BMJ Open

A survey across four European countries to determine rheumatology health professionals' awareness of physical activity measures in people with inflammatory joint diseases

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To cite: Kennedy NM, McKenna SG, O'Neill A, *et al*. A survey across four European countries to determine rheumatology health professionals' awareness of physical activity measures in people with inflammatory joint diseases. *BMJ Open* 2018;**8**:e020809. doi:10.1136/bmjopen-2017-020809

► Prepublication history and additional material for this paper are available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2017-020809).

Received 5 December 2017
Revised 13 February 2018
Accepted 4 April 2018

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ABSTRACT

Objectives The objectives of this study were to determine rheumatology health professionals' (HPs)' awareness of and confidence in using physical activity (PA) measures in people with inflammatory joint diseases (IJDs), their own self-reported PA levels and to identify HP-related educational needs.

Methods Rheumatology HPs in Denmark, Sweden, Ireland and Belgium participated in an on-line survey. Descriptive statistics and latent class analysis (LCA) were undertaken SPSS (v21and SASv9.4) to describe data aggregates and range and to identify subclasses of groups with respect to use of PA measures.

Results 322 (n=322, 75.5% women) HPs responded from Denmark (n=50, 15.5%), Sweden (n=66, 20.5%), Ireland (n=28, 8.7%) and Belgium (n=178, 55.3%) and the majority of respondents (n=286, 91.7%) reported it was important to measure PA in people with IJDs. Only 28.2% of HPs used simple body worn sensors to measure PA levels in their patients. The majority were interested in on-line education on measuring PA (82.9%). LCA, used to generate classes of PA measures employed by HPs, revealed three distinct classes reflecting differences in self-reported PA levels, awareness of PA measures, further education requirements and professional background.

Conclusions The majority of respondents reported that they considered measuring PA as important in people with IJDs; however, the majority lacked confidence in how to measure it. There was strong interest in further education around measuring PA. Three distinct respondent classes were identified to inform targeted education on how to measure PA.

Strengths and limitations of this study

- First survey to examine how rheumatology health professionals in four European countries measure physical activity (PA) in their clinical practice and their confidence in doing so.
- The use of latent class data analysis to identify subgroups to aid tailoring of further education relating to PA measurement in clinical practice is novel in this field.
- An overall response rate could not be calculated as two countries could not determine the total sample surveyed.
- Translation of the survey, which was originally designed in English, may have inadvertently led to a reduction in face validity of the survey.

INTRODUCTION

Regular physical activity (PA) is associated with improvements in health-related outcomes, such as quality of life, aerobic fitness and disease-related characteristics, including pain and stiffness in people with inflammatory joint diseases (IJDs).[1–4] However, research has shown lower levels of PA in the arthritis population,[5–9] thus better promotion of PA among people with IJDs is necessary.[10] Health professionals (HPs) are ideally placed to promote PA and its health benefits with their patients.[11]

Previous studies have investigated attitudes and educational needs relating to health-enhancing PA among HPs in the Netherlands[12] and Ireland.[13] However, these studies focused on whether HPs valued PA for people with arthritis and did not focus on how to measure PA in this population. In order to promote PA and to determine if people with IJDs are engaging in PA, HPs need to be aware of how to measure PA. Accurate measurement of PA is important for clinical decision making and monitoring of changes in outcomes. The range and complexity of devices available to measure PA have increased in recent times.[14–16] These devices, while presenting an opportunity to measure PA more comprehensively, may be a barrier to PA measurement

in practice due to their perceived complexity of use, cost and availability in clinical practice. Yet, these devices are increasingly used by patients necessitating that HPs are confidently able to discuss PA measurement using them.[17 18] To inform education aimed at enhancing HPs' knowledge of using PA measures in practice, it is first necessary to survey their current awareness of measuring PA.

Tailored interventions are preferable in changing HPs' practices[19] and advanced analysis of HPs' characteristics can assist with identifying subgroups for tailored education. Latent class analysis (LCA) is a statistical approach that allows for such identification of subclasses based on response patterns from the overall sample in a survey.[20]

Thus, the aim of this study was to determine rheumatology HPs' awareness of and confidence in using PA measures in people with IJDs. A second aim was to identify subclasses within this population to help tailor further education on use of PA measures for people with IJD.

METHODS

A survey reporting guideline[21] was used to guide reporting of this survey (Research checklist).

Design

A cross-sectional on-line survey design was used to allow a broad geographic distribution, convenience to respondents and guaranteed respondent confidentiality.[22]

Sample

Rheumatology HPs in Denmark, Sweden, Ireland and Belgium in Europe were invited to participate in an on-line survey. Participants were recruited to participate through their national rheumatology HP association/group. The Denmark HPs were recruited through the 'Danish Interdisciplinary Rheumatology Forum', 'Occupational Therapists in Rheumatology/Arthritis and Back Disorders' (Facebook group) and through the hospitals' rheumatology departments across the country. The Swedish HPs were recruited through the Swedish Association of Physiotherapists Rheumatology Interest group and the Swedish Rheuma Forum groups for occupational therapists and nurses. In Ireland, recruitment was through the Irish Rheumatology Health Professionals Society and the Irish Society for Rheumatology in Ireland and in Belgium, recruitment was through the Belgian Health Professionals in Rheumatology and Belgian Royal Society for Rheumatology in Belgium. HPs in this study included all HPs working in rheumatology, including medical, nursing and allied HPs. Separate ethical approval was granted by each participating country's research ethics committees.

Survey

The study steering group developed an on-line survey following review of previously used questionnaires to measure PA among HPs.[12 13] The questionnaire (online supplementary file 1) was divided into sections[i]: demographic profile; PA measurement; aerobic capacity testing and educational needs. As previous studies have noted that some HPs' own PA levels may have an influence on how they advise their patients about being physically active,[12 23] a measure of HPs' own PA was included. The Short Questionnaire to Assess Health Enhancing Physical Activity (SQUASH)[24] was chosen based on its previous use with rheumatology HPs[12] and its short completion time. The SQUASH contains 11 questions on PA related to commuting activities, leisure time and sports activities, household activities and activity at work and school and is reported to have acceptable reliability (overall reproducibility: r=0.58) and validity (correlation with an activity monitor for the total activity score was r=0.45).[24]

In this study, the total score used was the total minutes of activity per week as it incorporates frequency and duration of all included activities.

To ascertain face validity of the questionnaire used in this study, discussions were organised in each country by the country representative and up to four other HPs, to cover the different professional groups. These debriefings were held in order to explore whether the constructs surveyed within each questionnaire reflected the aims under study (ie, to identify missing or problematic questions/constructs) and were understandable in each language. No issues relating to conceptualisation in any language following translation were identified. The questionnaire was translated into each country's main language(s). Data were then back-translated where necessary and the final results were presented in English.

Data collection

The questionnaire was conducted online through SurveyMonkey, KI Survey or SurveyXact. In each country, the chairperson for each relevant HP association was contacted requesting permission for their group's members to participate. When this permission was granted, the chairperson acted as gatekeeper by sending the email containing the study information, survey link and researcher details to their group's members. The first page of the survey contained detailed information on the study and consent was implied if the respondent continued past this page to complete the survey. Reminders were sent to members, via the chairperson, at 1 month post the initial email 3 weeks apart.

Data analysis

Descriptive statistics of the demographic profile were derived from the data. Categorical data were described as counts and percentages. Continuous data that approximated a Gaussian distribution were described as means

[i]Parts of the survey on barriers to measurement and aerobic capacity testing will be reported in future papers.

and SDs, otherwise the continuous data were described as medians and IQRs. Differences between the demographic variables were tested using X^2 tests and analysis of variance test where appropriate. LCA,[20] a probability-based model, was used to generate classes of use of measures of PA. A number of latent class models, with one class up to four classes, were compared and two model fit indexes, Akaike information criterion (AIC)[25] and Bayesian information criterion (BIC),[26] were used to identify the optimal number of latent classes. The model with the smallest AIC and BIC indicates the best fitting model. Data analysis was carried out using the SPSS (v21, IBM USA) and SAS (v 9.4, SAS Institute, USA).

RESULTS

A total of 322 HPs responded to the survey, with country and sociodemographic profiles provided in table 1. The overall response rate for the survey could not be calculated, as exact membership numbers were not available in each country. On an individual country basis, the response rates were available for Ireland (65%) and Sweden (25%) only.

Measuring PA

When asked about the importance or not of measuring PA in people with IJDs, the majority (n=286, 91.7%) stated it was important, while 26 HPs (8.3%) said measuring PA was not important (table 1). Of those stating it was not important to measure PA (n=26), the majority (n=24, 92%) were physiotherapists (10% of overall physiotherapy sample), from Belgium (n=21, 80.8%), were mostly older aged (55-65) (n=11, 42%) with only country differences statistically significantly different (p=0.006) (table 2).

The majority of HPs (n=226 (87.6%)) wanted further education on PA measurement (table 1). There was strong interest in on-line education with the majority of respondents who answered yes to wanting further education (n=214, 82.9%) interested in this on-line format.

Respondents were most confident using, educating about and interpreting data from simple body worn sensors (pedometers, simple accelerometers and smartphone apps) and paper questionnaires/diaries and least confident using, educating about and interpreting complex body worn sensors (sensors that collect multiple data on one device) and digital diaries and questionnaires (PA surveys on phones, for example) (table 3). Physiotherapists were likely to use all sensors compared with occupational therapists and nurses, whereas occupational therapists and nurses were most likely to use paper/digital questionnaires (table 4).

Physiotherapists reported greater confidence in using, educating about and interpreting simple and complex body worn devices, which was statistically significant for confidence in using simple devices (p<0.005), educating patients about simple devices (p=0.003) and interpreting simple devices only (p=0.023) (table 4).

Table 1 Demographic profile of respondents*

	Variable	Count (%)
Country	Denmark	50 (15.5)
	Sweden	66 (20.5)
	Ireland	28 (8.7)
	Belgium	178 (55.3)
Gender	Female	243 (75.5)
	Male	79 (24.5)
Age	18–24	7 (2.2)
	25–34	54 (16.8)
	35–44	81 (25.2)
	45–54	89 (27.6)
	55–64	87 (27.0)
	65–74	4 (1.2)
Profession	Occupational therapist	30 (9.3)
	Physiotherapist	242 (75.2)
	Registered nurse	42 (13.0)
	Others†	8 (2.5)
Place of work	Hospital part-time	60 (18.6)
	Hospital full-time	94 (29.2)
	Private part-time	18 (5.6)
	Private full-time	104 (32.3)
	Primary part-time	1 (0.3)
	Primary full-time	3 (0.9)
	Mixed place of work	26 (8.1)
	Other	16 (5.0)
Patients treated with arthritis—%	<5%	97 (30.1)
	6–10%	63 (19.6)
	11–25%	33 (10.2)
	26–50%	25 (7.8)
	51–75%	26 (8.1)
	76–100%	76 (23.6)
	Other	2 (0.6)
Important to measure PA (n=312)	Yes	286 (91.7)
	No	26 (8.3)
Want further PA education (n=258)	Yes	226 (87.6)
	No	32 (12.4)
Want on-line further education on PA (n=258)	Yes	214 (82.9)
	No	44 (17.1)
SQUASH—(total minutes per week) Mean (SD)		3874 (2,231.0)

*Total n=322.
†Others—podiatrists, rheumatologists, social worker and pharmacist.
PA, physical activity; SQUASH, Short Questionnaire to Assess Health Enhancing Physical Activity.

Table 2 Demographic profile of respondents' views on importance of measuring physical activity†

	Important to measure			
	No (n=26)	Yes (n=286)		
	Count (%)	Count (%)	P values	Effect size
Age				
18–24	1 (3.8)	4 (1.4)	0.247	0.146
25–34	3 (11.5)	49 (17.1)		
35–44	4 (15.4)	75 (26.2)		
45–54	6 (23.1)	82 (28.7)		
55–64	11 (42.3)	73 (25.5)		
65–74	1 (3.8)	3 (1.0)		
Gender				
Female	16 (61.5)	222 (77.6)	0.065	0.105
Male	10 (38.5)	64 (22.4)		
Country				
Denmark	5 (19.2)	45 (15.7)	0.006*	0.199
Sweden	0 (0.0)	66 (23.1)		
Ireland	0 (0.0)	27 (9.4)		
Belgium	21 (80.8)	148 (51.7)		

†Total n=312 as 10 respondents did not answer this question.

PA levels

The SQUASH questionnaire was used to measure HPs' own PA levels (table 5). The mean total minutes of activity per week for the whole sample was 3874.2 (SD 2,231.0) minutes.

Latent class analysis

LCA was used to generate classes of use of measures of PA. Models with one through four latent classes were compared in order to select a model of activity levels. The BIC suggests that the two-class solution was superior (BIC=99.03), while the AIC suggests the three-class solution (AIC=46.04). An examination of both the two-class and three-class models suggested that the three-class model had greater parsimony (online supplementary file 2). The membership probabilities and the item response probabilities for the three-class LCA solution are presented in online supplementary file 2, while the association between the classes and the sociodemographics is shown in table 6.

- Class 1—*traditional group*— class membership probability for this class was 34.66% of individuals. People in this class had a high probability of using paper/digital means to measure PA, were mainly from Belgium, Sweden and Ireland, tended to be older and had lower years' experience working in rheumatology than Class 3 and greater years' experience in rheumatology than Class 2. They also had the lowest total minutes of activity per week.
- Class 2—*reluctant group*—resulted in the highest class membership probability, 49.62%. People in this group tended not to use any method of measurement, were older, had the shortest experience working in rheumatology, but the longest years working overall, were mainly nurses and from Belgium and Denmark and had a greater group membership who do not want further education about PA. This group's PA levels were higher than Class 1 but lower than Class 3.
- Class 3—*early adopters*— class membership probability for this class was 15.72% of the sample and can be categorised as those who use all methods to measure PA. This groups members were mainly physiotherapists from Belgium and Sweden who were working in rheumatology longer than Class 1 and 2 members and were in agreement as to the importance of measuring PA and want more education relating to PA. Members of this group also had the highest total minutes of activity per week.

DISCUSSION

This study is the first to investigate HPs' awareness of and confidence in using measures of PA for people with IJDs across four European countries. PA is an important part of the optimal management of people with IJDs.[27–29] In addition to promoting PA among people with IJDs, HPs also need to be able to adequately measure PA as an outcome measure.[17]

Our study highlights that the majority of HPs working with people with IJDs in four countries see the importance of measuring PA. However, confidence in using more objective measures of PA was low overall in this survey,

Table 3 Descriptives of confidence in using, educating about and interpreting physical activity measures*

	Simple body worn sensor Median (IQR)	Complex body worn sensor Median (IQR)	Paper questionnaire Median (IQR)	Paper diary Median (IQR)	Digital questionnaire Median (IQR)	Digital diary Median (IQR)
Confidence in using	7.0 (7.0)	4.0 (8.0)	7.0 (7.0)	8.0 (6.0)	3.5 (7.0)	3.0 (6.0)
Confidence in educating	5.0 (9.0)	2.0 (7.0)	8.0 (7.5)	6.0 (9.0)	2.0 (7.0)	2.0 (7.0)
Confidence in interpreting	6.0 (9.0)	3.0 (7.0)	7.0 (7.0)	6.0 (8.0)	4.0 (8.0)	3.0 (7.0)

*Confidence scores legend: possible score range 0–10—0 = not confident, 10=very confident.

Table 4 Health professionals' confidence in using, educating about and interpreting physical activity (PA) measures by profession*†

	Occupational therapist (n=30)	Physiotherapist (n=242)	Registered nurse (n=42)	Others‡ (n=8)
	Median (IQR)	Median (IQR)	Median (IQR)	Median (IQR)
Confidence in using PA measures by profession				
Simple	5.0 (3.5)	7.0 (7.0)	5.0 (9.0)	5.5 (6.25)
Complex	3.5 (6.0)	5.0 (8.0)	2.0 (5.0)	1.0 (8.5)
Paper Q.	8.0 (3.0)	7.0 (7.0)	8.0 (8.0)	6.5 (7.25)
Paper D.	8.0 (4.25)	6.0 (8.0)	6.0 (8.0)	5.0 (7.25)
Digital Q.	5.0 (4.25)	3.0 (6.0)	5.0 (7.5)	5.0 (5.5)
Digital D.	5.0 (4.0)	2.0 (6.0)	3.0 (7.0)	5.0 (5.0)
Confidence in educating patients to use PA measures by profession				
Simple	5.0 (6.5)	6.0 (9.0)	1.0 (5.0)	2.0 (2.0)
Complex	4.0 (5.5)	4.0 (8.0)	0.0 (4.0)	1.0 (2.75)
Paper Q.	8.0 (2.5)	8.0 (8.0)	5.0 (10.0)	6.5 (6.0)
Paper D.	8.0 (4.5)	6.0 (9.0)	5.0 (10.0)	5.5 (5.25)
Digital Q.	6.0 (5.0)	2.0 (7.0)	2.0 (9.0)	5.0 (4.75
Digital D.	5.0 (5.5)	2.0 (7.0)	2.0 (8.0)	5.0 (4.75)
Confidence in interpreting results from PA measures by profession				
Simple	6.0 (5.0)	7.0 (9.0)	2.0 (6.0)	1.0 (2.25)
Complex	4.0 (6.0)	4.0 (8.0)	0.0 (2.5)	0.0 (0.5)
Paper Q.	9.0 (3.0)	7.0 (7.0)	7.0 (10.0)	4.0 (7.0)
Paper D.	8.0 (4.0)	5.0 (8.25)	6.0 (9.0)	4.0 (7.0)
Digital Q.	6.0 (4.0)	3.0 (8.0)	3.0 (7.5)	2.0 (5.25)
Digital D.	5.0 (4.0)	2.0 (7.0)	2.0 (7.0)	2.0 (5.25)

*Confidence scores legend: possible score range 0–10—0=not confident, 10=very confident.
†Total n=322.
‡Others—podiatrists, rheumatologists, social worker and pharmacist.
Complex, complex body worn sensor; Digital D, digital diary; Digital Q, digital questionnaire; Paper D, paper diary; Paper Q, paper questionnaire; Simple, simple body worn sensor.

with just a small group of physiotherapists, predominantly from Belgium and Sweden who were experienced in the field of rheumatology most likely to use any body worn sensor to PA measure in their patients. Lack of confidence in measuring PA is not uncommon among HPs. A survey of primary care physicians in Sydney found that less than 30% of primary care encounters involve PA assessment[30] with physicians indicating differing preferences for what instrument to use in practice to measure PA.[31]

Previous research has examined the self-report PA levels of rheumatology HPs[12] and reported lower PA levels using the same score (total minutes of activity per week) compared with this study. Physiotherapists' and nurses' total minutes of activity per week were 863 and almost 1000 min higher, respectively, than in the Hurkmans *et al* study. The SQUASH PA levels reported in this study are very high but reflective of the totality of activity that the respondents reported, including light daily activities during work, getting to and from work and not just structured exercise, which are often not captured. The differences between our SQUASH results and that of the previous Dutch study[12] may be explained by greater awareness among HPs of the importance of regular PA for their own health in the intervening time between the two studies, the inclusion of different countries in this study and the use of different aggregate values in both studies.

The majority of respondents wanted further education on PA measurement and the majority would like this in an on-line format. Development of more tailored education programmes are preferable for changing HPs' practices.[32] To help identify if differences existed between countries, professions, place of work and rheumatology experience, we used a statistical approach to determine if different groupings existed regarding use of PA measures. The three groups modelled using LCA showed that while a majority were aware of measures of PA, respondents in the *reluctant* group are a priority for education as they had the lowest awareness of PA measures. The value of using LCA to generate classes of use of measures of PA in this study is in aiding the tailoring of further PA education, which may in turn enhance participant's confidence in measuring

Table 5 Respondents own physical activity levels (SQUASH*) demographics†

	SQUASH mean (SD)	P values	η^2
Sex			
Female (n=183)	3859.1 (2205.6)	0.841	0.000
Male (n=49)	3931.1 (2345.7)		
Age			
18–24 (n=3)	6286.7 (2737.3)	0.062	0.045
25–34 (n=36)	4717 (2088.3)		
35–44 (n=64)	3576 (2348.1)		
45–54 (n=67)	3720.9 (2076.7)		
55–64 (n=60)	3725.5 (2248.2)		
65–75 (n=2)	4223.0 (229.1)		
Country			
Denmark (n=41)	3781.5 (1478.5)	<0.000*	0.248
Sweden (n=46)	2881.3 (1385.8)		
Ireland (n=27)	1662.9 (914.6)		
Belgium (n=118)	4808.7 (2390.5)		
Profession			
Occupational therapist (n=16)	3118.1 (2029.6)	0.361	0.014
Physiotherapist (n=180)	3986.6 (2219.2)		
Registered nurse (n=31)	3759.7 (2388.6)		
Others‡ (n=5)	2959.0 (2193.1)		

*Total minutes of activity per week.
†Total n=232 as not all respondents completed SQUASH data.
‡Others—podiatrists, rheumatologists, social worker and pharmacist.
SQUASH, Short Questionnaire to Assess Health Enhancing Physical Activity.

PA. Generic approaches to delivery of education can result in reduced uptake of the education with resultant lack of change in practice. Based on the results of this study, people in the *reluctant* group should be targeted first as they do not report measuring PA as important and did not report an interest in further education on measuring PA. Members in the *reluctant* group were from all four countries (majority from Belgium and Denmark), all three professions (highest physiotherapy) and were the longest qualified group, but working the least years in rheumatology. Their reluctance may be part formed by an assumption of expertise in this area based on length of experience and/or a view that not all HPs need to be educated in measuring PA. An education programme for this group around measurement of PA would need to take a graded approach starting with a basic introduction to the value of PA measurement and the various methods of doing so in a clinical setting. This learning could then be contextualised to rheumatology incorporating case studies to allow for application of learning. Members of the *traditional* group were most likely to already use a basic form of PA measurement, thus an intermediate level module focusing on the range of PA measures and how to interpret data from them would form the basis for their learning. Finally, the minority of respondents belonging to the *early adopters* group were most likely to be already using all methods of PA measurement —for this group, a more advanced educational module could be developed incorporating theories of PA behavioural change and advanced PA measurement. These educational modules may also need to consider differing professional scopes of practice around PA measurement and management. The use of a statistical approach to develop groups to help target educational interventions has been used in other areas of practice, including antibiotic use and resistance in Sweden[33] and nurses beliefs about caring for patients traumatic brain injury.[34] In this study, the use of LCA to generate classes of use of measures of PA was valuable in helping to identify subgroups with similar scores who have different scores from the other subgroups.[20] Further research using qualitative methods would build on these findings to explore educational needs among respondents within each subgroup.

Implications for practice

While measuring PA was reported as important by HPs in these four European countries, there is not a concomitant high number of HPs measuring PA in practice. Measuring PA is important as engagement in PA is important for patients and has numerous health benefits. Thus, it can become a routine outcome measure in practice. Encouraging practitioners to use some of the range of measures available to measure PA is important given the importance of PA in managing IJDs. To improve the use of PA outcome measures in practice, it is necessary for HPs to improve their awareness of and confidence in using objective measures of PA.

Limitations

As with any survey, respondents may have misinterpreted the questions with resultant inaccuracy in responses. The original survey was designed in English and translated into Swedish, Danish, French and Flemish with results being reported into English. Hence, some understanding or interpretation may have been lost in translation and back-translation. We identified no changes in interpretability following translation; however, future studies should undertake a more rigorous process with regard to translation and back-translation and should undertake large-scale cross-cultural validity work prior to undertaking the final survey. Some information on the benefits of PA measurement provided in the introduction to the questionnaire and some questions may have had a leading effect on respondents.

Also, respondents were largely physiotherapists, occupational therapists and nurses, thus the results cannot be considered to be reflective of the views of other rheumatology HPs, including rheumatologists. Rheumatologists are an important group to consider when examining how to promote PA,[35] thus further research is needed to determine their awareness of PA measures in people with IJDs. Finally, response rates were estimates only for two countries as exact membership numbers for those countries were not available.

Table 6 Association between latent classes and sociodemographics

	Class 1 (*Traditional*) (n=91) Count (%)	Class 2 (*Reluctant*) (n=157) Count (%)	Class 3 (*Early adopters*) (n=42) Count (%)	P values	Effect size†
Country					
Denmark	9 (9.89)	40 (25.48)	1 (2.38)	<0.001*	0.276
Sweden	32 (35.16)	17 (10.83)	17 (40.48)		
Ireland	12 (13.19)	14 (8.92)	0 (0.0)		
Belgium	38 (41.76)	86 (54.78)	24 (57.14)		
Gender					
Female	71 (78.02)	126 (80.25)	30 (71.43)	0.467	0.073
Males	20 (21.98)	31 (19.75)	12 (28.57)		
Age					
18–24	1 (1.10)	3 (1.91)	0 (0.0)	0.741	0.109
25–34	14 (15.38)	26 (16.56)	8 (19.05)		
35–44	26 (28.57)	36 (22.93)	14 (33.33)		
45–54	25 (27.47)	52 (33.12)	9 (21.43)		
55–64	25 (27.47)	37 (23.57)	10 (23.81)		
65–74	0 (0.0)	3 (1.91)	1 (2.38)		
Profession					
Occupational therapist	14 (15.38)	12 (7.64)	1 (2.38)	0.001†	0.195
Physiotherapist	63 (69.23)	112 (71.34)	41 (97.62)		
Registered nurse	14 (15.38)	27 (17.20)	0 (0.0)		
Other	0 (0.0)	6 (3.82)	0 (0.0)		
Place of work					
Hospital part-time	22 (24.18)	25 (15.92)	11 (26.19)	0.344	0.164
Hospital full-time	26 (28.57)	51 (32.48)	11 (26.19)		
Private part-time	2 (2.20)	11 (7.01)	2 (4.76.)		
Private full-time	25 (27.47)	49 (31.21)	13 (30.95)		
Primary care part-time	0 (0.0)	0 (0.0)	1 (2.38)		
Primary care full-time	2 (2.20)	1 (0.64)	0 (0.0)		
Mixed practice	9 (9.89)	11 (7.01)	3 (7.14)		
Other	5 (5.49)	9 (5.73)	1 (2.38)		
Important to measure					
No	2 (2.20)	20 (12.74)	0 (0.0)	0.001†	0.213
Yes	89 (97.80)	137 (87.26)	42 (100.0)		
PA education					
No	5 (5.62)	25 (18.94)	2 (5.41)	0.005†	0.203
Yes	84 (94.38)	107 (81.06)	35 (94.59)		
ACT education					
No	8 (8.99)	31 (22.96)	3 (8.57)	0.009†	0.191
Yes	81 (91.01)	104 (77.04)	32 (91.43)		
Years qualified					
Median (IQR)	20 (17)	24 (18)	20.5 (17)	0.996	<0.001
Years rheumatology					
Median (IQR)	12 (13)	9 (20)	16 (21)	0.015†	0.03
SQUASH					
Total minutes of activity per week, Mean (SD)	3626.67 (2439.94)	3949.98 (21.28.98)	4274.36 (1995.48)	0.33	0.01

*Statistically significant relationship.
†Cramer's V effect size is used for categorical variables, otherwise η^2 is used.
ACT, aerobic capacity testing; PA, physical activity; SQUASH, Short QUestionnaire to ASsess Health Enhancing Physical Activity.

The SQUASH questionnaire has mixed evidence for its reliability and validity in patients with ankylosing spondylitis[36] and total knee arthroplasty[37] and in non-clinical populations[24 38] with one recent study identifying its considerable variation in test–retest reliability and validity among a multiethnic population in The Netherlands.[39] We would not recommend the use of this measure of self-report PA based on what we identified, but were unable to verify, in the absence of an observational study, if over-reporting of PA levels occurred. Respondents were not asked to detail if their work and home were urban or rural locations, which limited the interpretation of the SQUASH data.

CONCLUSION

The majority of the rheumatology HPs reported that it was important to measure PA; however, levels of awareness and confidence were moderate to low about how to use, interpret and educate patients about more complex measures such as body worn devices. There was strong interest in further education around measuring PA. Three distinct subgroups were identified allowing for targeted education and training for HPs to be developed in future to improve knowledge and confidence in using PA measures.

Research reporting checklist

The following reporting checklist was used in the preparation of this manuscript—Good Practice in the conducting and reporting of survey research.[21]

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Funding This study was funded by the European League Against Rheumatism Health Professionals Research Grant 2015.

Competing interests None declared.

Patient consent Not required.

Ethics approval University of Limerick research ethics committee 2015_09_02_EHS.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Individual participant data that underlie the results reported in this article, after deidentification (text, tables and appendices), immediately after publication for 3 years to any researchers who provide a methodologically sound proposal. Requests for data sharing should be directed to norelee.kennedy@ul.ie.

REFERENCES

1. Plasqui G. The role of physical activity in rheumatoid arthritis. *Physiol Behav* 2008;94:270–5.
2. Metsios GS, Stavropoulos-Kalinoglou A, Sandoo A, *et al*. Vascular function and inflammation in rheumatoid arthritis: the role of physical activity. *Open Cardiovasc Med J* 2010;4:89–96.
3. Stavropoulos-Kalinoglou A, Metsios GS, Veldhuijzen van Zanten JJ, *et al*. Individualised aerobic and resistance exercise training improves cardiorespiratory fitness and reduces cardiovascular risk in patients with rheumatoid arthritis. *Ann Rheum Dis* 2013;72:1819–25.
4. Hurkmans E, van der Giesen FJ, Vliet Vlieland TP, *et al*. Dynamic exercise programs (aerobic capacity and/or muscle strength training) in patients with rheumatoid arthritis. *Cochrane Database Syst Rev* 2009;4:CD006853.
5 Tierney M, Fraser A, Kennedy N. Physical activity in rheumatoid arthritis: a systematic review. *J Phys Act Health* 2012;9:1036–48.
6. Sokka T, Häkkinen A, Kautiainen H, *et al*. Physical inactivity in patients with rheumatoid arthritis: data from twenty-one countries in a cross-sectional, international study. *Arthritis Rheum* 2008;59:42–50.
7. Hootman JM, Macera CA, Ham SA, *et al*. Physical activity levels among the general US adult population and in adults with and without arthritis. *Arthritis Rheum* 2003;49:129–35.
8. Haglund E, Bergman S, Petersson IF, *et al*. Differences in physical activity patterns in patients with spondylarthritis. *Arthritis Care Res* 2012;64:1886–94.
9. Swinnen TW, Scheers T, Lefevre J, *et al*. Physical activity assessment in patients with axial spondyloarthritis compared to healthy controls: a technology-based approach. *PLoS One* 2014;9:e85309.
10. Austin S, Qu H, Shewchuk RM. Health care providers' recommendations for physical activity and adherence to physical activity guidelines among adults with arthritis. *Prev Chronic Dis* 2013;10:E182.
11. Larkin L, Gallagher S, Fraser A, *et al*. If a joint is hot it's not the time: health professionals' views on developing an intervention to promote physical activity in rheumatoid arthritis. *Disabil Rehabil* 2017;39.
12. Hurkmans EJ, de Gucht V, Maes S, *et al*. Promoting physical activity in patients with rheumatoid arthritis: rheumatologists' and health professionals' practice and educational needs. *Clin Rheumatol* 2011;30:1603–9.
13. McKenna S, Kelly G, Kennedy N. FRI0585-HPR A Survey of Irish Physiotherapists' Current Practice in Promoting Physical Activity in Rheumatoid Arthritis. *Ann Rheum Dis* 2014;73(Suppl 2):1206.3–7.
14. Tierney M, Fraser A, Purtill H, *et al*. Study to determine the criterion validity of the SenseWear Armband as a measure of physical activity in people with rheumatoid arthritis. *Arthritis Care Res* 2013;65:888–95.
15. Semanik P, Song J, Chang RW, *et al*. Assessing physical activity in persons with rheumatoid arthritis using accelerometry. *Med Sci Sports Exerc* 2010;42:1493–501.
16. Sylvia LG, Bernstein EE, Hubbard JL, *et al*. Practical guide to measuring physical activity. *J Acad Nutr Diet* 2014;114:199–208.
17. Trost SG, O'Neil M. Clinical use of objective measures of physical activity. *Br J Sports Med* 2014;48:178–81.
18. Ainsworth B, Buchholz SW. How to Assess Physical Activity in Clinical Practice and for Scholarly Work. *The Journal for Nurse Practitioners* 2017;13–14–20 https://doi.org/.

19. Baker R, Camosso-Stefinovic J, Gillies C, *et al*. Tailored interventions to address determinants of practice. *Cochrane Database Syst Rev* 2015;4:CD005470.
20. Kongsted A, Nielsen AM. Latent Class Analysis in health research. *J Physiother* 2017;63:55–8.
21. Kelley K, Clark B, Brown V, *et al*. Good practice in the conduct and reporting of survey research. *Int J Qual Health Care* 2003;15:261–6.
22 Domholdt E. *Rehabilitation research: principles and applications*: Elsevier Saunders, 2005.
23. Iversen MD, Eaton HM, Daltroy LH. How rheumatologists and patients with rheumatoid arthritis discuss exercise and the influence of discussions on exercise prescriptions. *Arthritis Care Res* 2004;51:63–72.
24. Wendel-Vos GC, Schuit AJ, Saris WH, *et al*. Reproducibility and relative validity of the short questionnaire to assess health-enhancing physical activity. *J Clin Epidemiol* 2003;56:1163–9.
25 Akaike H. Factor Analysis and AIC. *Springer series in statistics (Perspectives in Statistics)*. New York, NY: Springer, 1987.
26. Schwarz G. Estimating the Dimension of a Model. *The Annals of Statistics* 1978;6:461–4.
27. Veldhuijzen van Zanten JJ, Rouse PC, Hale ED, *et al*. Perceived Barriers, Facilitators and Benefits for Regular Physical Activity and Exercise in Patients with Rheumatoid Arthritis: A Review of the Literature. *Sports Med* 2015;45:1401–12.
28. Agca R, Heslinga SC, Rollefstad S, *et al*. EULAR recommendations for cardiovascular disease risk management in patients with rheumatoid arthritis and other forms of inflammatory joint disorders: 2015/2016 update. *Ann Rheum Dis* 2017;76.
29. Withall J, Haase AM, Walsh NE, *et al*. Physical activity engagement in early rheumatoid arthritis: a qualitative study to inform intervention development. *Physiotherapy* 2016;102–264–71 https://doi.org/.
30. Winzenberg T, Reid P, Shaw K. Assessing physical activity in general practice: a disconnect between clinical practice and public health? *Br J Gen Pract* 2009;59:359–67.
31. Dutton SN, Dennis SM, Zwar N, *et al*. An explorative qualitative study on acceptability of physical activity assessment instruments among primary care professionals in southern Sydney. *BMC Fam Pract* 2016;17:138.
32. Baker R, Camosso-Stefinovic J, Gillies C, *et al*. Tailored interventions to overcome identified barriers to change: effects on professional practice and health care outcomes. *Cochrane Database Syst Rev* 2010:CD005470.
33. Vallin M, Polyzoi M, Marrone G, *et al*. Knowledge and Attitudes towards Antibiotic Use and Resistance - A Latent Class Analysis of a Swedish Population-Based Sample. *PLoS One* 2016;11:e0152160.
34. Oyesanya TO, Thomas MA, Brown RL, *et al*. Nurses' Beliefs About Caring for Patients With Traumatic Brain Injury. *West J Nurs Res* 2016;38:1114–38.
35. Iversen MD, Eaton HM, Daltroy LH. How rheumatologists and patients with rheumatoid arthritis discuss exercise and the influence of discussions on exercise prescriptions. *Arthritis Rheum* 2004;51:63–72.
36. Arends S, Hofman M, Kamsma YPT, *et al*. AB0910 Validity and reliability of the IPAQ and squash to assess daily physical activity in patients with ankylosing spondylitis. *Ann Rheum Dis* 2013;71(Suppl 3):690.16–690.
37. Wagenmakers R, van den Akker-Scheek I, Groothoff JW, *et al*. Reliability and validity of the short questionnaire to assess health-enhancing physical activity (SQUASH) in patients after total hip arthroplasty. *BMC Musculoskelet Disord* 2008;9:141 http://europepmc.org/abstract/MED/18928545.
38. Chinapaw MJ, Slootmaker SM, Schuit AJ, *et al*. Reliability and validity of the Activity Questionnaire for Adults and Adolescents (AQuAA). *BMC Med Res Methodol* 2009;9:58.
39. Nicolaou M, Gademan MG, Snijder MB, *et al*. Validation of the SQUASH Physical Activity Questionnaire in a Multi-Ethnic Population: The HELIUS Study. *PLoS One* 2016;11:e0161066.