasibility text responses						
Positive feedback: • Easy to implement (participants 19, 35, 280, 437). • *"efficient learning and balanced way of presenting new concepts for practicing clinicians" (*participant 437) • *"I feel it is very implementable in the context of upskilling for me as a health professional" (*participant 19) ***Areas for improvement:*** • Time consuming/Perceived time burden due to volume of content (participant 277, 347). • *"It is a lot of content, so it is not easy to do for health professionals who have a high caseload" (*participant 347*)* • *"I think it is honestly quite time-consuming for the direct value/appeal it provides clinicians" (*participant 277)						
Acceptability of implementation of the program Acceptability of intervention measure (AIM)	**Completely disagree n (%)**	**Disagree n (%)**	**Neither agree nor disagree n (%)**	**Agree n (%)**	**Completely agree n (%)**	**Median score (IQR)**
The OA eLearning program meets my approval	–	–	1 (3)	15 (48)	15 (48)	4.0 (4.0–5.0)
The OA eLearning program is appealing to me	–	–	(1 (3)	13 (42)	17 (55)	5.0 (4.0–5.0)
I Like the OA eLearning program	–	–		15 (48)	16 (52)	5.0 (4.0–5.0)
I Welcome the OA eLearning program	–	–	2 (7)	13 (42)	16 (52)	5.0 (4.0–5.0)
Acceptability text responses						
Positive feedback: • The program was accepted well by participants (participants 15, 19, 35, 247, 316, 437, 439, 450) • *"I want to spread the word and share it with my colleagues as soon as possible" (*participant 316) • *"I enjoy that it is self-paced" (*participant 439) • *"The content is excellent and enjoyable to work through"* (participant 450) ***Areas for improvement:*** • Improve visualisation of achievements, provide more positive feedback to learner? • *"making the home page more visually appealing to the learning in their achievements would elevate the program significantly'* (participant 450).						
Appropriateness of implementation of the program Intervention appropriateness measure (IAM)	**Completely disagree n (%)**	**Disagree n (%)**	**Neither agree nor disagree n (%)**	**Agree n (%)**	**Completely agree n (%)**	**Median score (IQR)**
The OA eLearning program seems fitting as an education resource for you as a health professional	–	–	1 (3)	17 (55)	13 (42)	4.0 (4.0–5.0)
The OA eLearning program seems suitable as an education resource for you as a health professional	–	–	1 (3)	13 (41.9)	17 (55)	5.0 (4.0–5.0)
The OA eLearning program seems applicable as an education resource for you as a health professional.	–	–	3 (10)	16 (52)	12 (39)	4.0 (4.0–5.0))
The OA eLearning program seems like a good match as an education resource for you as a health professional.	–	–	2 (7)	13 (42)	16 (52)	5.0 (4.0–5.0)
Appropriateness text responses						
Positive feedback: • Applicable to practice, useful content (participants 19, 316, 348). • *"The supporting infographics and resources are excellent, and I will refer to these in my practise. I think the modules around communication would be very helpful for less experienced clinicians" (*participant 348) • *"the program was set up in a way I could action my knowledge quickly"* (participant 316). ***Areas for improvement:*** none						

This table presents participant ratings of the feasibility, acceptability, and appropriateness of implementing the OA eLearning program, assessed 10 weeks post-intervention. Items were rated on a 5-point Likert scale (1 = Completely Disagree to 5 = Completely Agree), with higher scores indicating more favourable responses. Median scores and interquartile ranges (IQR) are reported for each item. Qualitative responses are included to illustrate perceived strengths and areas for improvement in program implementation, appeal, and relevance to clinical practice.

Table 4
Learner metrics, device used, uptake and completion rates.

Learner Metrics		
Device used	n	%
Laptop computer	18	58
Desktop computer	15	48
Tablet	2	7
Smart phone	8	26
Number of modules completed	**n**	**%**
4	17	55
5	4	13
6–11	4	13
12	6	19
Modules	**Completed n = 31 (%)**	**Partially completed (n)**
Person-centred care and communication	29 (94)	5
Introduction to OA	20 (65)	1
Talking to people about their OA	20 (65)	1
History taking and physical assessment	23 (65)	0
Management planning, supporting self-management and behaviour change	15 (48)	2
Physical activity and exercise	16 (52)	2
Weight management	21 (68)	2
Adjunctive rehabilitative therapies	18 (58)	1
Pharmacotherapy and dietary supplements	12 (39)	
Surgical interventions	15 (48)	1
The interdisciplinary team and service delivery	12 (39)	0
Evidence-based practice and professional development	13 (42)	0

This table presents learner engagement metrics for the OA eLearning program, including device type used, uptake, and completion rates. Metrics reflect user interaction with the learning management system (LMS) over the 10-week intervention period. Data include the number of participants who accessed the program, frequency of use, module completion rates, and preferred devices (e.g., desktop, tablet, mobile). These indicators provide insight into user behaviour and program accessibility across different platforms.

4.2. Feasibility, acceptability and appropriateness

The study results align with existing evidence, demonstrating eLearning as an appropriate and acceptable upskilling tool for a diverse range of healthcare disciplines, including medical practitioners, and allied healthcare professionals [17,18,38,39]. The KneeCAPS study, for example, similarly found that an online training resource for knee OA increased healthcare professionals' confidence in knowledge and skills to provide guideline-informed care [17]. In this study, feasibility, acceptability and appropriateness were evaluated as key implementation outcomes. Extending on these implementation outcomes, healthcare professionals' knowledge and skills for the management of hip and knee OA will be evaluated in a subsequent randomised controlled trial.

Although most participants completed the required number of modules, some did not, highlighting feasibility challenges such as attrition, technological barriers and time constraints [36,37]. Understanding reasons for non-completion is essential for improving the adoption and impact of the eLearning program. Strategies such as CPD-aligned certificates and regularly updating content to reflect emerging evidence could strengthen engagement and long-term sustainability of the program [40].These strategies may also enhance the program's integration into Continued Professional Development pathways. The findings also suggest that understanding users learning preferences is needed, such as hybrid training models where online resources are complemented with synchronous peer interaction and/or in person training opportunities, especially for skills-based competencies.

Growing evidence supports eLearning as an effective implementation strategy for improving evidence-based care across many healthcare settings [19,41–43]. The E-SOLAS training program, for example, improved physiotherapists' confidence, knowledge, and behaviour in delivering OA care, while being acceptable, appropriate, feasible, and sustainable [16]. An eLearning program that is acceptable, appropriate and feasible to implement holds promise to not only improve knowledge but also to translate into better clinical practices and patient care [20]. The ATLAS OA eLearning program shows similar potential, and the online format has now been piloted to support broader international dissemination.

4.3. Uptake and completion of OA eLearning program

Despite broad advertising, most participants were physiotherapists and osteopaths who also had the highest completion rates across the modules. This likely reflects the strong relevance of the program to their clinical practice, as these healthcare professionals are centrally placed to provide first-line OA care [7,44]. Future recruitment strategies should aim to increase participation from other healthcare professional groups to ensure a more comprehensive representation of other healthcare disciplines.

Completion rates were modest overall, raising important questions about the minimum engagement needed to meaningfully influence guideline-informed care for OA. Assigning modules based on profession-specific competencies or implementing baseline knowledge testing could help tailor learning needs, helping to customise the learning experience to bridge individual knowledge and skill gaps [36,41,45]. Timing of program introduction also appears to be influential to uptake and completion [41]. Early-career healthcare professionals and students who are actively building their clinical knowledge and skills, may be particularly receptive. Targeting key career transition points, such as graduation, onboarding, or early practice may therefore improve uptake and enhance engagement and support the early embedding of guideline-informed care into routine practice.

4.4. Strengths and limitations

The development of the OA eLearning program was underpinned by established frameworks and strong educational design methodology [28,46]. These theoretical frameworks strengthened outcomes and provided sound measurement properties [31–33]. Another strength of this study was the standardised delivery of the eLearning program, which was developed and delivered as planned. This consistency

allowed for valid conclusions regarding its usability, feasibility, acceptability and appropriateness.

A key limitation of this study was the relatively small and narrow sample size, which may restrict the generalisability of findings. Participants were mostly limited to the countries where the study investigators are located; and most spoke English and all were <51 yrs. Therefore, the OA eLearning program may need cultural adaptation for use in other countries or communities where health systems differ. Additionally, there is a possibility of selection bias, as participants were likely to be those already motivated, digitally engaged and professionally connected healthcare professionals, which may inflate positive perceptions of usability and acceptability. This may have excluded individuals who are less informed or less proactive, and those who might benefit most from targeted interventions, thereby potentially skewing the results toward a more informed subset of the population. In addition, the perspectives of participants who withdrew, potentially due to usability challenges, limited relevance, or competing time demands, were not captured. As a result, the study may overestimate the program's true feasibility, acceptability, usability, and engagement.

Recruitment was further complicated by a high number of imposter participants, mostly originating from the broad social media campaign used for outreach. The need for extensive manual screening and verification against professional registration databases highlights an emerging difficulty in identifying fraudulent participants with online recruitment [47]. While digital platforms enable rapid and wide-reaching participant engagement, they also increase the risk of inaccurate or fraudulent entries, often driven by incentives such as gift cards. This experience highlights the importance of implementing stringent online recruitment protocols to ensure participant authenticity and data integrity [24,48].

4.5. Future directions

The OA eLearning program has demonstrated potential as a feasible, acceptable, and appropriate tool to support healthcare professionals in delivering guideline-concordant care. However, further research is needed to determine whether the OA eLearning program improves healthcare professional knowledge and skills, and to identify the determinants that influence implementation behaviour and practice change.

Future iterations of the program could benefit from incorporating structured opportunities for healthcare professionals to reflect on their clinical practices and engage in peer-to-peer learning communities [34]. This approach may foster deeper learning and sustained behaviour change. Additionally, future research should aim to evaluate the program's impact on clinical practice and patient outcomes, aligning with the higher levels of the Kirkpatrick Evaluation model [30]. Importantly, future updates should also consider co-designing learning content with people living with OA to ensure that the program is shaped by lived experience.

There is scope to integrate the program into undergraduate training programs and pre-professional accreditation pathways, to ensure healthcare professionals are equipped with the competencies necessary to deliver guideline-informed OA care from the outset of their careers. Uptake and engagement may be further enhanced through endorsement by health professional associations and the provision of micro-credentialling options.

Long-term follow-up studies could offer valuable insights into the sustainability of the eLearning program and the key determinants of clinical behaviours change. This study establishes a foundation for future research, positioning it as phase one of a broader evaluation aiming at OA care through scalable digital education. Findings from this feasibility study have informed updates to the OA eLearning program and guided the next phase of evaluation, a randomised control trial (RCT) to further evaluate the effectiveness of the OA eLearning program (ACTRN12625000787482).

5. Conclusion

This feasibility study indicates that the ATLAS OA eLearning program was deemed useable, engaging and acceptable with select healthcare professionals involved in caring for people with OA. While challenges related to engagement and completion remain, the findings provide valuable direction for refining program design and implementation strategies. The results justify advancing to a broader scale evaluation in an RCT to determine the program's impact on knowledge, skills and clinical behaviour in delivering OA care.

Author contributions

BG and SK contributed equally to this work and share first authorship, senior authorship was equally supported by JPE and DJH. Conception and design of the study was completed by BG, SK, JPE, and DJH. BG and SK coordinated the study and collected data. BG, SK, JLB, RSH, KB, AB, AMB, VD, CB; HF, JC, STS, HS, DO, DJH, KDA and JPE provided critical conceptual input, analysed and interpreted data, and critically revised the manuscript. All authors gave feedback on drafts of this paper and read and approved the final manuscript.

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Conflict of interests

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Appendix A. Supplementary data

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