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Barriers, facilitators and referral patterns of general practitioners, physiotherapists, and people with osteoarthritis to exercise

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Abstract

Background Barriers and facilitators of general practitioners (GPs), physiotherapists (PTs), and people with hip and knee osteoarthritis (PwOA) may influence uptake of and referral to guideline-based exercise treatments for OA.
Objective To identify barriers and facilitators of GPs, PTs and PwOA to uptake of and referral to exercise treatments for OA.
Methods An online survey was circulated to GPs, PTs, and PwOA in Ireland from March to September 2021. Data were collected on demographics, barriers and facilitators, and referral patterns to exercise treatments for OA. Frequency distributions were used to illustrate demographics, barriers and facilitators, and referral patterns to exercise treatments for OA.
Results 388 stakeholders responded (GPs = 148; PTs = 154; PwOA = 86). Barriers and facilitators were related to (1) stakeholder (e.g., patient tiredness and fatigue), (2) healthcare setting (e.g., appropriate referrals from GP or other sources), and (3) treatment (e.g., low-cost community-based exercise programmes) factors. While 91% of GPs would refer PwOA to physiotherapy if no barriers existed, only 60% would in their current practice. Only 33% of PwOA reported receiving a GP referral to physiotherapy.
Conclusion Stakeholder, healthcare setting and treatment barriers and facilitators of GPs, PTs, and PwOA influence uptake of and referral to exercise treatments for OA. Future strategies Future strategies addressing these factors may improve implementation of guideline-based management for OA.

Contribution of the Paper

- Despite an established evidence-based consensus, uptake of and referral to exercise as a first-line treatment for OA is suboptimal, partly influenced by the barriers and facilitators of stakeholders (e.g., GPs, PTs, and PwOA).
- Barriers and facilitators that influence uptake of and referral to exercise treatments for OA are related to stakeholder, healthcare setting, and treatment factors.

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- Majority of PwOA are not receiving GP referrals to physiotherapy, and a mismatch between GPs intentions to and actual referrals to physiotherapy exists, primarily due to long waitlists to access services.
- These findings may be adapted to inform strategies for the successful implementation of exercise treatments that are effective in encouraging guideline-based management of OA.

Keywords: Barriers; Facilitators; General practitioners; Physiotherapists; Exercise; Osteoarthritis

Introduction

Globally, osteoarthritis (OA) is the 15th highest cause of years lived with disability [1], with exercise (e.g., aerobic, muscle strengthening, neuromuscular) recommended as an integral first-line treatment [2,3]. Yet, research suggests clinical guidelines are not being implemented fully, with low referrals by general practitioners (GPs) to exercise [4], and inconsistencies between physiotherapists' (PTs) treatment choices and guidelines [5] reported. In addition, Wallis *et al.* [6] reported that only a small to moderate proportion of people with hip and knee OA (PwOA) meet guidelines for physical activity and recommended daily steps. Research has sought to critically evaluate this gap in guideline-based management of OA, with a systematic review reporting a failure of dissemination and implementation strategies, not a lack of quality guidelines [7]. This suggests that there is an opportunity to improve implementation of guideline-based exercise treatments for OA.

To maximise the likelihood of successful implementation, the context (i.e., stakeholders and healthcare setting), and the barriers and facilitators to uptake must be considered [8]. Barriers of GPs and PTs for delivering exercise treatments for OA include insufficient time in consultation, lack of expertise, and uncertainty about exercise dosage, frequency, and type [9,10]. Previously, personal experiences and perceptions of the role of exercise and its effects, professional advice, and social environment have been reported as barriers to exercise for PwOA [11]. International initiatives have aimed to address barriers and improve uptake and referral of guideline-based exercise treatments for OA in GPs, PTs, and PwOA [12,13]. However, there is a lack of knowledge on the most appropriate implementation strategies to use and limited evidence on context-specific (i.e., stakeholders and healthcare setting) barriers and facilitators [14,15].

As the global prevalence of OA is projected to rise, there is a strong need to improve guideline-based management of OA in clinical practice [16]. Therefore, the aim of this study is to identify the barriers and facilitators of GPs, PTs, and PwOA to uptake of and referral to exercise treatments for OA.

Methods

This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [17] and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) [18].

Study design and setting

As part of a larger study (IMPACT: IMPlementation of osteoArthritis Clinical guidelines Together) [19], a cross-sectional national online survey was undertaken between March to September 2021 by GPs, PTs, and PwOA in Ireland. These surveys were adapted from previous research [10,20] and reviewed by a public and patient involvement (PPI) panel of representative stakeholders (IMPACT Steering Committee consisting of researchers, GPs, PTs, PwOA champions/groups, policymakers) for face validity. Ethical approval was obtained from University of Limerick Faculty of Education & Health Sciences Research Ethics Committee (REC) (2020_12_13_EHS) and the Irish College of General Practitioners REC (ICGP_REC_21_0006).

GPs, PTs, and PwOA were invited to participate in a stakeholder-specific survey (Appendix A). Section 1 asked for demographic characteristics (e.g., age, gender, duration of pain, healthcare setting). Section 2 asked for views about the role of exercise in the treatment of OA. Section 3 asked for the barriers and facilitators to exercise treatments. An additional section in the GP survey asked for referral patterns to exercise treatments using a patient vignette of a typical person presenting with OA (e.g., treatment history, diagnosis; see Appendix A GP survey Section 3).

Surveys were administered using Qualtrics© software (Qualtrics, Provo, UT) and distributed via email, social media (e.g., Twitter, LinkedIn), and amongst networks of researchers, PPI panel members, and national committees (e.g., ICGP, Irish Society of Chartered Physiotherapists, University of Limerick Education and Research Network for General Practice). In addition, advocacy groups, patient/professional organisations and influencers were targeted to increase recruitment via social media (e.g., tagging key profiles and aligning visual infographics alongside social

media posts and events). Participants were provided with an information sheet and consent was implied by completion of the survey. All data were collected anonymously.

Participants

GPs and PTs were eligible for inclusion if they (1) were practicing in Ireland, and (2) treated PwOA in the past 6 months. PwOA were eligible for inclusion if they (1) were living in Ireland, (2) were aged 30 years or older, (3) had chronic hip or knee pain for 6 months or more, and (4) did not have joint replacement surgery on at least one of the painful hips or knees.

Survey design

Questions in each stakeholder-specific survey (Appendix A) included a combination of yes/no and multiple selection items. For example, for the following question: "In your practice and experience of treating patients with osteoarthritis, what are the main barriers to exercise prescription or referral?", participants were given an extensive list of options to choose from (e.g., "Insufficient time in consultation" or "Older age of patient"). If participants had additional comments, an optional "Other" category allowed for textual descriptions. Data were collected on demographics, barriers and facilitators, and referral patterns to exercise treatments for OA.

Data analysis

All data was downloaded from Qualtrics© software (Qualtrics, Provo, UT), processed in Microsoft Excel (Microsoft Excel v.16.59, Microsoft Co., 2010), and analysed using IBM-SPSS version 28.0.1.1 (14). Descriptive analysis was used to summarise data from GPs, PTs, and PwOA. Frequency distributions were used to illustrate demographics, barriers and facilitators, and referral patterns to exercise treatments for OA of GPs, PTs, and PwOA.

Results

Demographics

In total, 193 GPs, 196 PTs, and 112 PwOA responded. Data were only included for those with valid responses (i.e., completed sections related to barriers, facilitators, and referral patterns to OA exercise treatments). Tables 1 and 2 provide a summary of the demographics of valid responses by GPs ($n = 148$), PTs ($n = 154$), and PwOA ($n = 86$). GPs with invalid responses were male ($n = 17$; 38%) and did not receive post-qualification training on OA/chronic pain ($n = 18$; 40%), with no differences found between PTs and PwOA with valid and invalid responses.

Table 1
Demographics of service providers.

	GP ($n = 148$) n (%)	PT ($n = 154$) n (%)
Gender		
Female	81 (54)	121 (79)
Male	65 (44)	32 (21)
Prefer not to say	1 (< 1)	1 (< 1)
Other	1 (< 1)	0
How long have you been qualified?		
Less than 5 years	31 (21)	18 (12)
5 to 10 years	21 (14)	19 (12)
More than 10 years	96 (64)	117 (76)
Work practice setting (GPs)		
Urban	56 (38)	-
Rural	32 (22)	-
Mixed	60 (40)	-
Work practice setting (PTs)		
Public hospital	-	35 (23)
Private hospital	-	7 (5)
Primary care	-	38 (25)
Private practice clinic	-	68 (44)
Other	-	6 (4)
Post-qualification training on OA/ chronic pain		
Yes	84 (56)	119 (77)
No	64 (43)	35 (23)
Confidence in treating hip and knee OA		
Not confident	2 (1)	0
Slightly confident	30 (20)	4 (3)
Confident	72 (48)	41 (27)
Very confident	34 (23)	79 (51)
Extremely confident	10 (7)	30 (20)
% of typical caseload with hip/knee OA		
1% to 5%	16 (11)	17 (11)
6% to 25%	107 (72)	79 (51)
26% to 50%	23 (15)	35 (23)
51% to 75%	1 (< 1)	17 (11)
> 75%	0	4 (3)

Note: GP: general practitioner; PT: physiotherapist; OA: osteoarthritis.

Barriers and facilitators to exercise treatments for OA

Top-rated barriers to exercise treatments for OA were "Cost and accessibility of physiotherapy for patient" (GPs: $n = 98$; 66%), "Insufficient space and equipment resources" (PTs: $n = 90$; 58%), and "Pain or other joint symptoms" (PwOA: $n = 54$; 63%). GPs ($n = 12$; 8%), PTs ($n = 10$; 7%), and PwOA ($n = 2$; 2%) selected the "Other" category as a barrier to exercise prescription or referral with textual descriptions including, participant motivation and lack of space to deliver group exercise treatments for OA.

Top-rated facilitators to exercise treatments for OA were "Low-cost community-based exercise programmes" (GPs: $n = 128$; 87%), "Resources to deliver quality educational material regarding self-management alongside exercise" (PTs: $n = 75$; 49%), and "Exercise recommendations from a physiotherapist" (PwOA: $n = 41$; 48%). Textual descriptions of facilitators to exercise treatments for OA (i.e.,

Table 2
Demographics of service users.

	PwOA ($n = 86$) n (%)
Gender	
Female	67 (77)
Male	18 (21)
Prefer not to say	1 (> 1)
Other	0
Most bothersome joint	
Knee	46 (54)
Hip	40 (47)
Age category	
30 to 39 years	11 (13)
40 to 49 years	22 (25)
50 to 59 years	24 (28)
60 to 69 years	24 (28)
70 to 79 years	5 (6)
Living location	
Inner city	7 (8.)
Suburb of a city	35 (40)
Town	14 (16)
Village	14 (16)
Open country	16 (18)
Rating of pain/symptoms on an average day	
No pain/symptoms	0
Mild	26 (30)
Moderate	44 (51)
Severe	16 (18)
Duration of pain	
6 months to 1 year	19 (22)
1 to 2 years	13 (15)
2 to 3 years	14 (16)
3 to 4 years	9 (10)
4 to 5 years	6 (7)
More than 5 years	25 (29)
Spoken to GP about OA	
Yes	68 (78)
No	18 (21)

Note: GP: general practitioner; OA: osteoarthritis; PwOA: people with hip and knee OA.

Table 3
Barriers and facilitators of GPs ($n = 148$) to exercise treatments for OA.

	***n* (%)**
Facilitator	
Low-cost community-based exercise programmes	128 (87)
Shorter waiting lists and improved access to physiotherapy	115 (78)
Presence of an evidence-based physiotherapy-supervised group exercise programme for osteoarthritis in the locality	101 (68)
Patients who recognize the importance of strategies for self-management of pain using appropriate exercise recommendations	83 (56)
More consultation time to provide exercise prescription	64 (43)
Barrier	
Cost and accessibility of physiotherapy for patient	98 (66)
Physiotherapy waiting lists are too long	96 (65)
Insufficient time in consultation	96 (65)
Lack of a standardised physiotherapy programme for OA in the region	78 (53)
Patients prefer other management options	65 (44)
Uncertainty about the most appropriate exercise type	49 (33)
Patients want an orthopaedic consultant referral	46 (31)
Insufficient expertise	36 (24)
Older age of patient	28 (19)
Severity of disease (symptoms too severe)	25 (17)
Presence of many comorbidities	22 (15)
English language barrier for patients	10 (7)
Severity of disease (symptoms too mild)	8 (5)
Uncertainty about the effects of exercise	5 (3)
Uncertainty about the safety of exercise	5 (3)

Note: GP: general practitioner; OA: osteoarthritis.

participant selected the "Other" category) reported by GPs ($n = 5$; 3%), PTs ($n = 15$; 10%), and PwOA ($n = 10$; 12%) included access to supervised exercise treatments and availability of space and time. For the complete list of barriers and facilitators of GPs, PTs, and PwOA to exercise treatments for OA, see Tables 3 to 5 respectively.

Referral patterns to exercise treatments for OA

Based on a patient vignette of a typical person presenting with OA, who is a likely candidate for exercise referral, 91% ($n = 136$) of GPs would refer to physiotherapy, 2% ($n = 3$) to an orthopaedic consultant, and 6% ($n = 9$) to neither in an ideal world without barriers. In current practice, 60% ($n = 89$) of GPs would refer to physiotherapy, 16% ($n = 24$) to an orthopaedic consultant, and 29% ($n = 43$) to someone else, either in the primary/community team or secondary care. When asked to textually describe "someone else", majority of GPs reported a dietician or exercise instructor (e.g., yoga, swimming, gym). Reasons for selecting 'yes' ($n = 88$; 60%) to physiotherapy referral for a typical person with OA included, "deemed an appropriate candidate for supervised conservative treatment" ($n = 71$; 81%), "lack of time to appropriately address exercise needs in practice" ($n = 46$; 52%), and "ease of access to physiotherapy" ($n = 28$; 32%). Reasons for selecting 'no' ($n = 59$; 40%) to physiotherapy referral included, "long waiting lists and poor access to physiotherapy" ($n = 46$; 70%), "I would prefer to examine further therapeutic options first" ($n = 6$; 9%), and "other interventions are a priority" ($n = 5$; 8%). Reasons for selecting 'yes' ($n = 24$; 16%) to orthopaedic consultant referral for a typical person with OA included, "will likely need a joint replacement in a few years so put on waiting list now" (n = 19; 73%), "need a specialist opinion" ($n = 2$; 8%), and "deemed an appropriate candidate for surgery right now" ($n = 1$; 4%). Reasons for selecting 'no' ($n = 124$; 84%) to orthopaedic consultant referral included, "more conservative treatments have not been exhausted" ($n = 109$; 50%), "symptoms not severe enough to warrant joint replacement" ($n = 81$; 37%), and "waiting list too long" ($n = 21$; 10%).

Table 4
Barriers and facilitators of PTs ($n = 154$) to exercise treatments for OA.

	n (%)
Facilitator	
Resources to deliver quality educational material regarding self-management alongside exercise	75 (49)
GPs who impart knowledge regarding benefits of exercise to patients upon referral	73 (47)
Appropriate referrals from GP or other sources	64 (42)
More other post-qualification training e.g. short courses, workshops, videos	41 (27)
More education on group exercise delivery during physiotherapy training	38 (25)
None	22 (14)
More support from colleagues or managers	20 (13)
More university post-qualification education e.g. diploma or masters	3 (2)
Barrier	
Insufficient space and equipment resources	90 (58)
Insufficient personnel (staff) resources	63 (41)
Scheduling conflict related to patient working hours and clinic hours	47 (31)
Patients want individualized programmes	45 (29)
Access for patient (e.g. travel, parking, time)	40 (26)
Patients prefer other management options e.g. manual therapy	34 (22)
Insufficient referrals or low OA caseload	29 (19)
Cost for patient	23 (15)
Lack of a standardised programme or protocol for exercise for OA	15 (10)
Lack of support from colleagues or managers	15 (10)
English language barrier for patients	12 (8)
None	9 (6)
Insufficient expertise	4 (3)
Uncertainty about the most appropriate exercise type	4 (3)
Uncertainty about the safety of exercise	2 (1)
Uncertainty about the effects of exercise	2 (1)

Note: PT: physiotherapist; OA: osteoarthritis.

Table 5
Barriers and facilitators of PwOA ($n = 86$) to exercise treatments for OA.

	n (%)
Facilitator	
Exercise recommendations from a physiotherapist	41 (48)
Better knowledge of the best type of exercise to do	41 (48)
Access to exercise that is supervised by a health professional	37 (43)
More confidence in your joint	30 (35
Social aspect e.g. group exercise with other people with hip or knee pain	25 (29)
Safe exercise environment (e.g. well-lit pathways)	25 (29)
Low-cost community exercise programmes	24 (28)
Exercise recommendations from a GP	7 (8)
More support from family or friends	6 (7)
Barrier	
Pain or other joint symptoms	54 (63)
Tiredness and fatigue	43 (50)
Wet or cold weather	29 (34)
Family commitments or other responsibilities	21 (25)
Work commitments	20 (23)
Age	20 (23)
Finding time to exercise	19 (22)
Lack of enjoyment from exercise	19 (22)
Lack of exercise buddy or support network	19 (22)
Negative body image	19 (22)
Cost of a gym membership or physiotherapy visit	16 (19)
I don't know the best types of exercise to do	16 (19)
Uncertainty about the safety of exercise for joint pain	14 (16)
Other health problems	13 (15)
I don't know who to contact to learn more or do more exercise	9 (11)
Access to facilities (e.g. availability, travel, parking)	9 (11)
I need assistance for mobility e.g. walking stick, wheelchair	6 (7)
Uncertainty about the benefit of exercise for joint pain	6 (7)
Cost of active wear or equipment	4 (5)

Note: OA: osteoarthritis; PwOA: people with hip and knee OA.

33% ($n = 29$) PwOA self-reported receiving referrals to physiotherapy and 39% ($n = 34$) to an orthopaedic consultant. While 45% ($n = 39$) and 54% ($n = 47$) of PwOA did not report receiving referrals to physiotherapy or orthopaedic consultants, respectively, 15% ($n = 13$) decided to attend physiotherapy privately. Ten PwOA were on a waiting list (50% physiotherapy; 50% orthopaedic consultant). Length of time of physiotherapy waiting list ranged from less than 6 months ($n = 1$; 20%), 6 months-1 year ($n = 3$; 60%), and 1–1.5 years ($n = 1$; 20%), and for orthopaedic consultants lists from less than 6 months ($n = 1$; 20%), 1–1.5 years ($n = 2$; 40%), and more than 2 years ($n = 2$; 40%).

Discussion

A study by French *et al.* [21] found that self-reported OA in Irish adults aged 50 years or older is 13%, compared to global OA prevalence estimates at over 7% [1,16]. With an increase in OA prevalence projected in countries with established market economies (e.g., North America and Europe) [16], the aim of this study was to identify the barriers and facilitators of GPs, PTs, and PwOA to uptake of and referral to exercise treatments for OA. Findings suggest that GPs, PTs, and PwOA experience stakeholder, healthcare setting, and treatment barriers and facilitators that may be useful in strengthening implementation of guideline-based management of OA globally.

Stakeholder barriers and facilitators to uptake of and referral to exercise treatments for OA

While most GPs and PTs in our study received post-graduate training and education in musculoskeletal/hip or knee OA or chronic pain and were either "confident" or "very confident" in treating hip and knee OA, they reported insufficient expertise and uncertainty about the type, effect, and safety of exercise treatments. Similarly, despite most PwOA in our study reported having spoken to GP about

OA, they reported a lack of knowledge on exercise type and uncertainty on the safety and benefits of exercise for joint pain. Interestingly, Maserejian *et al.* [22] and El-Khoury *et al.* [23] found that recently graduated GPs and PTs were more likely to give exercise advice/referrals to physiotherapy than those with more clinical experience, and the majority of GPs and PTs in our study reported more than 10 years of experience. Patients' expectations/beliefs, preferences for other management options (e.g., individualised programmes, manual therapy), and language background have been reported previously by GPs and PTs [10,24,25], including pain or symptoms that may guide PwOA activity participation or avoidance [26]. Most PwOA in our study were aged 40 years or older and reported moderate pain/symptoms on an average day for more than 5 years which further aligns with GP-reported factors such as the presence of comorbidities, OA severity, and older age [25]. In addition, PwOA reported poor weather conditions, lack of time to exercise due to family/work or other responsibilities, lack of enjoyment from exercise, and poor self-image [27].

Additional education (e.g., short courses, diploma, or masters) and training (e.g., workshops, videos) opportunities for GPs, PTs, and PwOA on exercise treatments for OA and strategies to address barriers are strongly needed to improve uptake of and referral to guideline-based management of OA. These may include more specific knowledge on exercise type or effect, treatment history, physical functioning, and tailored recommendations for self-management. Future strategies that are contextualised to address exercise expectations/beliefs and improve confidence may further support implementation.

Healthcare setting barriers and facilitators to uptake of and referral to exercise treatments for OA

In accordance with previous literature, GPs, PTs, and PwOA in our study considered cost, accessibility and wait times of guideline-based management of OA in their decisions [25,28,29]. Additionally, access to facilities (e.g., travel, parking), availability of time, and appropriate space and equipment resources were important factors for all participants to uptake of and referral to exercise treatments for OA [25,28,30,31]. Specifically, PTs uptake of exercise treatments for OA may be influenced by staffing levels and good working relationships/mechanisms to communicate with other healthcare professionals and settings [30,32]. The Irish healthcare system is two-tiered (closest to the UK and Australia), with quicker access to treatments for those who can afford to pay privately or have voluntary health insurance [33,34]. Irish public health services are supported by the State and managed by the Health Service Executive (HSE). While the HSE hosts several initiatives, such as Community Funded Schemes and a Service Improvement Programme, many services are not standardised across the country and thus, may result in inequality of access for service users [33,34]. PTs are currently under-staffed in Ireland, with a 30% lower per capita supply than the European Union average [35]. Findings from a survey of chronic pain management services in Ireland reported a shortage of multidisciplinary staff and limited patient access due to long waiting lists [36]. Furthermore, we found that while in an ideal world without barriers GPs report higher referral rates to physiotherapy compared to orthopaedic consultants (91% versus 2%), in practice referral rates to physiotherapy are lower (60% versus 16%). This aligns with findings of a 2010 systematic review on GPs use of exercise for chronic knee pain/OA that reported physiotherapy referral estimates to be 13% to 63% [37]. Additionally, while PwOA in our study reported receiving a physiotherapy referral from their GP, they also reported being on waitlist for access to treatment. Such inequities in guideline-based management of OA have been observed previously including Australian GPs who have reported referring early knowing they could pursue other management options while PwOA await consultations [38]. In Canada, a cross-sectional survey study found that at least 50% of people with chronic pain have to wait 6 months or more for an appointment in a public multidisciplinary pain treatment facility [39]. A review on the challenges of implementing guideline-based management of OA across low- and middle-income countries (e.g., South Africa, Brazil, Nepal) also reported long waiting times, high costs, and a lack of skilled personnel and coordinated care pathways [40].

Our findings suggest that problems with public access to physiotherapy for chronic musculoskeletal conditions are leading to disparities in actual uptake and referral rates. Advocating for the development of appropriate features (e.g., space, equipment) and facilities (e.g., travel, parking) in healthcare settings is critical to support implementation of exercise treatments for OA. Targeted accessibility strategies that may shorten waiting lists and improve access to physiotherapy could include the provision of online-delivered exercise treatments and/or the availability of appointments outside of work/clinic hours. In addition, core components of future implementation strategies for guideline-based management of OA must include advice on multidisciplinary care pathways and adequate staffing levels.

Treatment barriers and facilitators to uptake of and referral to exercise treatments for OA

As reported previously, GPs, PTs, and PwOA in our study perceived that the availability of community-based exercise rehabilitation programmes and high-quality self-management education resources may promote guideline-based management of OA [25,28,30]. Specifically, PwOA reported receiving a recommendation/referral from a trusted healthcare professional, social support (e.g., group session, exercise buddy, family/friends), and safe exercise

environment [26,29]. In our study, most GPs and PTs were located in mixed and private healthcare settings, with most PwOA living in the suburb of a city. While the distribution of existing chronic musculoskeletal pain services in Ireland is poor [36], similar findings have been reported across the UK [41] and Canada [42].

Attitudes to community-based self-management programmes and resources that encourage guideline-based management of OA may be influenced by pressure and issues within healthcare systems like Ireland's (e.g., uneven distribution of healthcare professionals). There is a strong need to promote healthcare policies that may enhance implementation in clinical practice including, for example, increasing the number of scholarships or grants available for new guideline-based exercise treatments for OA. Moreover, future strategies must prioritise the delivery of additional supervised group exercise and education OA self-management programmes and resources that are available in safe, local environments.

Strengths and limitations

This study presents several strengths, namely the inclusion of all stakeholder perspectives and a broad set of potential barriers and facilitators to exercise treatments for OA (i.e., 'select all that apply' questions). In addition, our most frequently reported barriers and facilitators included both healthcare setting and treatment factors that may be applicable to other guideline-based exercise treatments for OA. It is important to note that our survey was self-reported, available online in Ireland only, and did not include other professionals involved in OA management (e.g., dietician). As the survey was administered during the COVID-19 pandemic lockdown, it was not possible to apply conventional recruitment methods (e.g., flyers in community centres, clinic waiting rooms). The study sample is largely representative of the general population of GPs, PTs, and PwOA in Ireland. Most PTs were female and equally located in the public and private healthcare settings, and most PwOA reported knee pain [21,35]. However, most PwOA were aged 40 years or older, which may be due to the exclusion criteria (e.g., did not have joint replacement surgery) and/or online survey distribution. Due to the study design, we were unable to perform an analysis on responders versus non-responders, and this may be an important area for further exploration. A limitation of this research was the omission of an implementation framework or theory in the methodological and analytical design. This group [43] and others [44] have since completing this study effectively used the Consolidated Framework for Implementation Research (CFIR) to qualitatively identify determinants of implementation after completion of specific programmes. Although the current study did not focus on a specific programme or innovation, there were similarities identified as most facilitators could align with the CFIR domain of "Innovation", as reported in Bhardwaj *et al.* [43] (i.e., low-cost programmes, additional educational resources and PT recommendation). Regardless of innovation, the "Inner setting" construct of "Available resources" was identified as a barrier for PTs.

Conclusion

Stakeholder, healthcare setting, and treatment barriers and facilitators of GPs, PTs, and PwOA influence uptake of and referral to exercise treatments for OA. A major barrier to uptake of and referral to exercise treatments for OA was the cost and accessibility of physiotherapy and the availability of community-based exercise and education self-management programmes and resources. Uptake of exercise treatments may be deterred by waitlists to access services rather than GP intent to refer to exercise treatments. Guideline-based management of OA may be improved by addressing the context-specific (stakeholder, healthcare setting, treatment) barriers and facilitators to implementation. Future strategies must consider providing additional targeted exercise and education self-management programmes and resources and developing appropriate features/facilities and multidisciplinary care pathways in healthcare settings. In addition, strategies may focus on addressing exercise expectations/beliefs, improving confidence, offering alternative (e.g., online) or flexible (e.g., outside of work/clinic hours) exercise treatments, and advocating for low-costs, appropriate staffing levels and reimbursement models/incentives or scholarships. These findings may contribute to the development of future healthcare research, policy, and practice supporting the uptake of and referral to exercise treatments for OA.

Ethical approval: Ethical approval was obtained from University of Limerick Faculty of Education & Health Sciences Research Ethics Committee (REC) (2020_12_13_EHS) and the Irish College of General Practitioners REC (ICGP_REC_21_0006).

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Conflicts of interest

No conflicts of interests were disclosed.

Reporting guidelines

This study is reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement and the Checklist for Reporting Results of Internet E-Surveys (CHERRIES).

Data availability

Data presented in this study are available under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) from Zenodo at: https://doi.org/10.5281/zenodo.7428386.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.physio.2024.101416.

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