



Many physiotherapists lack preparedness to prescribe physical activity and exercise to people with musculoskeletal pain: A multi-national survey



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ARTICLE INFO

Article history:

Received 28 November 2020

Received in revised form

3 February 2021

Accepted 6 February 2021

Keywords:

Physiotherapy

Physical therapy

Knowledge

Evidence

Exercise

Musculoskeletal pain

ABSTRACT

Objectives: Determine physiotherapists' (i) awareness of physical activity, and exercise prescription guidelines; (ii) perceived role, knowledge, confidence, skills and training in prescribing and progressing aerobic exercise and resistance training to people with musculoskeletal pain; (iii) professional development preferences; and (iv) perceived influences of external factors on exercise prescription for people with musculoskeletal pain.

Design: Multi-national cross-sectional survey.

Methods: An open online survey was developed specifically for this study.

Results: 1,352 physiotherapists from 56 countries participated. The majority of respondents correctly stated physical activity guidelines for adults (60%) and children (53%), but only 37% correctly stated guidelines for older adults. Eleven percent and 16% could name an accepted guideline for aerobic exercise and resistance training, respectively. Most agreed their role included prescribing aerobic exercise (75%) and resistance training (89%). Fewer reported they had the confidence, training or skills to prescribe aerobic exercise (38–50%) and resistance training (49–70%). Workshops were the most preferred (44%) professional development option. Most respondents believed appointment scheduling and access to equipment and professional development (62–79%) affected their ability to prescribe effective exercise. **Conclusion:** Many physiotherapists lack knowledge and training to provide physical activity advice, and to prescribe aerobic exercise and resistance training to people with musculoskeletal pain.

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1. Introduction

Physical activity and exercise therapy, including aerobic exercise and resistance training, reduces pain and improve function in people with musculoskeletal pain (Oliveira et al., 2018). Physical

activity can be defined as any bodily movement that requires energy expenditure (Caspersen et al., 1985), while exercise therapy is a form of physical activity that is prescribed and progressed to achieve specific therapeutic goals (Taylor et al., 2007). Effectiveness of exercise therapy is supported by strong evidence and multiple clinical practice guidelines (Geneen et al., 2017; Babatunde et al., 2017; Booth et al., 2017; Diercks et al., 2014; Kristensen & Franklyn-Miller, 2012; Lin et al., 2020; McAlindon et al., 2014; Nelson et al., 2014; Oliveira et al., 2018; Willy, Hoglund, & Barton, 2019). Additional benefits of appropriately prescribed and progressed exercise therapy include improved mental health and well-

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being (Geneen et al., 2017; Cooney et al., 2013), weight loss and management (Batsis et al., 2017; Bellicha et al., 2018; Cheng et al., 2018), reduced systemic inflammation (Bauman et al., 2016; Benatti & Pedersen, 2015; Skou et al., 2018), and improved cartilage-, bone-, tendon- and muscle-health (Maestroni et al., 2020; Khan & Scott, 2009). The promotion of regular physical activity also has positive effects on health-related quality of life (Bize et al., 2007) and community participation (Piercy et al., 2018), promotes healthy aging (Chodzko-Zajko et al., 2009), and may reduce the risk of at least 35 chronic diseases (Booth et al., 2017).

Physiotherapists play a key role in physical activity promotion and exercise prescription and progression for people with musculoskeletal pain (WHO, 2018; Kunstler et al., 2019). However, physiotherapists' implementation of guideline based care, including physical activity and exercise prescription, is varied and inconsistent (Lowe, Gee, McLean, et al., 2018, Lowe, Littlewood, McLean 2018; Zadro et al., 2019). National surveys report most United Kingdom (UK) (86%) (Lowe et al., 2017) and Israeli (87%) (Yona et al., 2019) based physiotherapists report awareness of World Health Organization (WHO) physical activity guidelines. However, few (7–16%) could correctly state their content (Lowe et al., 2017; Organization, 2011; Yona et al., 2019). An Australian survey reports only 10% of physiotherapists could correctly cite physical activity and sedentary behavior guidelines (Freene et al., 2017). Potential drivers of inconsistent implementation may include physiotherapists' awareness, knowledge and perceived competency related to exercise prescription and progression guidelines for physical fitness and musculoskeletal health (Bauman et al., 2016; Khan & Scott, 2009; World Health Organization, 2011; Bird et al., 2005; Garber et al., 2011; Lloyd et al., 2016; ACSM, 2009). However, no study to date has evaluated this. The influence of training opportunity, clinical environment, community (e.g. culture, patient expectations) and policy (e.g. funding) factors on physical activity and exercise prescription by physiotherapists is also unknown.

One way to influence physiotherapists' implementation of evidence-based interventions, such as physical activity and exercise therapy for people with musculoskeletal pain, is through tailored professional development. All practicing physiotherapists worldwide are required to participate in professional development to maintain and/or improve their knowledge and competence in their chosen scope of practice. To design professional development initiatives that improve preparedness to prescribe physical activity and exercise for people with musculoskeletal pain, we need to understand the learning needs and preferences (Stander et al., 2019) of physiotherapists.

The primary aims of this study were to determine international physiotherapists' (i) awareness and knowledge of physical activity, aerobic exercise, and resistance training guidelines; (ii) perceived role, knowledge and competency in prescribing aerobic exercise and resistance training to people with musculoskeletal pain; (iii) learning preferences to address professional development needs related to exercise prescription; and (iv) perceived influences of work environment (appointment scheduling, facilities) and opportunity for professional development on the ability to prescribe effective exercise programs for people with musculoskeletal pain. The secondary aim was to determine if years of experience and completion of post-graduate training was related to awareness and knowledge of physical activity, aerobic exercise, and resistance training guidelines.

2. Materials and methods

The research design was a cross-sectional online multi-national survey of physiotherapists. Reporting was guided by the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach,

2004). Ethical approval was granted by La Trobe University's Human Ethics Research Committee (S17-024).

2.1. Development and testing

The online survey was developed by the research team and informed by WHO physical activity guidelines (Organization, 2011), American College of Sports Medicine position stands on 'progressive resistance training' (ACSM, 2009) and 'fitness' (Garber et al., 2011), and other key exercise literature (Bauman et al., 2016; Khan & Scott, 2009; Bird et al., 2005; Lloyd et al., 2016). Mixed question formats (multiple choice, Likert scales, open ended) were used and covered knowledge, perceived role, competency and use of physical activity and exercise training guidelines; and perception of external factors and learning preferences affecting exercise prescription (Supplementary file 1). Questions related to perceived role, knowledge and competency were structured based on components of the Theoretical Domains Framework (Huijg et al., 2014; Lawton et al., 2016). Participant characteristics including country of work, profession, years of experience and post-graduate training completion were also collected.

The survey was piloted with five physiotherapists within the lead author's (CJB) clinical network. Small changes to the wording of questions were made to improve clarity. The final survey was administered using 'Survey Monkey®' (San Mateo, United States) software, and included 8 pages of questions (Supplementary file 1). The survey introduction included information outlining the expected length of time to complete the survey (25 min), data storage, who the chief investigator was, the study purpose and a tick box indicating informed consent. Prior to completion, participants were able to return to previous pages if they desired to change responses, but summaries of their answers were not provided for checking. Adaptive questions were used for two questions (13 and 14) which involved recall of guidelines.

2.2. Recruitment

A convenience sample of health professionals working with people with musculoskeletal pain were recruited via social media (Facebook and Twitter) and email advertisement to professional networks of study authors. Participation was open to any health professional treating people with musculoskeletal pain. Consistent with a similar study, (Lowe et al., 2017) only data from physiotherapists were included in this analysis. Participants were offered free access to an online multimedia platform with engaging education resources related to resistance training and aerobic exercise principles of prescription and progression (www.exercise.trekeeducation.org). Access was granted on provision of a unique email address, after completion of the survey.

2.3. Data synthesis and analysis

Data (Supplementary file 1.2) were exported into Microsoft Excel for synthesis and analysis. Responses were checked for any duplicate IP addresses prior to finalising data for analysis. As no one item/question in the survey was compulsory, data from all consenting physiotherapists were exported for analysis, with unanswered questions from incomplete survey's classed as "skipped" questions. Data were analysed anonymously. Knowledge of WHO physical activity guidelines were summarised as the proportion of correct and incorrect answers to the multiple choice questions. Awareness and use of aerobic exercise and resistance training guidelines were summarised as the proportion reporting awareness or use, and ability to name an accepted guideline. To be considered an 'accepted' guideline, the named guideline had to

focus on describing and guiding prescription and progression principles and be from a recognised professional body. Examples of 'accepted' guidelines were American College of Sports Medicine (ACSM) Guidelines for Exercise Testing and Prescription (ACSM, 2009; Garber et al., 2011), National Strength and Conditioning Association (NSCA) Strength and Conditioning Professional Standards and Guidelines (Lloyd et al., 2016), Physical Activity in the Prevention and Treatment of Disease (Sweden) (Johan et al., 2010), and UK Strength and Conditioning Association Position Statements (Lloyd et al., 2016; Lloyd et al., 2012). Responses naming systematic reviews, individual research papers, individual researchers or condition-specific guidelines were not considered accepted guidelines.

Perceived knowledge, training, skills, confidence and role were summarised as the proportion of participants reporting 'strongly agree', 'agree', 'neither agree or disagree', 'disagree' and 'strongly disagree'. Learning preferences were summarised as proportions of ranking (1st to 7th). Perceived influences of work environment (appointment scheduling, facilities) and professional development (opportunity, funding) on the ability to prescribe effective exercise programs for people with musculoskeletal pain were summarised as 'yes', 'partially' or 'no'.

Chi-square tests for independence (χ^2) were used to determine if experience (<5 years, 5–10 years, 11–15 years, >15 years) and completion of formal post-graduate training, such as a post-graduate certificate or higher, influenced physiotherapist awareness of WHO physical activity guidelines and accepted aerobic exercise, and resistance training guidelines. Chi-square comparisons were completed in R Studio (R, R Foundation for Statistical Computing) with α set at 0.05.

3. Results

A total of 1,764 health professionals consented to participate, including 1,352 qualified physiotherapists (77%) from 56 countries (Table 1). One instance of the same IP address was identified. On further investigation, responses and email addresses supplied to gain access to the online resource were different, indicating these responses were from different people. Nearly all participants

Table 1
Cohort characteristics of 1352 respondents from 56 countries.

Characteristic	Cohort
Clinical Setting: n, (%)	
- Private (including elite sport)	740 (55%)
- Public	333 (25%)
- Both public and private	233 (17%)
- Other or skipped question	46 (3%)
Experience Level: n, (%)	
- < 5 years qualified	502 (37%)
- 5 to 10 years qualified	367 (27%)
- 11 to 15 years qualified	181 (13%)
- > 15 years qualified	302 (22%)
Speciality area: n, (%)	
- Musculoskeletal	858 (63%)
- Musculoskeletal and other	471 (35%)
- Other or skipped question	23 (2%)
Completed post-graduate education relating to exercise prescription: n, (%)	
- Post graduate training	441 (33%)
- No post graduate training	536 (40%)
- Did not answer	375 (28%)

Cohort consists of participants from 56 countries. ^a Defined as checking the box for at least one formal academic qualification (post-graduate certificate or higher) from the question "Have you completed any of the following post-graduate training specifically related to exercise prescription?"

(n = 1309, 97%) completed the survey (i.e. clicked the 'submit' button on the final page) in a mean time of 26 min. Completeness rate of individual questions varied from 89 to 100%, with the rate decreasing towards the end of the questionnaire, with the rate decreasing towards the end of the questionnaire. Key findings are summarised in Figs. 1–5. Countries where more than 100 participants responded to the survey included the UK (n = 425), Australia (n = 276), and Spain (n = 122). Corresponding data for these countries are shown in Supplementary file 2.

3.1. Guideline knowledge, awareness and use

Sixty percent (n = 739) correctly stated that adults, and 37% (n = 454) correctly stated that older adults, should accumulate 150 min of moderate or 75 min of vigorous minutes of physical activity per week. Sixty-eight percent (n = 819) correctly stated adults should complete strength training involving major muscle groups at least twice per week. Fifty-three percent (n = 657) correctly stated children (5–17 years) should accumulate at least 60 min of physical activity per day (Fig. 1).

Twenty percent (n = 250) stated they were aware of aerobic exercise guidelines, with 11% (n = 141) naming an accepted guideline; and 16% (n = 208) stated they used aerobic exercise guidelines, with 10% (n = 122) naming an accepted guideline (Fig. 2). Thirty-one percent (n = 391) stated they were aware of resistance training guidelines, with 21% (n = 265) naming an accepted guideline; and 24% (n = 301) stated they used resistance training guidelines, with 14% (n = 183) naming an accepted guideline (Fig. 2). The ACSM Guidelines for Exercise Testing and Prescription (ACSM, 2009; Garber et al., 2011) was the most commonly named guideline (n = 185).

3.2. Perceived role, training, competency, learning preferences, and external barriers

Most physiotherapists agreed their role included prescribing aerobic exercise (75%) and resistance training (89%) to people with musculoskeletal pain (Fig. 3). Fewer physiotherapists stated they knew how to deliver aerobic exercise (49%) and resistance training (70%); had received training to deliver aerobic exercise (38%) and resistance training (50%); had the skills to deliver aerobic exercise (50%) and resistance training (67%); and had the confidence to deliver aerobic exercise (45%) and resistance training (58%) following accepted guidelines (Fig. 3). Workshops were the preferred learning resource (44%), followed by original research articles (15%) (Fig. 4). Most physiotherapists believed their ability to prescribe effective exercise programs was at least partially affected by appointment scheduling (75–79%), access to facilities (62–69%) and opportunity and funding (79%) for professional development (Fig. 5).

3.3. Influence of experience and post-graduate training

Experience level was related to physiotherapists' knowledge of WHO strength training guidelines, with less experience associated with a greater proportion of knowledge (<5 years = 69%, 5–10 years = 73%, 11–15 years = 61%, >15 years = 64%; p = 0.02, Supplementary file 3.1). Completion of post-graduate training (PGT) was negatively related to knowledge of WHO physical activity (PGT = 55%, no PGT = 63%; p = 0.01) and strength training (PGT = 62%, no PGT = 71%; p < 0.01) guidelines for adults; and positively related to ability to name and accepted aerobic exercise guideline (PGT = 12%, no PGT = 7%; p = 0.01) (Supplementary file 4.1).

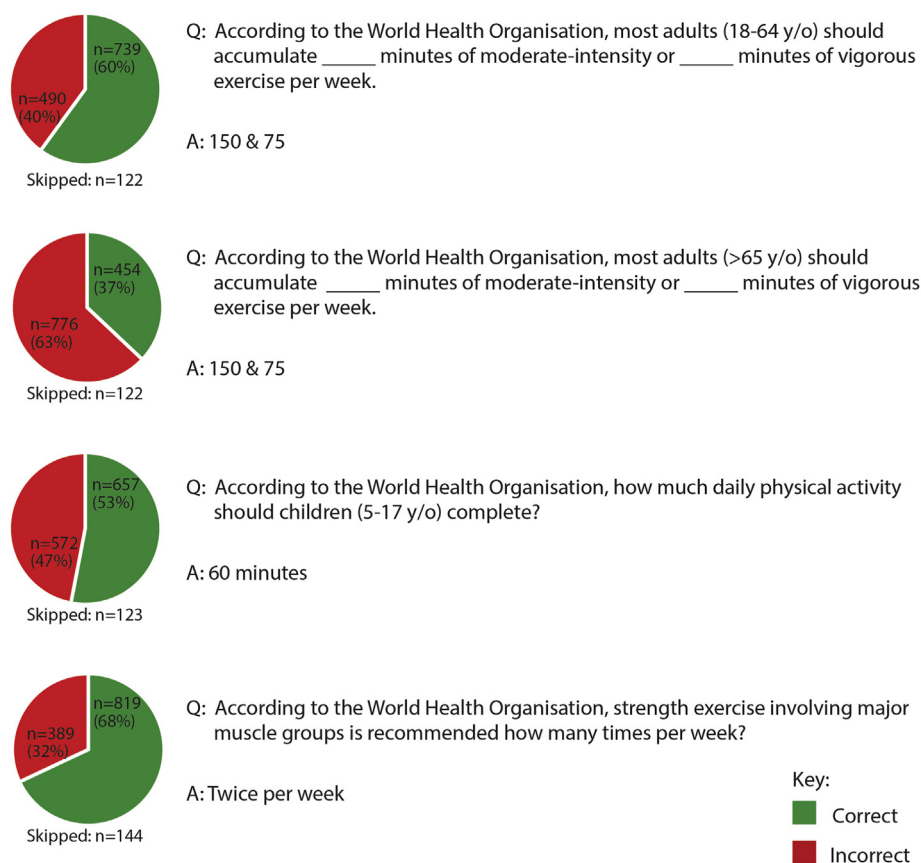


Fig. 1. Physiotherapist's awareness of the World Health Organisation's physical activity guidelines. Questions were not compulsory - response numbers vary per question.

4. Discussion

This large multi-national survey indicates many physiotherapists lack guideline knowledge, awareness and perceived competence to promote physical activity for people with musculoskeletal pain. Sixty percent of physiotherapists were able to correctly state WHO physical activity guidelines for adults, reflecting findings from similar national-level studies (50–60%) (Lowe et al., 2017; Yona et al., 2019). Even fewer physiotherapists were able to correctly state WHO physical activity guidelines for older adults (37%) and children (53%). This lack of physical activity guideline knowledge among physiotherapists worldwide may impair the profession's ability to promote physical activity to people with musculoskeletal pain (Rubio-Valera et al., 2014), a practice considered vital to broader public health (Booth et al., 2017; Bize et al., 2007; Chodzko-Zajko et al., 2009; Oldridge, 2008)

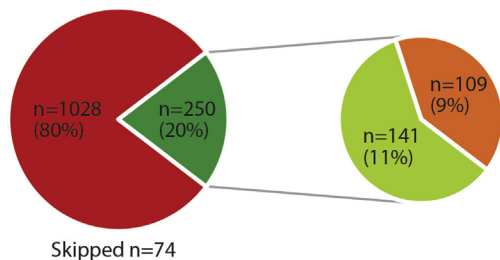
Consistent with patient expectations in Australia (Kunstler et al., 2019), most physiotherapists in this study agreed their role involved exercise prescription for people with musculoskeletal pain. Considering perceived roles of health professionals enables implementation of health promotion interventions (Rubio-Valera et al., 2014), education and training may be needed to increase these proportions among physiotherapists internationally. Despite acknowledging their role, only 38% and 50% of physiotherapists believed they had been trained to prescribe and progress aerobic exercise and resistance training following accepted guidelines, respectively. Additionally, very few stated they were aware of accepted aerobic exercise and resistance training guidelines (20–31%), and fewer were able to name accepted guidelines (11–21%).

The proportion of physiotherapists who named accepted aerobic exercise and resistance training guidelines was substantially lower than those who reported perceived knowledge (49–70%), skills (50–67%) and confidence (44–58%) in prescribing exercise. This finding may indicate a discord between perceived and actual knowledge of physical activity guidelines among physiotherapists, consistent with previous surveys (Lowe et al., 2017; Yona et al., 2019). Addressing perceived and actual competency barriers to physiotherapists prescribing physical activity, aerobic exercise and resistance training may help better align practice with guidelines (Lowe, Gee, McLean, et al., 2018; Lowe, Littlewood, McLean 2018; Zadro et al., 2019), and ensure health benefits of exercise prescription can be optimised for people with musculoskeletal pain (Geneen et al., 2017; Batsis et al., 2017; Bauman et al., 2016; Bellicha et al., 2018; Benatti & Pedersen, 2015; Cheng et al., 2018; Cooney et al., 2013; Khan & Scott, 2009; Maestroni et al., 2020; Skou et al., 2018)

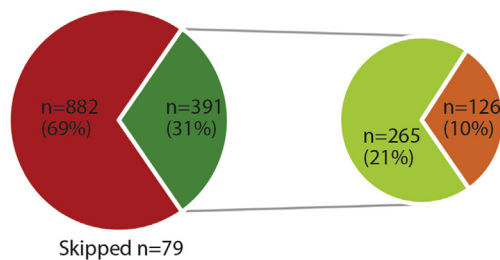
A higher proportion of physiotherapists who had completed post-graduate training could name an accepted aerobic exercise guideline, but fewer could correctly state WHO adult physical activity and strength training guidelines compared to the rest of the cohort. A greater proportion of less experienced physiotherapists (0–10 years) correctly stated adult strength training guidelines compared to participants with more experienced physiotherapists (>10 years). Understanding what causes these differences requires further research, but it may be a result of evolving physiotherapy curriculum, better recall due to recency of learning, or more experienced physiotherapists relying on clinical experience. Collectively, our findings indicate professional development initiatives may benefit all physiotherapists, regardless of post-graduate training or experience.

Are you aware of any published guidelines for:

Aerobic exercise prescription and progression?
If yes, please state the guideline

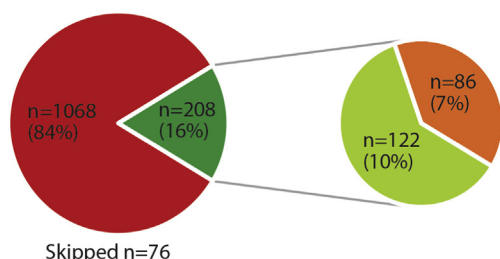


Resistance training prescription and progression?
If yes, please state the guideline



Do you use any published guidelines for:

Aerobic exercise prescription and progression?
If yes, please state the guideline



Resistance training prescription and progression?
If yes, please state the guideline

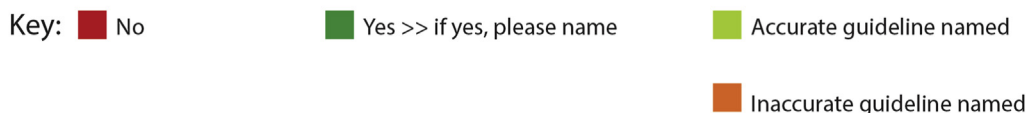
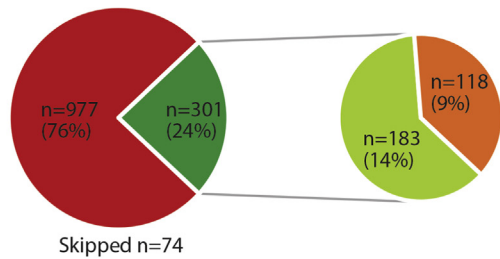


Fig. 2. Physiotherapist's awareness and use of aerobic exercise and resistance training prescription and progression. Questions were not compulsory - response numbers vary per question. Guideline named as "see previous answer", "as above" or "as per" were marked as inaccurate.

A need for professional development initiatives related to exercise prescription is indicated by 79% of physiotherapists believing limited opportunity to improve knowledge at least partially affected their ability to prescribe exercise effectively. Preference for workshops, aligns with work indicating that practical learning is considered most worthwhile by health professionals (Leahy, Chipchase, Calo, & et al, 2020a, 2020b). Workshops, including active learning, can improve knowledge and change health professional behavior (Leahy et al., 2020a, 2020b). Yet, development and evaluation of workshops to improve preparedness of physiotherapist to prescribe exercise when treating people with musculoskeletal pain is limited (Lowe, Gee, McLean, et al., 2018; Leahy et al., 2020a, 2020b; Leahy et al., 2020a, 2020b). Addressing this gap in knowledge translation, alongside development and evaluation of multimedia education resources preferred by some physiotherapists in this study, should be a priority.

Most physiotherapists believed their ability to effectively prescribe exercise was at least partially affected by appointment

scheduling (75–79%), and access to equipment, space and gymnasiums (62–69%). These time and resource barriers are consistent with research in primary care and health promotion (Rubio-Valera et al., 2014), and highlight that organisational-level factors can influence exercise prescription, alongside individual-level factors such as knowledge and competency.

4.1. Limitations and future directions

Our online survey was informed by guidelines, position stands and the Theoretical Domains Framework, and piloted with physiotherapists. However, we did not establish the reliability and validity of the final survey questions. Although our sample was large it may not be representative of the broader physiotherapy profession. An estimated 625,000 physiotherapists work in 131 countries worldwide, which suggests our sample represents 0.22% of the total possible physiotherapist population (WCPT, 2020). Our recruitment was facilitated by social media and email advertisement to

Please rate you level of agreement with the following statements related to exercise capabilities

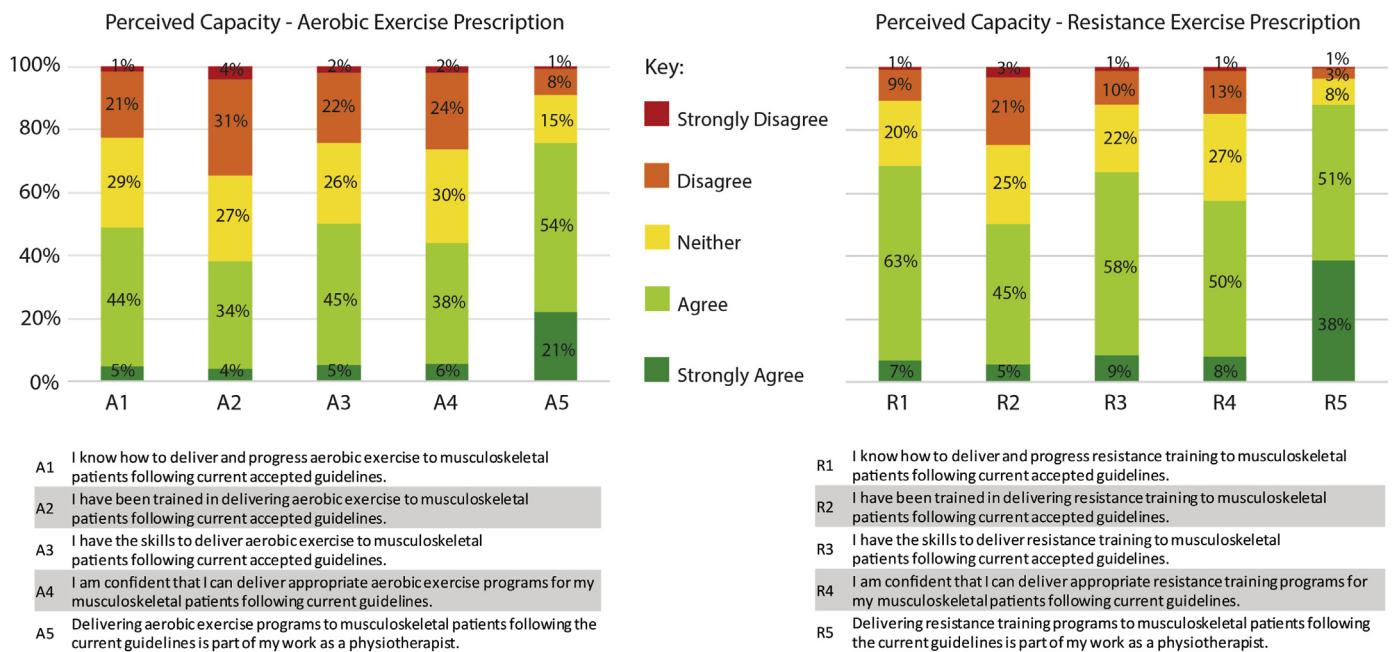


Fig. 3. Physiotherapist's perceived knowledge, competency, and role in providing aerobic exercise and resistance training to people with musculoskeletal pain. Questions were not compulsory, response numbers: perceived capacity - aerobic exercise prescription n=1280, perceived capacity - resistance exercise prescription n = 1282.



Fig. 4. Physiotherapist's most preferred learning resources to address professional development needs. Question was not compulsory, response number n = 1350, data reported as % of participants ranking the resource from 1 to 7. 1 = Most preferred, 7 = least preferred.

professional networks of study authors, potentially creating a biased sample. Additionally, we included the incentive of free access to an online education platform upon completion. Therefore, those who identified the need to complete professional development related to exercise prescription, and were seeking this through online educational opportunities, may have been more likely to respond, potentially affecting generalizability of our findings. Nonetheless, physiotherapists from diverse geographical

locations (56 countries), work settings (public/private) and experience levels participated. Additionally, a large proportion (33%) reported previous post-graduate training related to exercise prescription.

This study identified broad considerations for professional development to address large variations in guideline knowledge, awareness and perceived competence to implementation among physiotherapists. Further work, including co-design of novel

Do you feel the following factors affect your ability to prescribe effective rehabilitation programmes for patients with musculoskeletal disorders?

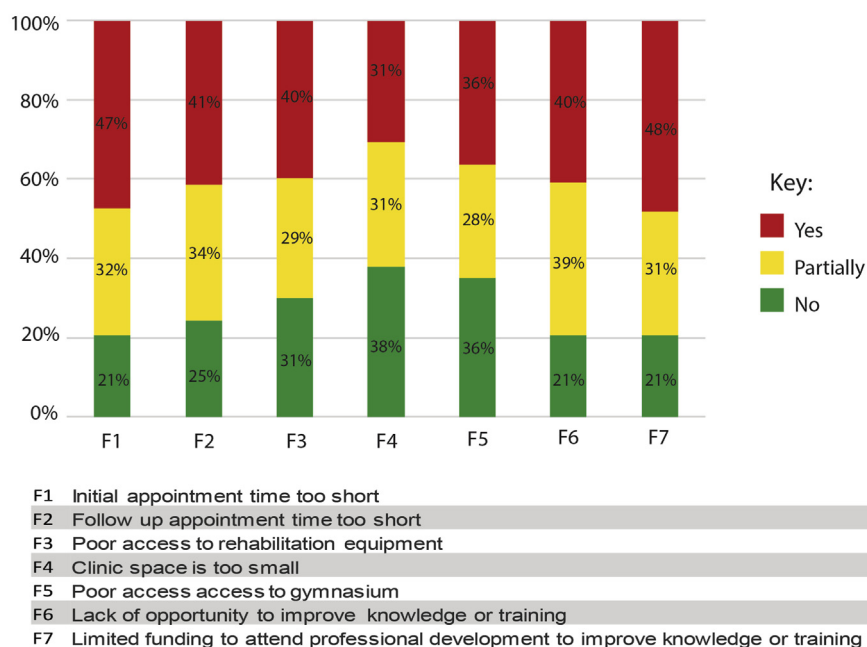


Fig. 5. Physiotherapist's perceived influences of practice and training related factors on the ability to prescribe effective rehabilitation programs for musculoskeletal patients. Question was not compulsory, n = 1206 supplied a response.

professional development initiatives, is now needed to better prepare physiotherapists to provide physical activity advice and prescribe exercise therapy support to people with musculoskeletal pain. When considering the broader socioecological context (McLeroy et al., 1988), our work focused on the individual physiotherapists (knowledge, attitude), and provided some insight into organizational barriers (environment). In order to optimize exercise prescription in physiotherapy practice, other potential practice influences at community (e.g. culture, patient expectations) and policy (funding) levels (Rubio-Valera et al., 2014; McLeroy et al., 1988) should also be considered.

5. Conclusion

Most physiotherapists agree their role involves exercise prescription for people with musculoskeletal pain. Yet, many physiotherapists lack preparedness to prescribe physical activity, aerobic exercise and resistance training following guidelines to people with musculoskeletal pain. Workshop and supporting multimedia resource development, alongside consideration to other barriers within the broader socioecological context, may help to better prepare physiotherapists to prescribe exercise interventions to people with musculoskeletal pain.

Sources of grant support

This project received funding from the Pat Cosh Trust, which was established in 2010 for the purpose of advancing education of all Victorian physiotherapists. CJB is supported by an MRFF TRIP Fellowship (APP1150439).

Ethics

Ethical approval was granted by La Trobe University's Human Ethics Research Committee (S17-024).

Financial disclosure/conflict of interest

Nil.

Declaration of competing interest

The authors declare that they have no competing interests.

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