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Confidence and Attitudes Toward Osteoarthritis Care Among the Current and Emerging Health Workforce: A Multinational Interprofessional Study

Andrew M. Briggs,[1] Rana S. Hinman,[2] Ben Darlow,[3] Kim L. Bennell,[2] Michelle Leech,[4] Tania Pizzari,[5] Alison M. Greig,[6] Crystal MacKay,[7] Andrea Bendrups,[8] Peter J. Larmer,[9] Alison Francis-Cracknell,[10] Elizabeth Houlding,[1,11] Lucy A. Desmond,[12] Joanne E. Jordan,[13] Novia Minaee,[1] and Helen Slater[1]

Objective. To measure confidence and attitudes of the current and emerging interprofessional workforce concerning osteoarthritis (OA) care.

Methods. Study design is a multinational (Australia, New Zealand, Canada) cross-sectional survey of clinicians (general practitioners [GPs], GP registrars, primary care nurses, and physiotherapists) and final-year medical and physiotherapy students. GPs and GP registrars were only sampled in Australia/New Zealand and Australia, respectively. The study outcomes are as follows: confidence in OA knowledge and skills (customized instrument), biomedical attitudes to care (Pain Attitudes Beliefs Scale [PABS]), attitudes toward high- and low-value care (customized items), attitudes toward exercise/physical activity (free-text responses).

Results. A total of 1886 clinicians and 1161 students responded. Although a number of interprofessional differences were identified, confidence in OA knowledge and skills was consistently greatest among physiotherapists and lowest among nurses (eg, the mean difference [95% confidence interval (CI)] for physiotherapist-nurse analyses were 9.3 [7.7-10.9] for knowledge [scale: 11-55] and 14.6 [12.3-17.0] for skills [scale: 16-80]). Similarly, biomedical attitudes were stronger in nurses compared with physiotherapists (6.9 [5.3-8.4]; scale 10-60) and in medical students compared with physiotherapy students (2.0 [1.3-2.7]). Some clinicians and students agreed that people with OA will ultimately require total joint replacement (7%-19% and 19%-22%, respectively), that arthroscopy is an appropriate intervention for knee OA (18%-36% and 35%-44%), and that magnetic resonance imaging is informative for diagnosis and clinical management of hip/knee OA (8%-61% and 21%-52%). Most agreed (90%-98% and 92%-97%) that exercise is indicated and strongly supported by qualitative data.

Conclusion. Workforce capacity building that de-emphasizes biomedical management and promotes high-value first-line care options is needed. Knowledge and skills among physiotherapists support leadership roles in OA care for this discipline.

INTRODUCTION

The increasing prevalence and burden of disease of osteoarthritis (OA) and disability sequelae will have profound future consequences for human capital, population health, and demand for health services (1). Contemporary models of care and service delivery for OA highlight the critical importance of a health care workforce of adequate volume and with requisite competencies

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[1]Andrew M. Briggs, BSc(Phthy)Hons, PhD, FACP, Novia Minaee, BA(Psych), MBiostat, Helen Slater, BAppSci(Phthy), MAppSci(Phthy), PhD, FACP: Curtin University, Perth, Australia; [2]Rana S. Hinman, B(Phthy)Hons, PhD, Kim L. Bennell, BAppSci(Phthy), PhD: University of Melbourne, Australia; [3]Ben Darlow, B(Phthy), M(Phthy), PhD: University of Otago, New Zealand; [4]Michelle Leech, MB BS, PhD, FRACP: Monash University, Australia; [5]Tania Pizzari, B(Phthy)Hons, PhD: La Trobe University, Australia; [6]Alison M. Greig, BHK, BSc(Phthy)Hons, PhD: University of British Columbia, Canada; [7]Crystal MacKay, BSc(Phthy), MHSc, PhD: Toronto Rehabilitation Institute, University Health Network, Canada; [8]Andrea Bendrups, MB BS, MSc, FRACP: Royal Melbourne Hospital, University of Melbourne, Australia; [9]Peter J. Larmer, Dip(Phthy), Dip(Accup), MPH, DHSc: Auckland University of Technology, New Zealand; [10]Alison Francis-Cracknell, BAppSci(Phthy): Monash University, Australia; [11]Elizabeth Houlding Curtin University, Perth, Australia, and University of Ottawa, Ontario, Canada; [12]Lucy A. Desmond, BBMed, MD: Western Health, Victoria, Australia; [13] Joanne E. Jordan, BSc, BA, MPH, PhD: HealthSense (Aust) Pty, Ltd, Victoria, Australia.

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Address correspondence to Andrew M. Briggs, BSc(Phthy)Hons, PhD, FACP, School of Physiotherapy and Exercise Science, Curtin University, GPO Box U1987, Perth, Western Australia 6845, Australia. E-mail: a.briggs@curtin.edu.au.

to deliver safe, effective, evidence-based care (ie, high-value care) (2). This includes knowledge and skills to disinvest in ineffective (low-value) care. An international focus on the primary health care workforce is critical because, in most nations, the highest volume of OA care and its coordination commences in primary care settings wherein care coordination is often fragmented (3). Although interprofessional primary care–based management is recommended across OA clinical guidelines, implementation of best-practice primary care remains inadequate (4), and multiple barriers have been identified to explain evidence-practice gaps (5).

A range of clinicians may be involved in OA care, with general practitioners (GPs)/family physicians, primary care nurses, and physiotherapists generally considered as core care providers (6). A disconnect between evidence and these clinicians' attitudes and practice behaviors has been identified across a range of musculoskeletal health conditions, including low back pain (7–12), rheumatoid arthritis (RA) (13,14), and osteoporosis (15,16). Currently, there is a dearth of comparative interprofessional data for OA care, although similar gaps likely exist. A systematic evidence review has highlighted inadequate clinician knowledge and skills as a key barrier to appropriate OA care delivery in primary care (17). Evidence-practice gaps may be attributed, in part, to inadequate prelicensure education in musculoskeletal, rheumatology, and pain care (18). In this regard, optimizing curricula and workforce readiness for prelicensure health professionals presents the greatest opportunity to close OA evidence-practice gaps for the future workforce *en masse* (19,20). Given the continued emergence of models of care for OA (6) and national and jurisdictional strategies to close evidence-practice and implementation gaps (21), contemporary snapshots of workforce capacity are important to be able to judge feasibility for implementation.

Innovative changes in OA workforce configuration, such as nurse and allied health-led triage and coordination roles, have been proposed to improve patient outcomes and cost effectiveness (6). To sustainably implement proposed workforce models, it is critical to evaluate contemporary interprofessional capabilities and identify areas for improvement that can build capacity and support implementation efforts globally. Although a web of evidence exists surrounding clinicians' beliefs and attitudes in the context of OA care, these primary studies tend to be discipline-specific (22–28) and intervention-specific (eg, exercise) (23–26), they have not considered nurses in interprofessional sampling (29,30), and, to our knowledge, no studies have sampled prelicensure clinicians (students) across like-nations and used mixed-methods approaches.

We aimed to address these limitations and provide contemporary data on interprofessional workforce capabilities that have multinational transferability and relevance and could inform foci for professional development and resources development. Specifically, we aimed to undertake a multinational survey of core practicing primary care clinicians (GPs, GP registrars, primary care nurses, and physiotherapists) and prelicensure clinicians (physiotherapy and medical students). The survey was designed to explore self-rated confidence in knowledge and skills to deliver OA care and identify attitudes toward OA-related pain and high- and low-value care approaches for OA. We also sought to explore the differences in these outcomes between disciplines and predict clinicians' outcomes based on demographic profiles. A companion paper, reporting unique data, has been published previously (31).

METHODS

Design. A multinational, cross-sectional survey across Australia, New Zealand, and Canada was conducted between April and December 2017. These three Member States of the Organization for Economic Cooperation and Development were selected because of commonalities in health systems, education, and sociocultural characteristics. Ethics approval was granted by Human Research Ethics Committees at all participating institutions, and all participants provided consent. Curtin University, Australia, provided primary approval (reference number: HRE2016-0461).

Reporting is consistent with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement for cross-sectional studies (Supplementary File 1).

Participants and settings. Both practicing clinicians and prelicensure clinicians (ie, final-year students) were sampled. Practicing clinicians included physiotherapists, primary care nurses, GPs, and GP registrars. For pragmatic reasons, GPs were sampled in Australia and New Zealand only and GP registrars were sampled in Australia only. Inclusion criteria for clinicians were i) current registration to practice in one of the three nations and ii) enrollment in the Australian General Practice Training Program in 2017 (GP registrars only). Students included physiotherapy and medical students enrolled in a final year of prelicensure university training in 2017 at one of eight university programs in Australia, New Zealand, or Canada.

Recruitment. To recruit a representative sample of clinicians and minimize sampling bias, national professional bodies and University Alumni offices and/or academic departments disseminated an invitation to participate, independent to the research team. Students were invited to participate through academic staff at their university, either electronically or as part of a lecture/tutorial, coordinated by one of the investigators. Strict site-specific university protocols were followed to minimize coercion and institutional sampling bias.

Protocol. Tranches of data collection were undertaken at different times over 2017. Clinicians were directed to a secure online data collection portal (Qualtrics). Students completed the survey during a lecture/tutorial electronically via Qualtrics or via paper surveys developed for Optical Mark Read (OMR) scanning. Students not present at the lecture/tutorial were invited to com-

plete the survey outside the tutorial/lecture time. OMR scanning of paper surveys was performed by an external company (accuracy rate of 99.8%). A key-from-image protocol captured responses to free-text questions, and 10% of total data were manually checked for accuracy.

Outcome measures. The survey collected data on demographics, employment (clinicians), and educational history (students) (Supplementary File 2). The items of the survey focusing on barriers and enablers to implementation of high-value care have been reported previously (31), whereas the outcome measures and data reported here are unique.

Knowledge and skills. Self-rated confidence in OA management knowledge and clinical skills were measured using a customized battery of items based on a tool previously developed to measure the constructs in RA care (32). In the original tool, items were derived from a critical appraisal of RA clinical guidelines and an international Delphi study (33). Adequate measurement properties have been established for the tool, which has been applied in a clinical trial (32). For the current study, items from the original tool that were not RA-specific and could be reasonably translated to OA care were retained (eg, principles of nonpharmacologic care, principles of chronic disease self-management, application of diagnostic criteria, outcomes tools). Additional disease-specific items for OA care were identified from a synthesis of OA clinical guidelines (34) and considered by the interprofessional research team. These items were refined, assessed for relevance by an external expert panel, and combined with the non–RA-specific items. All survey items were measured on a 5-point Likert scale (1 = not at all confident; 5 = very confident) and subscale scores were derived for OA management knowledge (11 items, score range 11-55) and clinical skills (16 items, score range 16-80), with higher scores indicating greater self-rated confidence, which is consistent with the original RA tool.

Attitudes. The Pain Attitudes and Beliefs Biomedical Subscale (PABS-biomed) was used to measure general attitudes toward joint pain associated with OA. The PABS, originally developed for use in low back pain and refined by Houben et al (35), was adapted by replacing the term "low back pain" with "joint pain." The PABS-biomed measures the biomedical orientation of health care providers to musculoskeletal pain; that is, the extent to which the provider believes in a biomedical model of disease, wherein disability and pain are consequences of specific tissue pathology and treatment is aimed at treating the pathology. The 10 PABS-biomed items were measured on a 6-point Likert scale (1 = totally disagree; to 6 = totally agree; score range 10-60), with higher scores indicating a greater biomedical orientation toward joint pain. Adequate measurement properties of this scale have been established previously across disciplines (35–37). Additional customized questions related to the inevitability of joint replacement surgery, arthroscopic surgery for knee OA, magnetic resonance imaging (MRI) for hip/knee OA, and the role of exercise/physical activity (PA) were also included. These items were developed by the research team as contemporary high- and low-value care options for OA based on current evidence and models of care (38). Participants also provided a free-text response to explain their attitudes toward exercise/PA as a core intervention for OA, irrespective of the stage of the disease.

All quantitative survey items (other than the PABS-biomed) were subject to content validity testing using the method proposed by Polit et al (39). A panel of 12 independent international experts iteratively rated and commented on the relevance of the items, from which a modified kappa (k^*), to correct for chance agreement, was calculated per item. All items remained above the k^* threshold for inclusion, with 93% evaluated as "excellent" (ie, $k^* > 0.74$) with k^* (95% CI) ranging from 0.70 (0.61, 0.79) to 1.0 (1.0, 1.0).

Professional development preferences. Respondents were asked to rank their preferred delivery modes of professional development for OA specifically, from five options (ranked 1-5: lecture-based, workshop style, independent reading, online, and blended modes), consistent with a previously used instrument (13).

Data analysis. Continuous data were summarized using mean and standard deviations, whereas categorical data were summarized using frequency distributions. General linear models were used to analyze differences in sum scores of instruments between discipline groups. All available data were used for analyses, and because the proportion of missing data was very low, imputation methods were not applied. Clinician and student data were analyzed separately. Multiple linear regression models were used to evaluate the relationship between clinicians' quantitative scores (confidence in knowledge and skills, attitudes) and *a priori*–defined multiple demographic variables (discipline, OA professional development in last 5 years [yes/no], postgraduate training in musculoskeletal health [yes/no], and years of clinical experience in OA care), adjusted for current clinical practice in OA care (yes/no). The coefficient of determination (R^2) was used to interpret the proportion of variance explained by variables in the multiple regression models. For all analyses, $P < 0.05$ was considered statistically significant after a conservative Bonferroni correction for multiple comparisons. Data were analyzed using IBM SPSS Statistics v.25. Free-text data were analyzed separately for clinicians and students by one primary analyst (EH for clinicians and LAD for students) using a summative content-analysis approach (40) that is consistent with methods of Cunningham and Wells (41).

This approach has been comprehensively described elsewhere (31). Briefly, this involved development of an inductively derived coding framework. Both the coding framework and subsequent coding were verified by two researchers using a random 20% sample of responses. Discordances occurred for 6% of clinician data and 4% of student data. Three researchers (AMB, EH, and HS) then amalgamated first-order codes into subthemes (second-order codes) and mapped them to overarching themes

(third-order codes). Code frequencies were calculated to give an indication of prominence for each code.

RESULTS

Demographic characteristics. Table 1 summarizes demographic characteristics for clinicians and students. A total of 2440 clinicians accessed the survey portal, of which 2000 (82%) commenced the survey and 1886 (94%) were eligible to participate and provided valid responses (77% who accessed the survey portal). A total of 1127 (60%) responses were provided from Australia, 366 (19%) from New Zealand, and 393 (21%) from Canada. Most clinicians were engaged in a clinical role that involved care for people with OA (79%-97%), with the majority seeing 1-10 patients with OA per week. Most primary care nurses, GPs, and GP registrars worked in private practice (78%-88%), whereas physiotherapists tended to practice across care settings (52% in private practice). A greater proportion of physiotherapists had completed OA-specific professional development training and been awarded a postgraduate qualification in musculoskeletal health compared with other disciplines.

A total of 583 students completed paper surveys and 648 accessed the online survey of which 578 (89%) were eligible to participate; these provided valid responses (total n = 1161; 94% of potential respondents). A total of 683 (59%) responses were provided from Australia, 270 (23%) from New Zealand, and 208 (18%) from Canada. Half of the students held a prior degree. Most (84%-92%) had assessed/managed a person with OA during clinical training, although 20% of medical students and 37% of physiotherapy students reported no experience in developing or implementing a chronic disease management plan for any long-term health condition.

Knowledge and skills. Table 2 summarizes confidence outcome measures and professional development mode preferences. Table 3 summarizes confidence scores by item, pooled for clinicians and students. All disciplines/students other than nurses scored in the third quartile of the scale range (suggesting moderate confidence), whereas nurses scored in the second quartile (suggesting low confidence). Confidence in OA knowledge and clinical skills was significantly higher among physiotherapists compared with GPs (mean difference, 95% CI: 2.1, 0.8-3.4 and 2.4, 0.6-4.3; respectively), GP registrars (5.0, 2.8-7.2 and 6.0, 2.9-9.2), and nurses (9.3, 7.7-10.9 and 14.6, 12.3-17.0); in GPs compared with GP registrars (2.9, 0.5-5.3 and 3.6, 0.1-7.1) and nurses (7.2; 5.3-9.1 and 12.2, 9.4-15.0); and in GP registrars compared with nurses (4.3; 1.7-6.9 and 8.6, 4.8-12.4). Medical and physiotherapy students' total knowledge and skills confidence scores were not significantly different. Overall, the smallest mean differences in confidence in knowledge and skills were observed between physiotherapists and GPs, whereas the largest mean differences were observed between physiotherapists and nurses. The physiotherapist-GP mean differences were proportionally small relative to the size of the measurement scales (4.8% and 3.8% of the scale range for knowledge and skills, respectively), whereas the physiotherapist-nurse mean differences were comparatively large (21.4% and 22.8% of the scale range for knowledge and skills, respectively).

Supplementary File 3 displays confidence in OA knowledge and skills, respectively, by item, disaggregated by clinical and student groups. Nurses consistently reported less confidence across OA knowledge and skills items. Physiotherapists and physiotherapy students were less confident in pharmacologic care for OA than other disciplines; however, they were more confident than other disciplines in their knowledge of physical performance and patient-reported outcome measures (PROMs) for OA. Similarly, physiotherapists and physiotherapy students were less confident than other disciplines in their skills to discuss the role of medicines, but more confident in skills to discuss the pathology and disease course of OA (including neurobiology of persistent pain) and skills to develop a PA plan that considers pain, disability, and a person's beliefs.

Attitudes. Biomedical treatment orientation was significantly greater for nurses compared with physiotherapists (6.9, 5.3-8.4), GPs (5.4, 3.6-7.3), and GP registrars (2.7, 0.2-5.2); for GPs compared with physiotherapists (1.5; 0.3-2.7); for GP registrars compared with physiotherapists (4.2; 2.1-6.3) and GPs (2.8; 0.5-5.1); and for medical students compared with physiotherapy students (2.0; 1.4-2.7) (Table 2). Similar to knowledge and skills outcomes, the mean difference between physiotherapists and GPs for the PABS instrument was relatively small, representing 2.8% of the scale range, whereas the mean difference between physiotherapists and nurses was comparatively large, representing 13.8% of the scale range. The mean difference between students was also small, representing 4.0% of the scale range.

Although less than a quarter of clinicians and students agreed that people with OA ultimately require total joint replacement (7%-19% and 19%-22%, respectively), a greater proportion agreed that arthroscopy is appropriate for knee OA (18%-36% and 35%-44%) and that MRI is informative for diagnosis and clinical management of hip/knee OA (8%-61% and 21%-52%). Almost all clinicians and students agreed that all people with OA should engage in PA/exercise irrespective of disease stage (90%-98% and 92%-97%, respectively) (Figure 1).

Outcome measures and clinicians' demographic characteristics. Multiple variables combined (discipline, OA professional development in the last 5 years, postgraduate training in musculoskeletal health, and years of clinical experience in OA care) and adjusted for current practice in OA care accounted for up to one-third of the variation in confidence in OA knowledge and skills (Table 4). Higher confidence was associated with a greater number of years of providing OA care, having been

Table 1. Clinicians' and students' demographic characteristics (data are presented as mean [SD] unless stated otherwise)

Descriptor	Physiotherapists	Primary Care Nurses	General Practitioners	General Practitioner Registrars	Pooled Clinicians	Medical Students	Physiotherapy Students	Pooled Students
Total population	AU: 28 921[a]	AU: 43 271[d]	AU: 19 749[g]	AU: 5489	119 735	1215	1000	2215
	CA: 11 355[b]	CA: 500[e]	NZ: 4242[h]					
	NZ: 2854[c]	NZ: 3354[f]						
Respondents, n (% population)	1380 (3.2)	158 (0.3)	267 (1.1)	81 (1.5)	1886 (1.6)	465 (38.3)	696 (69.6)	1161 (52.4)
Gender, n (% female)	1026 (74.5)	155 (98.1)	185 (69.1)	56 (69.1)	1422 (75.4)	279 (60.0)	458 (65.9)	737 (63.5)
Age, years	40.1 (12.3)	48.0 (11.7)	44.1 (11.6)	33.4 (6.6)	41.0 (12.3)	25.1 (3.4)	24.0 (3.5)	24.5 (3.5)
Years registered to practice [min, max]	16.1 (12.3)	20.0 (13.1)	13.4 (12.2)	3.2 (2.0)	15.5 (12.5)	...	...	...
	[1, 56]	[1, 50]	[1, 52]	[1, 12]	[1, 56]			
Years registered including care for people with OA [min, max]	13.7 (11.1)	12.7 (10.4)	13.1 (11.9)	2.6 (1.5)	13.1 (11.2)	...	...	...
	[0, 56]	[0, 47]	[0, 45]	[0, 6]	[0, 56]			
Clinical practice hours/week [min, max]	28.8 (12.3)	25.2 (11.1)	29.1 (11.2)	30.8 (11.6)	28.6 (12.0)	...	...	...
	[0, 69]	[0, 50]	[0, 70]	[0, 60]	[0, 70]			
Clinical role includes OA care, n (%) yes	1207 (88.6)	118 (78.7)	252 (96.6)	75 (96.2)	1652 (89.2)	...	...	...
Currently caring for patients with OA, n (%):						...	...	...
0 patients/wk	21 (1.7)	2 (1.7)	0 (0)	3 (4.1)	26 (1.6)			
1-5 patients/wk	419 (34.9)	58 (49.6)	76 (30.3)	43 (58.1)	596 (36.6)			
6-10 patients/wk	405 (33.7)	31 (26.5)	105 (41.8)	23 (31.1)	564 (34.3)			
11-20 patients/wk	222 (18.5)	17 (14.5)	56 (22.3)	4 (5.4)	299 (18.2)			
>20 patients/wk	135 (11.2)	9 (7.7)	14 (5.6)	1 (1.4)	159 (9.7)			
Completed OA-specific PD in last 5 years,[j] n (%) yes	454 (33.3)	22 (14.7)	59 (22.6)	2 (2.6)	537 (29.0)	...	...	...
Awarded postgraduate qualification in MSK health, n (%) yes	520 (38.2)	5 (3.3)	26 (10.0)	2 (2.6)	553 (29.9)	...	...	...
Primary site of clinical practice, n (%) yes						...	...	...
Private practice	709 (52.4)	116 (78.4)	227 (87.6)	63 (81.8)	1115 (60.7)			
Public community health center	120 (8.9)	15 (10.1)	19 (7.3)	3 (3.9)	157 (8.5)			
Residential aged-care facility	70 (5.2)	1 (0.7)	0 (0)	0 (0)	71 (3.9)			
Tertiary hospital	236 (17.4)	4 (2.7)	0 (0)	5 (6.5)	249 (13.3)			
Nontertiary hospital	115 (8.5)	2 (1.4)	3 (1.2)	2 (2.6)	122 (6.6)			
Other	104 (7.7)	10 (6.8)	10 (3.9)	4 (5.2)	128 (7.0)			

(Continues)

Table 1. (Cont'd)

Descriptor	Physiotherapists	Primary Care Nurses	General Practitioners	General Practitioner Registrars	Pooled Clinicians	Medical Students	Physiotherapy Students	Pooled Students
Registrar training year, %		...	...		...	...	...	...
Zero (not started)	...			3 (3.7)				
One				20 (24.7)				
Two				16 (19.8)				
Three				29 (35.8)				
Four				12 (14.8)				
Five				0 (0)				
Six				1 (1.2)				
Previous qualification, n (%) yes:	...	...	...	...	...	246 (52.9)	332 (47.7)	578 (49.8)
PhD[k]						3 (1.2)	0 (0)	3 (0.5)
Master (by research)						12 (4.9)	6 (1.8)	18 (3.1)
Master (by coursework)						8 (3.3)	24 (7.2)	32 (5.5)
Postgrad certificate/diploma						7 (2.8)	3 (0.9)	10 (1.7)
Bachelor with honors						72 (29.3)	103 (31.0)	175 (30.3)
Bachelor						173 (70.3)	206 (62.0)	379 (65.6)
Other						6 (2.4)	14 (4.2)	20 (3.5)
Experience in clinical training, % yes	...	...	...	...	...			
- Managing or assessing a person with OA						425 (91.8)	584 (84.0)	1009 (87.1)
- Developing or implementing a chronic disease management plan						370 (79.9)	441 (63.5)	811 (70.0)

Abbreviation: MSK, musculoskeletal; OA, osteoarthritis; PD, professional development.
[a]Based on physiotherapists holding general registration in Australia in 2017; [b]based on 2016-2017 membership of Canadian Physical Therapy Association in membership categories "practicing A/B" and "new graduate," and excludes "life" and "non-practicing" members; [c] bsed on 2017 working members of Physiotherapy New Zealand; [d]based on 2016 Australian workforce census data; [e]based on 2017 membership of Canadian Family Practice Nurses Association; [f]based on 2017 workforce census data from New Zealand Nursing Council; [g]based on 2016/17 members of the Royal Australian College of General Practitioners; [h]based on registered GPs in 2017 in New Zealand reported by Medical Council of New Zealand; [i]based on 2017 enrolments in the Australian General Practice Training Program. [j]PD defined as a duration of at least half a day of OA-specific education. [k]Qualification subgroups may sum to greater than 100% as respondents could select more than one qualification option.

Table 2. Summary measures of confidence and attitude outcomes and professional development mode preferences for clinicians and students, reported as mean (SD); n

Outcome (Cohort *n*)	Physiotherapists (1380)	Primary Care Nurses (158)	General Practitioners (267)	General Practitioner Registrars (81)	Medical Students (465)	Physiotherapy Students (696)
Confidence in OA knowledge [possible score range: 11-55]	38.9 (7.0)[a]; 1332	29.6 (7.8) [a]; 146	36.8 (6.2)[a]; 255	33.9 (6.1)[a]; 76	34.6 (6.1); 453	35.1 (6.0); 691
Confidence in OA skills [possible score range: 16-80]	59.6 (10.2)[a]; 1306	45.0 (11.4)[a]; 142	57.2 (8.9)[a]; 253	53.6 (8.7)[a]; 75	54.2 (9.1); 445	53.2 (8.9); 689
PABS-biomed [possible score range: 10-60]	28.0 (6.8)[a]; 1296	34.9 (5.5)[a]; 134	29.4 (6.0)[a]; 249	32.2 (5.3)[a]; 74	33.4 (5.5)[b]; 424	31.4 (5.8)[b]; 690
Professional development modes [possible score range: 1-5]						
• Face-to-face workshop style (lecture and small group work)	2.6 (1.4); 1211	2.4 (1.3); 117	2.5 (1.3); 232	2.7 (1.5); 71	2.3 (1.3)[b]; 403	2.1 (1.3)[b]; 631
• Blended: online plus face-to-face learning	2.7 (1.3); 1211	2.8 (1.4); 117	2.7 (1.4); 232	2.9 (1.2); 71	2.5 (1.3); 403	2.5 (1.2); 631
• Professional conference (lecture based)	3.0 (1.3); 1211	3.0 (1.4); 117	2.9 (1.4); 232	3.0 (1.3); 71	3.0 (1.3); 403	2.9 (1.2); 631
• Modular and interactive online	3.0 (1.4); 1211	2.9 (1.3); 117	3.0 (1.4); 232	2.6 (1.3); 71	3.4 (1.3); 403	3.5 (1.2); 631
• Independent reading (journals, texts)	3.7 (1.4); 1211	3.9 (1.1); 117	3.8 (1.3); 232	3.8 (1.4); 71	3.8 (1.3)[b]; 403	4.0 (1.3)[b]; 631

Abbreviation: OA, osteoarthritis; PABS, Pain Attitudes Beliefs Scale.
[a]Significantly different to all clinical disciplines ($P < 0.05$). [b]Significant difference between student groups.

awarded a postgraduate qualification in musculoskeletal health and having undertaken OA professional development in the last 5 years. Identification as a clinician (other than a physiotherapist) was associated with lower confidence in OA knowledge, whereas identification as primary care nurse was associated with lower confidence in OA skills. A stronger biomedical treatment orientation was associated with nursing and GP registrar disciplines, whereas a less biomedical orientation was associated with musculoskeletal postgraduate training.

Qualitative findings. A total of 1651 clinicians and 1040 students provided free-text responses concerning attitudes to exercise/PA as a core intervention for OA care. Responses were coded using 42 first-order codes, resulting in 5433 and 3684 coded responses for clinicians and students, respectively, organized around five themes: i) exercise/PA is a core intervention for people with OA (incorporating subthemes of biopsychosocial and general well-being outcomes, evidence of effectiveness, and indications in the perioperative period); ii) important components of an exercise/PA program and the need for tailoring; iii) system and service-level benefits achieved from exercise/PA as an intervention for OA (incorporating subthemes of health system benefits and considerations at the service delivery level); iv) risk/benefit trade-offs for exercise/PA as an intervention for OA; and v) exercise/PA in the context of persistent musculoskeletal pain. Across the themes, respondents strongly emphasized the benefits of exercise/PA for general health, psychosocial well-being, musculoskeletal function, improving OA symptoms and function, and benefits to other body systems. Respondents, particularly physiotherapists and nurses, emphasized the importance of tailoring exercise/PA to accommodate symptoms and comorbidities and clinicians highlighted the importance of exercise as a core component of an OA management plan. Table 5 provides a summary of the five themes, their subthemes, and frequencies of specific codes by discipline. A more detailed narrative metasynthesis is provided in Supplementary File 4.

Table 3. Responses by item[a] to knowledge and skills confidence measures, presented as median and interquartile range, for pooled clinicians (n = 1776)[b] and pooled students (n = 1134)[b]

Knowledge Items	Clinicians	Students
The pathology (eg, involvement of articular and periarticular structures and neurobiology of persistent pain) and typical disease course of OA	4.0 (1.0)	3.0 (1.0)
The relationship between pathology of OA with pain and disability	4.0 (1.0)	4.0 (1.0)
Risk factors associated with the development of OA	4.0 (1.0)	4.0 (1.0)
Current clinical diagnostic criteria for OA	3.0 (1.0)	3.0 (2.0)
Current best-practice nonpharmacologic and nonsurgical treatment strategies for OA	4.0 (1.0)	3.0 (1.0)
Current best-practice pharmacologic care for OA	3.0 (2.0)	3.0 (1.0)
Principles of chronic disease self-management for OA and other chronic health conditions	4.0 (1.0)	3.0 (1.0)
Principles for supporting self-management and health behavior change	4.0 (1.0)	3.0 (1.0)
Physical performance measures to monitor the functional impact of OA	3.0 (1.0)	3.0 (2.0)
Appropriate tools to capture patient-reported outcomes to monitor the impact of OA	3.0 (1.0)	3.0 (1.0)
Timing and suitability for surgical intervention for people with OA	3.0 (1.0)	3.0 (1.0)
Confidence Items		
Clinically assess a person complaining of joint pain to determine the likelihood of OA	4.0 (1.0)	3.0 (1.0)
Engage in a discussion and provide education about:		
• The disease of OA (pathology, risk factors, typical disease course)	4.0 (1.0)	3.5 (1.0)
• Role of exercise and physical activity	4.0 (1.0)	4.0 (1.0)
• Role of nutrition management (incorporating weight loss, if appropriate)	4.0 (1.0)	3.0 (1.0)
• Role of medicines	3.0 (1.0)	3.0 (2.0)
• Role of surgery	4.0 (1.0)	3.0 (2.0)
• How to practically manage pain, based on a contemporary understanding of pain neurobiology	4.0 (1.0)	3.0 (1.0)
• A diagnosis of OA does not mean that joint symptoms will inevitably worsen	4.0 (1.0)	3.0 (1.0)
Explain why a particular diagnostic test, imaging (eg, MRI), procedure, or surgery is not indicated to diagnose or manage OA	4.0 (1.0)	3.0 (1.0)
Discuss with a patient their beliefs about OA and beliefs about therapeutic options	4.0 (1.0)	4.0 (1.0)
Engage in shared decision making regarding care options	4.0 (1.0)	4.0 (1.0)
Develop a management plan based on best evidence for nonpharmacologic and nonsurgical care options	4.0 (1.0)	3.0 (1.0)
Support positive health behavior change in a person with OA	4.0 (1.0)	4.0 (1.0)
Develop a physical activity or exercise program that considers pain, disability, and beliefs about physical activity/exercise	4.0 (2.0)	4.0 (1.0)
Engage in a discussion with overweight or obese patients about a nutritional/weight management program, and develop such a program	3.0 (1.0)	3.0 (1.0)
Measure the impact of OA using standard outcome measures	3.0 (2.0)	3.0 (2.0)

Abbreviation: MRI, magnetic resonance imaging; OA, osteoarthritis.
[a]Items measured on a 5-point Likert scale (1-5), where 1 = not at all confident and 5 = very confident. [b]Represents 94.2% and 97.7% complete data for the clinician and student cohorts, respectively.

DISCUSSION

To our knowledge, this is the first multinational, mixed-methods study to measure self-rated confidence and attitudes toward OA care across clinical and student disciplines, which is important for providing a contemporary picture of workforce capacity in OA care. Our findings suggest important foci for entry-to-practice curriculum development and professional development across disciplines, particularly with respect to prioritizing high-value care options and emphasizing behaviorally oriented management of OA for some disciplines.

The greater confidence in OA knowledge and skills reported by physiotherapists, compared with other disciplines, may reflect a closer alignment between physiotherapy scope of practice and recommended first-line management for OA. Furthermore, higher confidence outcomes were associated in multivariate models with professional development and postgraduate training, which were more commonly undertaken by physiotherapists. We acknowledge, however, that only about one-third of the variance in confidence could be explained by factors in the multivariate models. Across all disciplines, the knowledge and use of outcome instruments were limited,

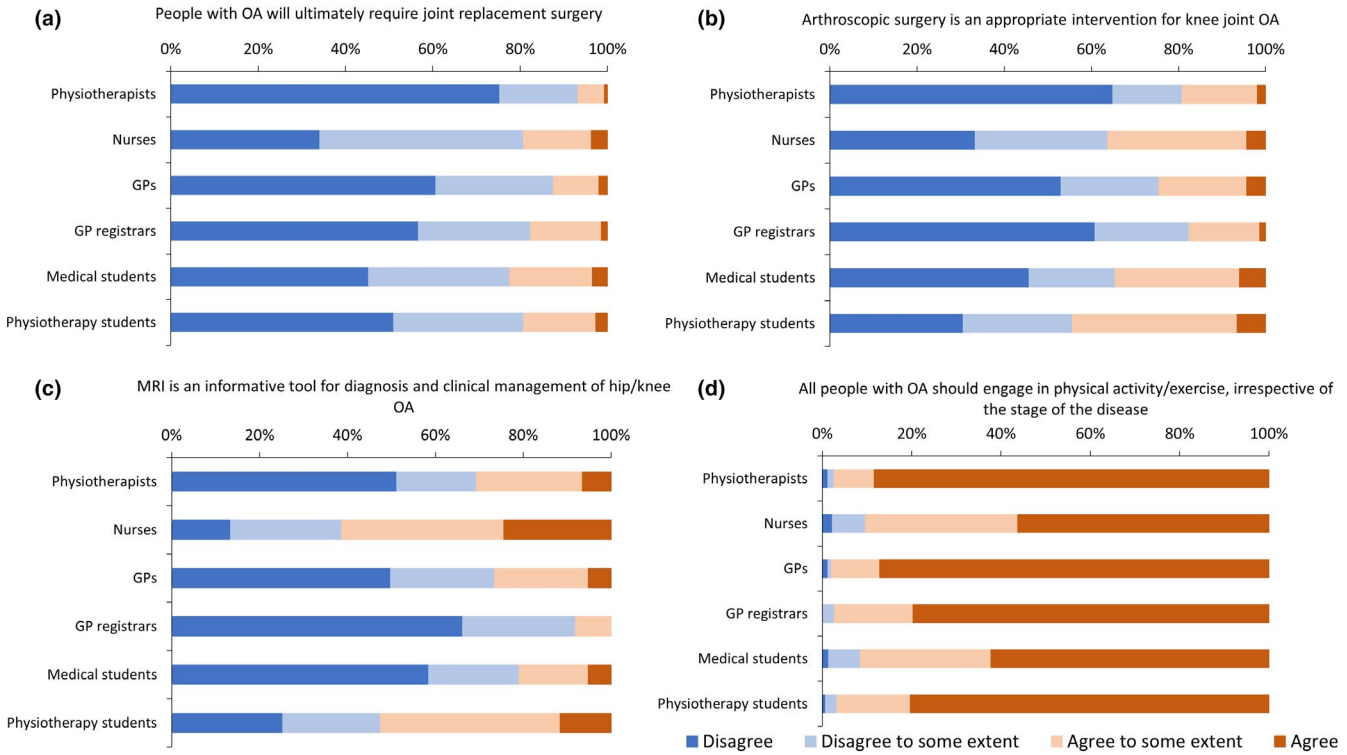

Figure 1. Proportional agreement with specific osteoarthritis (OA) care approaches by clinicians and students: inevitability of joint replacement surgery ("People with OA will ultimately require joint replacement surgery")(**A**); arthroscopic surgery as a management intervention for knee OA ("Arthroscopic surgery is an appropriate intervention to manage knee joint OA") (**B**); magnetic resonance imaging (MRI) for diagnosis/clinical management of hip/knee OA ("MRI is an informative tool for the diagnosis and clinical management of hip and knee OA") (**C**); exercise/physical activity (PA) as an intervention of OA ("All people with OA should engage in PA or an exercise program, irrespective of the stage of the disease") (**D**). The original 6-point scale has been collapsed to a 4-point scale for ease of interpretation.

highlighting the need for improving access to and supporting use of recommended PROMS and physical performance tests. Although most clinicians and students were confident in discussing exercise/PA, confidence in the implementation of an exercise/PA plan was generally low in disciplines other than physiotherapists and physiotherapy students. Physiotherapy clinicians and students reported relatively larger confidence gaps in pharmacologic care and care supporting weight loss. Primary care nurses were consistently the least confident in their disease-specific knowledge and skills, which suggests the potential of specific training to better empower nurses to support people with OA. To enhance nursing workforce capacity, further training may be needed for generalist primary care nurses taking on OA care coordination roles and justifies expansion of the rheumatology-trained nursing workforce (42). Although a recent trial in the United Kingdom included upskilling of primary care nurses in OA care, referral from GPs to the nurses for self-management support was underutilized (43), raising uncertainty about the scalability of this co-care model of service delivery. These findings highlight the need to develop core interprofessional competencies in OA care to promote a collaborative and consistent approach to care by primary care practitioners and to overcome clinical inertia for first-line care options; that is, where no care is provided where confidence is lacking.

Nurses, GP registrars, and medical students reported a stronger biomedical orientation to joint pain than physiotherapists, GPs, and physiotherapy students. This may reflect a greater orientation toward biomedically focused, low-value OA care options, perhaps related to entry-to-practice training curricula. Although we cannot speculate on how these attitudes directly influence treatment choices, aligned literature confirms an association between beliefs and practice behaviors (7,8). There is an opportunity to optimize OA care through an enhanced emphasis in curricula and professional development informed by a contemporary biopsychosocial approach to OA and pain care (44). This represents a critical area for OA care reform, particularly in light of our findings that a sizable proportion of clinicians and students perceive arthroscopy to be appropriate as a management option for knee OA, MRI to be an informative tool for diagnosis and clinical management, and joint replacement to be inevitable.

Support for exercise/PA as a core intervention for OA, irrespective of disease stage, was almost ubiquitous across disciplines, aligning with findings from earlier research and suggesting a positive attitude toward exercise from GPs, despite limited

Table 4. Multiple regression model outcomes amongst clinician respondents (n = 1886), summarizing the association between outcome variables and demographic and training variables, adjusted for current clinical activity in OA care

Outcome	Model Fit: R^2 (P value)	Model Coefficients[a] (95% CI)			
		Discipline[b]	Registered years for OA care	Awarded postgraduate qualification in MSK health[c]	Undertaken OA-related PD in last 5 years[c]
Confidence in OA knowledge [possible score range: 11-55]	0.33 ($P < 0.0001$)	Nurse: −7.1 (−8.1, −6.0) GP: −1.1 (−1.9, −0.2) GP registrar: −1.6 (−3.1, −0.1)	0.13 (0.1, 0.2)	2.4 (1.7, 3.1)	4.8 (4.2, 5.5)
Confidence in OA skills [possible score range: 16-80]	0.32 ($P < 0.0001$)	Nurse: −11.5 (−13.1, −9.9) GP: −0.9 (−2.1, 0.4)[d] GP registrar: −1.5 (−3.8, 0.7)[d]	0.2 (0.1, 0.2)	3.8 (2.8, 4.8)	5.9 (4.9, 6.9)
PABS-biomed [possible score range: 10-60]	0.1 ($P < 0.0001$)	Nurse: 6.3 (5.1, 7.5) GP: 0.8 (−0.1, 1.8)[d] GP registrar: 3.7 (2.1, 5.3)	<−0.0001(−0.03, 0.03)[d]	−1.6 (−2.3, −0.9)	−0.4 (−1.1, 0.3)[d]

Abbreviation: CI, confidence interval; GP, general practitioner; MRI, magnetic resonance imaging; MSK, musculoskeletal; OA, osteoarthritis; PD, professional development.
[a]Unstandardized β coefficients. [b]Physiotherapist as the reference category. [c]Binary yes/no variables. [d]Indicates that the value is not statistically significant.

implementation (45). Our data also suggest more positive attitudes toward exercise than data collected from physiotherapists in the United Kingdom in 2006 (26). This may reflect a practice change over the last decade through evidence-diffusion for use of exercise in OA care. Our qualitative data also strongly support incorporation of tailored exercise/PA into OA management programs.

Although exercise/PA was strongly supported across disciplines as a high-value OA care intervention, most respondents linked exercise/PA with musculoskeletal system (biological) outcomes in free-text responses. Based on the code frequencies, relatively fewer respondents identified other functional and psychosocial outcomes, potentially suggesting a stronger or more familiar biomedical management paradigm for OA, despite contemporary evidence for adopting a broader biopsychosocial model (46). The widespread support for exercise/PA as a high-value approach to OA care contrasted with attitudes held by a sizable proportion of respondents that generally low-value interventions are also indicated, such as arthroscopy for knee OA. In this context, supporting translation of evidence-based beliefs (ie, exercise/PA) into behaviors to support best-practice care remains a critical target.

Thirty percent of students had no experience in developing or implementing chronic disease management plans, which highlights potential knowledge and skills gaps in chronic disease management. Although this finding may point to curricula gaps, it may also be related to acute care-focused training sites and curricula (particularly for medical students) and the need to better link theory, or "knowing," with "doing'" for musculoskeletal disease management (47). Optimizing entry-to-practice curricula that support knowledge and skills in chronic disease management is essential to ensure alignment with contemporary evidence for OA care and creation of a workforce that is confident to participate in effective interprofessional management of a high-prevalence and high-burden condition. Such optimization is not easy and arguably may not be feasible with overcrowded training programs that require alignment with specific credentialing and competencies. Nonetheless, there are likely opportunities to optimize relevant training curricula through co-design efforts between educators and researchers, clinicians, and credentialing bodies. Such an approach has been adopted through the development and implementation of the International Association for the Study of Pain (IASP) curriculum for pain care and the English Musculoskeletal Core Capabilities Framework (48–50).

The strengths of this study include the large, multinational sample of mixed disciplines and students that allows transferability of findings across aligned health systems and care settings. We did not plan *a priori* to undertake between-nation comparisons. The overarching purpose of the research was to sample clinicians and students from "like" nations in order to inform the development of resources. These resources can help close evidence-practice gaps and overcome barriers to implementation of high-value OA care, with the potential for transferability and scalability at a multinational level. Undertaking between-nation comparisons may be unhelpful to achieve this broader aim. Furthermore, the unbalanced sample sizes between nations may threaten the validity of comparisons and interpretation of the findings. The inclusion of qualitative data enabled measurement of constructs otherwise not determi-

Table 5. Summary of themes, subthemes, and codes from content analysis of free-text responses

Subthemes	First-Order Codes	Proportion of Respondents Providing a Response to the Code (%)						Demonstrative Quote
		PT	NU	GP	GPr	MStu	PTStu	
Theme 1: Exercise/PA is a core intervention in OA care								
1.1 Biopsychosocial and general well-being outcomes associated with exercise/PA	1.1.1 Exercise/PA provides general health benefits	16.9	16.0	19.8	29.2	49.9	43.9	*Functional rehabilitation for OA is essential, not only for improving joint health and strengthening supporting muscle striations within the affected joint but also for psychological well being for the patient. Prehabilitation is also shown to improve postsurgical outcomes for any patient considering joint replacement (ID25, GP)*
	1.1.2 Exercise/PA provides a physiologic benefit to the musculoskeletal system (maintain and/or improve function of joints, strength, stability of joints through muscle support, endurance, balance, flexibility, ROM/mobility, increase bone density to prevent/manage osteoporosis, falls prevention)	49.1	40.0	53.3	50.0	37.0	46.0	
	1.1.3 Exercise/PA slows disease progression of OA	3.9	0.8	4.1	0	10.1	6.5	
	1.1.4 Exercise/PA improves symptoms associated with OA (pain, stiffness, feelings of instability)	21.7	16.8	27.3	23.6	25.4	33.5	
	1.1.5 Exercise/PA improves functional outcomes for people with OA (quality of life, physical function, work capacity, participation)	25.9	17.6	19.8	23.6	22.0	31.7	
	1.1.6 Exercise/PA provides a physiologic benefit to other body systems (eg, reduce cardiovascular disease risk, respiratory function) and can assist with weight loss	21.0	17.6	22.7	29.2	27.4	24.1	
	1.1.7 Regular exercise/PA reduces the risk and impact of comorbid health conditions, including morbidity and mortality risks	6.4	4.0	2.9	1.4	6.7	9.1	
	1.1.8 Exercise/PA provides a psychosocial benefit (mental health, motivation, pain coping and pain sensitivity, stress management, self-efficacy, confidence, attitudes and beliefs about OA, socialization, resilience, reduce fear associated with movements)	22.0	20.8	28.1	19.4	19.8	25.0	
	1.1.9 Exercise/PA enables people to actively manage their OA symptoms and empowers the individual to take control of their chronic disease. This promotes a general sense of well-being.	10.1	8.0	12.0	6.9	8.1	9.2	
	1.1.10 Exercise/PA can reduce unnecessary analgesia intake	0.1	0.8	0.8	0	0	0	
	1.1.11 There are health risks associated with not exercising (eg, comorbid conditions, weight gain)	0.7	7.2	0.4	0	0	0	
	1.1.12 There are limits to the healing effects of exercise/PA	0.5	1.6	0	0	0	0	

(Continues)

Table 5. (Cont'd)

Subthemes	First-Order Codes	Proportion of Respondents Providing a Response to the Code (%)						Demonstrative Quote
		PT	NU	GP	GPr	MStu	PTStu	
1.2 Evidence for the effectiveness of exercise/PA as a therapeutic intervention for OA	1.2.1 Exercise/PA is the most effective (evidence-based) non-pharmacological treatment for OA for managing symptoms and function, and is reflected in clinical guidelines.	9.5	1.6	3.7	2.8	7.1	17.2	*Exercise is considered the most effective nonpharmacological treatment for reducing pain and improving movement in osteoarthritis. It is shown to improve joint range of movement, muscle strength, cardiovascular fitness and reduces stress and body weight. (ID381, MStu)*
1.3 Indications for exercise/PA in the perioperative period	1.3.1 Exercise/PA should be encourage pre- and postoperatively to optimize surgical outcomes.	6.8	0.8	5.0	6.9	3.5	4.1	*For those with advanced or severe OA, exercise can help prepare the person for possible joint replacement if needed as they will likely have a better outcome if they are more physically fit and if they improve their strength and ROM as much as possible. (ID1845, PT)*
	1.3.2 Exercise/PA can delay the need for surgical interventions for OA	0.7	1.6	1.2	0	0.2	0.9	

(Continues)

Table 5. (Cont'd)

Subthemes	First-Order Codes	Proportion of Respondents Providing a Response to the Code (%)						Demonstrative Quote
		PT	NU	GP	GPr	MStu	PTStu	
Theme 2: Components of exercise/PA as a management strategy for people with OA and the importance of tailoring to the individual								
No subthemes	2.0.1 Exercise/PA that is excessive or executed incorrectly can lead to adverse effects (eg, exacerbated pain) resulting in reduced quality of life.	0.2	0	0	0	2.7	3.6	*Everyone with OA should be taking part in some form of PA; the level and type will need to change depending on the symptoms. (ID29, PT)*
	2.0.2 Limitations on exercise/PA may be required to prevent exacerbation of symptoms or further joint damage (eg, limit to non–weight bearing only)	1.0	5.6	1.7	1.4	10.4	6.0	
	2.0.3 Exercise/PA can be tailored, including the environment (eg, water-based exercise) to safely accommodate varying severity of OA disease, symptoms, and comorbid conditions	49.9	47.2	28.1	26.4	30.9	28.3	
	2.0.4 Exercise/PA may be difficult or not tolerated among people with severe disease, intolerable pain, limited mobility, frailty and poor social supports, lack of transport, and those living in rural locations	3.8	9.6	3.7	6.9	11.1	2.7	
	2.0.5 An individual's preference should be taken into account to encourage engagement and sustained participation (eg, the type of activity they enjoy, beliefs about what they feel capable of doing)	8.1	12.0	5.8	4.2	0.7	3.6	
	2.0.6 Exercise/PA programs should be varied and incorporate strengthening and mobility components or functional activities	6.1	1.6	2.9	2.8	5.4	4.7	
	2.0.7 Research evidence does not identify specific types of exercise/PA that are superior for OA care	0.2	0	0	0	0	0	
	2.0.8 Regular exercise/PA are important components of an OA management plan. Very rarely are there circumstances that preclude participation in exercise/PA	23.1	24.0	28.1	27.8	2.5	8.5	
	2.0.9 Non–weight bearing or low-impact activity is highly recommended for people with OA, especially those with severe disease, during postoperative recovery, and where weight bearing is not tolerated because of pain	14.4	12.0	5.4	5.6	14.6	7.7	

(Continues)

Table 5. (Cont'd)

Subthemes	First-Order Codes	Proportion of Respondents Providing a Response to the Code (%)						Demonstrative Quote
		PT	NU	GP	GPr	MStu	PTStu	
Theme 3: System and service benefits of exercise/PA as a management strategy for OA care								
3.1 Health system benefits of exercise/PA	3.1.1 As an appropriate treatment for OA, exercise/PA reduces the burden of disease of OA, whereas not recommending exercise/PA leads to greater stress on health care systems	0.5	0	0	0	0	0	*In fact there are so many benefits of exercise for the individual and wider population, including those with OA, such as: improved joint mobility, increased muscle mass (ideally surrounding affected joint/s), decreased pain, increased function, increased quality of life, improved mood, decreased likelihood of acquiring or advancing other chronic lifestyle illnesses related to lack of activity (eg, diabetes) and more effective use of health dollars. (ID954, PT)*
	3.1.2 Patients who believe they are incapable of exercise/PA because of OA may claim unnecessary disability benefits	0	0	0	0	0.2	0	
	3.1.3 Exercise/PA is an inexpensive treatment option associated with positive health outcomes	0.2	0.8	0	0	0	0	
3.2 Service-level delivery considerations for exercise/PA as a management strategy in OA care	3.2.1 Implementation and/or monitoring of exercise/PA programs requires cooperation between medical and allied health professionals	1.5	6.4	1.6	4.2	3.4	1.6	*An exercise program helps build strength and psychosocial aspects of a patient's life, irrespective of the stage of the disease. Nothing wrong with getting strong—as long as it is suited to the patient and managed by a health care professional. (ID250, PTStu)*
	3.2.2 Exercise/PA as a management strategy for OA is ultimately the individual's choice	0	0	0	0	0	2.7	
	3.2.3 Maintaining a view that all patients with OA should engage in exercise/PA has the potential to compromise a professional's (eg, PT, doctor) relationship with the patient	0.2	0.8	0.4	0	0.5	0.2	
	3.2.4 Education about the importance of exercise/PA for people with OA is fundamental across the disease continuum	4.0	0	0.4	0	2.5	1.9	

(Continues)

Table 5. (Cont'd)

Subthemes	First-Order Codes	Proportion of Respondents Providing a Response to the Code (%)						Demonstrative Quote
		PT	NU	GP	GPr	MStu	PTStu	
Theme 4: Risk benefit trade-offs of exercise/PA in the treatment of OA								
No subthemes	4.0.1 A balance between engaging in regular exercise/PA and preventing further joint damage or symptoms exacerbation is necessary	1.2	1.6	2.5	0	4.7	1.7	*Well, if totally advanced, then do not do PA as too much pain and disability … wait for surgery and rehab. (ID738, NU)*
	4.0.2 Exercise/PA should not be expected in those with OA who have greater health concerns (eg, palliated, severe neurological impairment, severe mental illness)	2.6	6.4	2.1	9.7	4.2	0.6	
	4.0.3 Not engaging in exercise/PA is a poor prognostic sign	1.7	0	0	0	5.4	7.1	
	4.0.4 Risks associated with exercise/PA are minimal compared with benefits and risks associated with inactivity	1.3	0.8	0.4	2.8	0	0	
	4.0.5 Inactivity leads to atrophy, muscle tightness/stiffness, and deconditioning that further limits function and results in ongoing pain and negative psychosocial impact	8.1	9.6	11.6	8.3	11.1	14.1	
Theme 5: Exercise/PA in the context of persistent pain								
No subthemes	5.0.1 Engagement in exercise/PA may be limited by pain	4.0	5.6	1.2	1.4	8.4	6.6	*The [exercise] program will greatly depend on the patient's symptoms, preferences and goals, rather than severity on x-ray. (ID1553, PT)*
	5.0.2 Some pain with exercise/PA may be inevitable for those with OA and under these circumstances it should not be discouraged	1.4	0	0.4	1.4	2.5	3.9	
	5.0.3 Structural joint changes do not correlate with pain necessarily, so advanced disease should not preclude participation in exercise/PA	2.1	0	0.4	0	0.2	1.6	
	5.0.4 Individuals are more likely to participate in exercise/PA if pain is well managed. Therefore, multimodal interventions (eg, psychosocial therapies and analgesia) prior to commencing exercise/PA may be required	0.3	0	0.4	0	3.5	0.9	
	5.0.5 Psychological factors and/or beliefs about pain and exercise can pose a large barrier to implementation of exercise/PA programs and lead to poorer outcomes. Care coordination with psychologists may be beneficial in such contexts.	1.2	0.8	0.8	0	0	1.9	
	5.0.6 Ongoing pain with exercise may indicate the need for future joint replacement	0.3	0	0	0	1.2	0	

Abbreviation: OA, osteoarthritis; PA, physical activity; PT, physiotherapist; NU, nurse; GP, general practitioners; GPr, general practitioner registrar; MStu, medical student; PTStu, physiotherapy student; ROM: range of motion.

Physiotherapists (n = 1212 respondents; 4032 coded responses); nurses (n = 125 respondents; 375 coded responses); general practitioners (n = 242 respondents; 724 coded responses); general practitioner registrar (n = 72 respondents; 213 coded responses); medical student (n = 405 respondents; n = 1391 coded responses); physiotherapy student (n = 635 respondents; n = 2293 coded responses).

nable from survey measures alone. We recognize, however, that transferability of findings may be limited in low- and middle-income settings where work cadres are likely to differ. Currently, we are unable to comment neither on the interpretation of absolute confidence and PABS scores, the clinical relevance of the magnitude of differences observed, nor on how observed differences relate to actual clinical behaviors. These represent important foci for future research. A further limitation is the clinician sample size relative to the total possible population size and a sampling bias toward Australian and physiotherapy clinicians. We did not sample GPs from Canada and did not sample GP registrars from New Zealand or Canada, which limited the interpretation of multinational findings for these disciplines. More than half of our clinician sample reported a caseload between 6-20 patients per week with OA, which may suggest a sampling bias toward clinicians who more frequently treat patients with OA; therefore, our data may overestimate confidence levels. This, however, may be offset by a small proportion of clinicians not currently involved in OA care (range 3.4%-21.3%).

In conclusion, there are opportunities to enhance workforce capacity in delivery of high-value care options to people with OA, which may be targeted at practicing clinicians and students. Our data suggest that physiotherapy clinicians may have the requisite skills and knowledge to adopt leadership roles in OA care, providing justification for innovative workforce models leveraging health professionals in roles such as triage, advance practice, and extended scope practice across care settings. Recognizing the critical role of practice nurses in supporting general practice, building nurses' capacity to deliver high-value OA care will be important. Professional development and curricula that deemphasize a biomedical approach to management and that explicitly inform indications for arthroscopy and MRI are needed. Although delivery of exercise/PA education and care is viewed as fundamental, improving access, aligning with patient preferences, and managing comorbidities and pain are important considerations for service delivery models.

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Analysis and interpretation of data. Briggs, Bennell, Houlding, Desmond, Minaee, Slater.

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