

What do healthcare professionals want from a resource to support person-centred conversations on physical activity? A mixed-methods, user-centric approach to developing educational resources.

REID, Hamish <<http://orcid.org/0000-0003-2094-5506>>, CATERSON, Jessica, SMITH, Ralph, BALDOCK, James, JONES, Natasha and COPELAND, Robert <<http://orcid.org/0000-0002-4147-5876>>

Available from Sheffield Hallam University Research Archive (SHURA) at:

<http://shura.shu.ac.uk/30386/>

This document is the author deposited version. You are advised to consult the publisher's version if you wish to cite from it.

Published version

REID, Hamish, CATERSON, Jessica, SMITH, Ralph, BALDOCK, James, JONES, Natasha and COPELAND, Robert (2022). What do healthcare professionals want from a resource to support person-centred conversations on physical activity? A mixed-methods, user-centric approach to developing educational resources. *BMJ Open Sport & Exercise Medicine*, 8, e001280.

Copyright and re-use policy

See <http://shura.shu.ac.uk/information.html>

What do healthcare professionals want from a resource to support person-centred conversations on physical activity? A mixed-methods, user-centric approach to developing educational resources

Hamish Reid ^{1,2}, Jessica Caterson,³ Ralph Smith,⁴ James Baldock,⁴ Natasha Jones,^{1,4} Robert Copeland,² on behalf of the Moving Medicine development group

To cite: Reid H, Caterson J, Smith R, *et al.* What do healthcare professionals want from a resource to support person-centred conversations on physical activity? A mixed-methods, user-centric approach to developing educational resources. *BMJ Open Sport & Exercise Medicine* 2022;**8**:e001280. doi:10.1136/bmjsem-2021-001280

► Additional supplemental material is published online only. To view, please visit the journal online (<http://dx.doi.org/10.1136/bmjsem-2021-001280>).

Accepted 9 June 2022



© Author(s) (or their employer(s)) 2022. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

For numbered affiliations see end of article.

Correspondence to
Dr Hamish Reid;
h.reid@shu.ac.uk

ABSTRACT

Objectives Healthcare is a fundamental action area in population efforts to address the global disease burden from physical inactivity. However, healthcare professionals lack the knowledge, skills and confidence to have regular conversations about physical activity. This study aimed to: (1) understand the requirements of healthcare professionals and patients from a resource to support routine physical activity conversations in clinical consultations and (2) develop such a resource.

Methods This study used codesign principles across two phases, actively involving relevant stakeholders in an iterative development process. The preparatory phase included a scoping literature review and workshops with multidisciplinary healthcare professionals and patients. The Delphi phase included the development of a draft resource, a three-stage modified online Delphi study and an external review.

Results The scoping review highlighted the importance of addressing time restrictions, a behaviour change skill deficit, the need for resources to fit into existing systems and meeting patient expectations. Consultation included 69 participants across two clinical workshops. They recommended using the internet, valued guidance on all aspects of physical activity conversations and were concerned about how to use a person-centred approach. The Delphi phase, including 15 expert participants, met agreement criteria in two stages to develop the resource.

Conclusion This mixed-methods study delivered an online resource that was codesigned with and based on the requirements of healthcare professionals and patients. The resource presents condition-specific '1-minute', '5-minute' and 'more minute' person-centred and evidence-based conversation templates on physical activity in an accessible and usable format to meet the needs of real-life clinical practice.

INTRODUCTION

A strong and rapidly developing body of evidence defines the health risks of physical

WHAT IS ALREADY KNOWN ON THIS TOPIC

- ⇒ Healthcare professionals are essential contributors to population efforts to increase physical activity.
- ⇒ The physical activity knowledge, skills and confidence of healthcare practitioners are low.
- ⇒ There is a lack of physical activity tools and educational resources available to help healthcare professionals.

WHAT THIS STUDY ADDS

- ⇒ Healthcare professionals want in-depth evidence on physical activity and specific conditions to be available and presented in an accessible hierarchy using hyperlinks on a web platform so they can choose what they need.
- ⇒ '1-minute', '5-minute' and 'more minute' person-centred conversations are flexible enough to meet the demands of healthcare professionals and patients.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE AND/OR POLICY

- ⇒ The resource developed during this study will help healthcare professionals talk to people about physical activity and is freely available online at www.movingmedicine.ac.uk
- ⇒ Future research should seek to test the resources developed during this study to determine efficacy and help improve the format and function of resources to better support conversations on physical activity in the management of long term conditions.
- ⇒ Comprehensive evaluation is required of system-wide implementation projects to understand how to use these resources to improve continuity and support people as they journey through healthcare services in their long-term management of health conditions.

inactivity and the role of therapeutic physical activity in treating chronic medical conditions.¹⁻³ The WHO recognises physical

inactivity as the fourth leading risk factor for global morbidity and premature mortality, being directly responsible for 6% of deaths globally⁴ and the cause of more deaths than smoking.²

Healthcare is a fundamental component of population-level approaches to addressing the inactivity burden and is essential due to the sector's contact with, and potential to influence, people living with health conditions.^{5,6} Individuals living with health conditions are among the least active in society and generally become even less active following diagnosis.² Consequently, this group stands to gain the most from even small increases in physical activity to treat existing and prevent new medical conditions.⁷

Healthcare professionals are a central part of the systems-wide approach required to drive change and improve the delivery of physical activity.^{6,8} Routine person-centred conversations between healthcare professionals and their patients offer a vital intervention area.^{9–13} Healthcare professionals repeatedly report lacking the skills and confidence required to effectively counsel people living with a health condition on physical activity.^{14–21}

There is a lack of tools and education platforms to operationalise physical activity conversations in healthcare.^{18,22} Furthermore, generic resources and efforts to improve behaviour change skills in other domains such as smoking cessation and weight loss do not appear to translate to improved physical activity confidence and skills.^{23,24} Meaningful patient involvement in quality improvement initiatives helps drive quality and innovation and is recommended for novel approaches to clinical resource development.²⁵ Codesign (also called coproduction or cocreation) is an approach that focuses on actively involving all relevant stakeholders to help ensure a design process meets their needs so that educational resources and service provision models are usable in real-life scenarios.^{26,27} Codesign principles were used in this study to address the following aims:

1. Understand the requirements of healthcare professionals and patients from a resource to support routine physical activity conversations in clinical consultations

2. Develop and test such a resource.

METHODS

Study design

Two study phases, reflecting the two study aims, are outlined in [figure 1](#). To understand the requirements of healthcare professionals around physical activity conversations, the preparatory phase included a scoping literature review and consultation workshops with multi-disciplinary healthcare professionals and patients. The Delphi phase aimed to iteratively develop and test such a resource over three rounds.

Codesign principles were employed throughout, engaging multidisciplinary healthcare professionals who will use the resource and people living with medical conditions with whom the healthcare professionals will use it. The Delphi method was chosen for its ability to collate a diverse set of expert opinions anonymously and without social pressure or a 'bandwagon effect'.^{28,29} Codesign enabled the Delphi phase of the study to focus on the iterative development of a resource that repackaged the physical activity evidence base into a clinically relevant and accessible format with input from a range of stakeholders through the generation of ideas and solutions rather than just in-depth analysis.^{30–32}

Patient and public involvement

Patient representatives identified through patient support groups of local charities attended the workshops. In the workshops, they were spread between groups to help understand and discuss the balance of perspectives required for conversations on physical activity in clinical practice. Their opinions directly informed resource design, and they subsequently contributed to external review and the development and dissemination of patient-facing information resources.

Preparatory phase

Scoping review

We undertook a scoping review following the five-stage protocol by Arksey and O'Malley reported according to the Preferred Reporting Items for Systematic Reviews

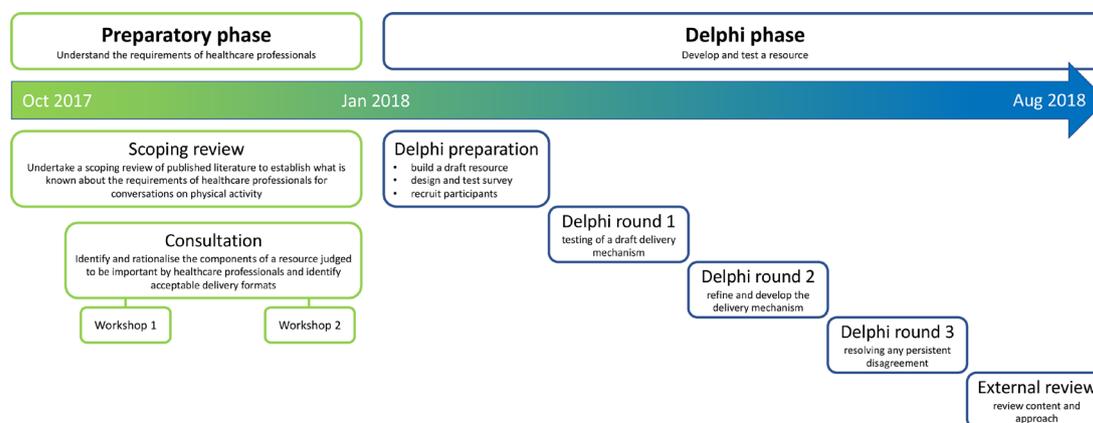


Figure 1 Structure and objectives of each Delphi study phase.

and Meta-Analyses extension for scoping reviews checklist.^{33–35} The review explored published literature, guidelines and online resources, aiming to gain a broad overview of the context of physical activity consultation in healthcare. It addressed two research questions: (1) what is known about the effectiveness and acceptability of physical activity consultations in healthcare? and (2) what is known about strategies to implement routine physical activity conversations in healthcare?³⁵

Consultation

We led two focused, interactive workshops informed by results from the scoping review (see online supplemental file 2). The workshops aimed to identify and rationalise the components of a resource judged to be important by healthcare professionals and identify acceptable delivery formats. Through professional contacts, we identified two multidisciplinary regional specialist networks to participate in the workshops. The first workshop focused on inflammatory rheumatic disease and the second on musculoskeletal pain. We summarised results from the workshops and organised them thematically to inform the development of a draft resource in the Delphi phase.

Delphi phase

We used a modified electronic Delphi process to collect data from remote contributors and facilitate automated data collection.^{36–37} We used the commercial software ‘SurveyMonkey’³⁸ for the survey rounds and followed the Conducting and REporting Delphi Studies guidelines throughout.³²

Building a draft resource

We commissioned a design agency and gave them a design brief based on findings of the preparatory phase. Design agency members also attended preparatory phase workshops to improve their understanding of the content and objectives. We developed a wireframe draft resource in conjunction with the design team through meetings, phone calls and email communication. The wireframe resource enabled the exploration of content, navigation and function during round 1 of the Delphi study without requiring the investment of a complete website build.

Developing and testing the survey

We developed and tested an online survey based on the structure and content of the wireframe resource, which reflected the development priorities outlined during the preparatory phase. Three clinicians not involved in the study piloted the survey before distribution to ensure usability by testing the structure and wording.^{28–39} We kept the completion time target below 30 min to reduce participant fatigue.⁴⁰

Participant recruitment

We formed an expert panel by purposive sample to generate a deliberately heterogeneous group of multidisciplinary participants with expertise covering healthcare,

physical activity, behavioural change and digital education.

According to recommendations for a Delphi study requiring in-depth feedback and continuity, 15 is a sufficient number of participants.^{31–41–42} We identified potential participants through professional and academic networks and established research interests with relevant publications. We invited participation by direct email, and where participants did not reply to the initial contact, we sent one further invitation email.

Following round 1, we contacted all participants by email and invited them to participate in round 2. In addition, three reminder emails were sent out for those who had not completed the second-round questionnaire: (1) a repeat of the initial invitation 2 weeks before the survey closing, (2) a reminder at 1 week and (3) a final reminder 2 days before survey closure.

Delphi rounds

Round 1 of the online Delphi aimed to test the structural components of the wireframe website and appraise preliminary design concepts. Round 2 involved testing a website built following round 1. Finally, round 3 enabled the resolution of any persistent disagreement if necessary.

Between-round feedback

Following each round, we prepared and distributed individualised feedback comparing individual responses to the group average for each question. This was a straight reproduction of the participant’s own words to avoid biasing responses in subsequent rounds.⁴² We also provided all participants with a summary of free-text feedback and a comprehensive list of and rationale for all actions taken (see figure 2).

Delphi consensus criteria

In keeping with described methods,^{32–39–42} we defined satisfactory agreement (consensus) ‘a priori’ according to the criteria outlined in figure 3.

External review

We identified three external groups to review the Delphi study’s outputs and circulated resources electronically to these groups after completing the Delphi rounds requesting open-text feedback via email. The objective of this feedback was to review the content and assess the feasibility and applicability of the approach recommended by the Delphi group. The groups were:

- ▶ An academic external validation group appointed through the Moving Medicine initiative.
- ▶ Funding and commissioning bodies at the Faculty of Sport and Exercise Medicine, Sport England and Public Health England.
- ▶ Collaborating professional bodies including the Royal College of Physicians, Royal College of Nurses, Royal College of General Practitioners, Chartered Society of Physiotherapists, Academy of Medical Royal Colleges, the British Association of Sport and

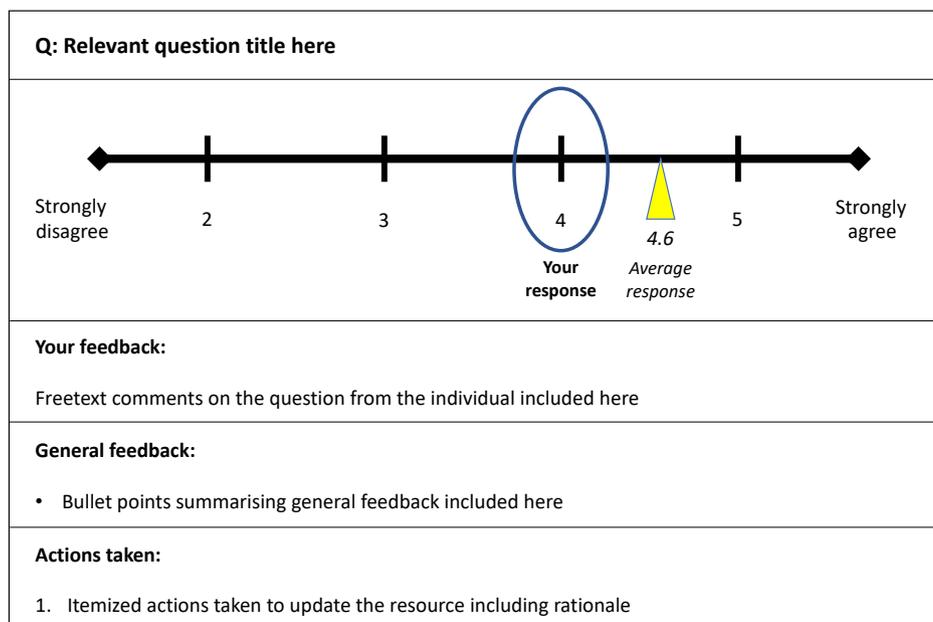


Figure 2 Format for individualised feedback on each question.

Exercise Medicine and the patient representatives of charities who had participated in the working groups.

RESULTS

Preparatory phase

Scoping review

The scoping review identified 616 references for screening (n=596 from databases and n=20 from hand searching). Following screening and removal of duplicates, 48 studies were included for analysis. Narrative results were synthesised thematically as they emerged from the data.³⁵ Online supplemental file 1 presents a summary of relevant findings.

Consultation

A total of 70 attendees took part in the face-to-face clinical workshops that took place in Oxford (autoimmune rheumatic disease) and Birmingham (musculoskeletal pain) in 2018 (see [table 1](#)). Healthcare professionals from a range of rheumatology, musculoskeletal and chronic pain services across England attended the workshops. The groups included doctors, nurses, physiotherapists, clinical academics and medical students. In addition, we identified patient representatives through local patient groups from the National Rheumatoid Arthritis Society and the Arthritis and Musculoskeletal Alliance,

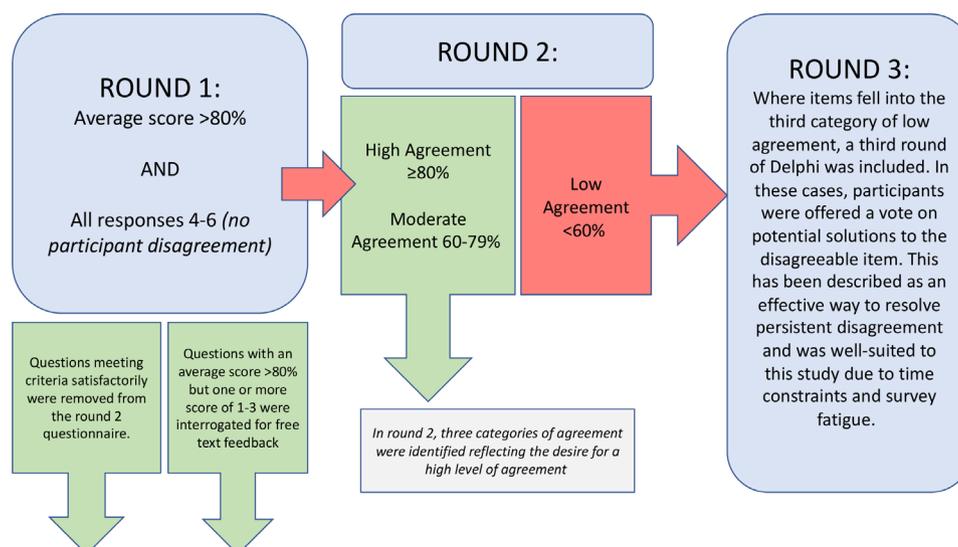


Figure 3 Definitions of consensus in each phase of the Delphi process.

Table 1 Professional mix in the preparatory workshops

	Autoimmune rheumatic disease workshop (n=37)	Musculoskeletal pain workshop (n=32)
Role		
Consultant	12	9
Specialist registrar	12	15
Physiotherapist	1	4
Nurse	4	0
Academic	2	1
Medical student	0	2
Lay representative	4	1
Designer	2	1
Gender		
Female	24	17
Male	13	16

an umbrella body in the UK connecting patient organisations and professional bodies across musculoskeletal health. Design and communication specialists from the project design team also attended. See online supplemental file 2 for more detail.

As outlined in [table 2](#), the headline themes identified were components to support healthcare professionals directly, clinical considerations for translating evidence

into practice and developing a mechanism to support access to knowledge in routine clinical care.

Delphi phase

Building a draft resource

Workshop participants identified the internet as an acceptable and scalable environment to host a resource to support conversations in everyday clinical practice. Using a website also enables delivery of the complexity of information identified as necessary. [Table 3](#) maps preparatory phase recommendations onto solutions generated during the iterative build of the wireframe website (see [figure 4](#)).

Developing and testing the survey

We identified the following problems during survey piloting:

- ▶ Errors in question format, including mistakes in a matrix table
- ▶ Confusing question layouts when viewed on mobile devices.
- ▶ Testing recommended that the classically used nine-point scale as per the original RAND UCLA method^{32,39} was an inappropriately long set of numbers for the digital screen. We selected a six-point scale instead, with the added advantage that it obliged participants to commit to either agreeing or disagreeing with statements.

Table 2 Summary of consultation workshop recommendations

Components identified to support healthcare professionals having conversations on physical activity	Condition-specific and general benefits (including symptoms).
	Directive messages to address common misconceptions.
	Safety messages addressing common concerns.
	Categories of activity (including what counts, practical suggestions and logistical considerations).
	Resources to give to patients.
	Activity recommendations that reflect disease activity.
	Gain an understanding of physical activity levels and physical activity history.
	Address perceived barriers and negative aspects of activity, for example, financial/access/time.
Clinical considerations for translating the evidence into practice	Signposting to appropriate resources for support of condition management and activity opportunities.
	A resource that cut out important information due to an arbitrary design consideration would significantly reduce usefulness and uptake among healthcare professionals, so all identified components need to be included.
	Time and prioritisation are prevalent barriers to physical activity conversations.
	Messages should be positively rather than negatively framed.
Developing a mechanism to support access to knowledge in routine clinical care	Clinical recommendations should focus on the individual rather than reference national guidelines. Specifically, healthcare professionals and patients perceive 150 min of moderate-intensity activity per week as an unnecessary barrier to conversations with inactive people.
	A person-centred approach to physical activity decision making is considered fundamental by clinicians and patients. However, clinicians lack confidence in achieving this. Both clinicians and patients recommend explicit guidance on how to approach person-centred decision making in behavioural change conversations.
	Disease-specific infographics were presented as a potential solution. Workshop participants unanimously agreed that flat infographics would not deliver the complexity of information healthcare professionals and patients require in clinical practice to support physical activity conversations.
	A resource must be flexible enough to be helpful in both a short or long period of time.
	To support conversations in practice, suggested responses to help address common concerns, such as the risks of physical activity, are helpful.
	The internet provides an accessible, acceptable and feasible route of delivery.

Table 3 Generating design solutions from preparatory phase recommendations

	Preparatory phase recommendation	Design solution
General features	Provide guidance on a conversation structure that supports different timeframes.	Three time-framed conversation templates were developed to host disease-specific information.
	Prioritise information to make it easily digestible.	Critical information is presented with hyperlinks to more detail.
	Include links to the evidence base.	A theory and evidence section included.
	Support a person-centred approach and individualised advice.	Conversation templates were developed to provide healthcare professionals with guidance on how to deliver individualised advice.
	Include positive and clear directive messaging.	'Did you know' posts created as stand-alone messages.
	Deliver via the internet.	Wireframe resource developed as a website.
Components	Physical activity history.	Include open questions and a screening tool.
	Include evidence on benefits for specific conditions.	Provide condition-specific resources with a summary of the relevant narrative evidence review.
	Address patient concerns and provide safety advice.	Enable customisation of concerns and safety advice for each condition by specialist healthcare professionals.
	Enable making a plan.	Include planning resources that can be shared with and given to patients.
	Signpost other resources and organisations.	Catalogue and hyperlink disease-specific resources from trusted sources and physical activity networks.
	Provide resources for patients to take away.	Include PDF output.
	Explain how physical activity is beneficial.	Include mechanistic explanations of symptom benefit.
	Suggest appropriate activities.	Include a list of example activities people find beneficial for each condition.

- Navigation of the wireframe website confused users, so we included images with detailed instructions to improve navigability.

Participant recruitment

We contacted 29 individuals, and 19 agreed to partake in round 1 of the study. Only 15 of 19 participants completed the survey in round 1 despite reminder emails, so only these participants were sent the round 2 survey. Ten of 15 of these participants responded to the round 2 survey. [Table 4](#) demonstrates participant demographics.

Delphi round 1

Overall, agreement levels were high in round 1 (see [table 5](#), full results are available in online supplemental file 3). However, there were two instances of participants registering a score or set of scores out of keeping with their free-text responses. We contacted these respondents directly to clarify their responses, and in each instance, there was an error or misunderstanding. For example, one respondent answered the scale of 1–6 the wrong way around, and another failed to open the design mock-ups

LOGO

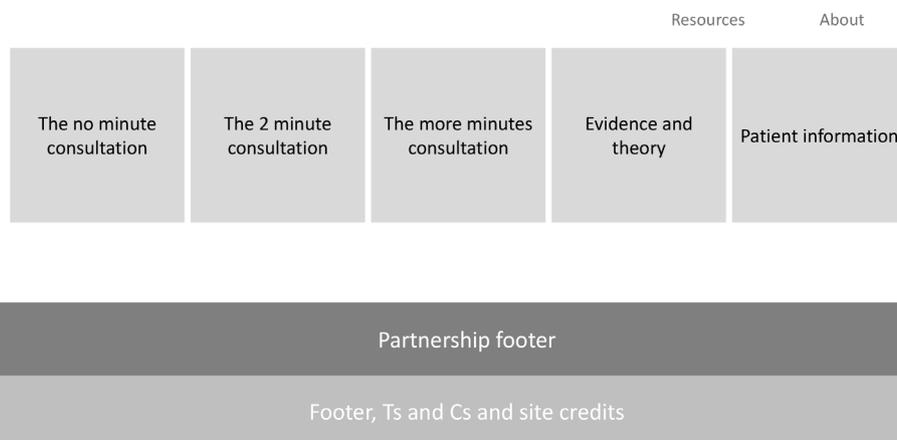
**Figure 4** Landing page for the UX-PIN wireframe website.

Table 4 Demographic and professional characteristics of Delphi expert panel

No.	Gender	Professional background	Professional role
1	M	Consultant	Clinical/physical activity academic
2*	F	Pharmacist	Clinical/education
3	F	Physiotherapist	Clinical
4*	M	Consultant	Clinical/physical activity
5	M	Consultant	Clinical
6	F	Academic	Intervention design/health policy
7	F	GP	Clinical
8*	M	Consultant	Clinical/academic
9	M	CEO	Digital communication/ physical activity
10	M	Consultant	Clinical
11*	F	Nurse	Clinical/education
12	F	Midwife	Clinical/education
13	M	Academic	Physical activity researcher
14	M	Consultant	Clinical/academic
15*	F	Psychologist	Behavioural change/health policy

*Did not participate in the second Delphi round.
F, female; M, male.

answering the design-specific questions on the strength of the wireframe website. These issues were rectified and were not ongoing issues for other participants.

We analysed and collated free-text responses thematically (online supplemental file 3). Where free-text responses were relevant but unclear or incomplete, we contacted the respondents by email and, in one case, telephoned to further clarify the meaning. Given the high levels of agreement, free-text responses identified most changes required following round 1. We made the following major changes following round 1:

- ▶ Revision of the conversation thread to further encourage patient-led decision making incorporating motivational interviewing theory and focusing on a ‘guiding’ rather than ‘telling’ approach.
- ▶ Shortening the ‘2 min’ conversation.
- ▶ Inclusion of patient-facing outputs for clinicians to hand out.
- ▶ Removal of the ‘theory and evidence’ page in favour of evidence statement ‘pop-ups’ to make navigation and accessibility more straightforward.
- ▶ Inclusion of a pop-up for out-of-date browsers advising software update and optimisation for mobile devices to make usage less reliant on National Health Service (NHS) IT infrastructure.

Delphi round 2

We built a draft website incorporating recommendations from round 1 for testing in round 2 of the Delphi (see figure 5).

Reflecting the high levels of consensus in round 1 of the Delphi (table 5), we dropped 10 questions for the

second survey. However, despite achieving consensus in round 1, we repeated question 11 because of significant changes to the relevant content due to free-text feedback.

In round 2, 12 consensus areas achieved high agreement, 6 moderate agreement and 1 low agreement. In addition, we observed moderate agreement for navigation, the achievability of content, the physical activity calculator and the signposting of organisations. See online supplemental file 4 for full results.

Delphi round 3

The inclusivity of design elements recorded low agreement (59%) in round 2. Free-text responses demonstrated that this was because the draft website only included one image. We did this intentionally to reduce build complexity at the draft stage. Ultimate plans were for a socioethnically diverse photograph carousel to feature in the final site, but we did not share this detail with respondents through oversight. We informed respondents of this solution by email, who were satisfied with the approach, and we did not need to proceed to a formal third round of the Delphi.

We revised the website following the amendments suggested in round 2. We then shared the website with the Delphi participants via email, inviting them to comment on the revisions. We received no further comments.

External review

After completing the Delphi study, we distributed the website to the predetermined external review groups. We invited feedback via open comments by email. Responses were unanimously positive, and no content changes were recommended. We received advice on launch, dissemination and engagement.

DISCUSSION

This mixed-methods study represents a unique effort to understand and address the requirements of healthcare professionals and people living with health conditions regarding conversations on physical activity in clinical practice. Results from an extensive preparatory phase, including scoping review and workshops, informed the development of an open-access online resource developed iteratively with expert Delphi consensus. The resultant resource combines published evidence, consensus opinion and practical advice from clinical specialists in a time-sensitive, person-centred, practical format to bridge the gap between evidence and clinical practice.

Codesign

Despite convincing evidence and numerous national guidelines defining the vital role of physical activity across UK healthcare,^{1–3 11 21 43–45} the translation of knowledge from research to clinical practice remains limited across professional disciplines.^{14–18 21 46} To address this, we employed codesign principles, which ‘offers the chance for clinicians to reconsider the purposes of medicine and

**Table 5** Overview of Delphi consensus results

No.	Question	Round 1			Round 2	
		% agreement	Any disagreement?	Consensus criteria met?	% agreement	Satisfactory agreement?
1	The information is laid out in a coherent manner that supports clinical consultation	77	Yes	No	83	Yes
2	Using patient quotes is an engaging way to make the content clinically meaningful	86	Yes	No	85	Yes
3	Navigation of the resource is straightforward	79	Yes	No	77	Yes
4*	The theory and evidence page contains a satisfactory amount of educational information	85	No	Yes	82	Yes
5	Presenting the options 'no minutes consultation', '2 min consultation', and 'more minutes consultation' is a useful approach for the busy clinician	94	No	Yes		
6	The menu page makes it clear what to expect from the resource	77	Yes	No	77	Yes
7	The 'no minutes consultation' contains the most important messages for a healthcare professional to share in a very short space of time	85	No	Yes		
8	The 'no minutes consultation' page includes an appropriate amount of information	85	Yes	No	75	Yes
9	The '2 min consultation' contains appropriate information	91	No	Yes		
10	Covering these objectives is achievable in a 2 min consultation	80	Yes	No	77	Yes
11†	The subheadings of the more minutes consultation (ask, share benefits, explain how it works, address concerns, plan and next steps) clearly signpost the content of each page	91	No	Yes	87	Yes
12	The four questions provide useful prompts for eliciting a patient-focused physical activity history	91	No	Yes		
13	The 'physical activity vital sign' is a useful screening tool for a brief intervention in physical activity	83	Yes	No	78	Yes
14	It is useful to present symptom reduction as primary benefits and prevention of further morbidity as secondary benefits	87	No	Yes		
15	It is necessary to display individual references at the bottom of the benefits page in addition to a clear link through to an explanation of the evidence with references on the 'evidence and theory' page	82	Yes	No	83	Yes
16	The positive/negative cycle of activity graphics will help healthcare professionals explain to their patients how physical activity will benefit their symptoms	91	No	Yes		
17	This information is presented in a clinically meaningful way	79	Yes	No	85	Yes
18	Key safety messages, such as addressing cardiac risk, are adequately addressed and explained	86	No	Yes		
19	This is a logical sequence of questions to support individualised physical activity prescription	82	Yes	No	87	Yes
20	'Building activity into all aspects of daily life' is an appropriate premise on which to base physical activity prescription	95	No	Yes		
21	'General Practice, the local social prescribing network, and county sports partnerships' are important organisations to signpost for further support	83	Yes	No	77	Yes
22	Do you have any suggestions for other national physical activity providers or resources we should signpost?	Freetext response				
23	Please arrange the following by the importance of including them in a patient information leaflet – drag and drop each component to your preferred position	Free-text response				

Continued

Table 5 Continued

No.	Question	Round 1			Round 2	
		% agreement	Any disagreement?	Consensus criteria met?	% agreement	Satisfactory agreement?
24	Do you have any recommendations/comments for the patient information section?	Free-text response			Freertext response	
25	The general 'look and feel' of the designed pages make the resource:					
	(A) Credible	81	Yes	No	83	Yes
	(B) Distinctive	82	Yes	No	81	Yes
	(C) Inclusive	79	Yes	No	59	No
	(D) Energetic	82	Yes	No	81	Yes
26	The design helps discriminate between different types of information, for example, core content and patient quotes	81	Yes	No	82	Yes
27	The design helps prioritise information	87	Yes	No	82	Yes

Statements meeting consensus criteria are coloured green and statements not meeting agreement are coloured red.
 *Question 4 was included in round 2 despite meeting agreement criteria because we changed the mechanism for delivering the evidence statements.
 †Question 11 was asked again in round 2 despite meeting agreement criteria because the subheadings changed.

for patients and other stakeholders to have their voices heard and respected'.⁴⁷ We listened to a wide range of healthcare professionals and patients to understand clinical practice requirements.²⁷ We interpreted this in the context of published evidence and recommendations to

make a draft solution that we tested and refined through the Delphi study. This iterative, user-centric approach enabled us to create a novel person-centred solution designed to adapt to day-to-day practice challenges that are not just scientifically right but also responsive to real

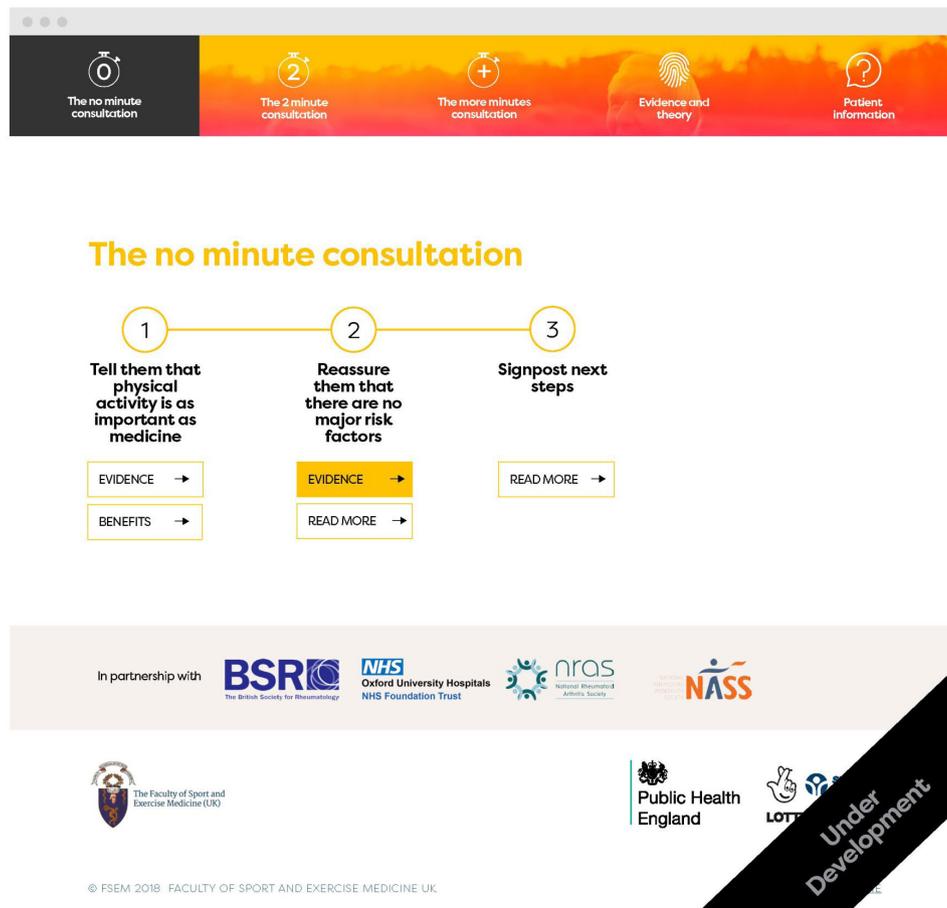


Figure 5 Condition-specific landing page for a 0 min conversation on the draft website for phase 2.



life.⁴⁸ Our resource will help address the lack of tools and training opportunities on physical activity counselling for staff in the NHS and elsewhere.^{18 22}

Undertaking codesign is challenging. We worked hard on finding a balance between the development of the delivery mechanism alongside the evolution of the content. At times, this confused participants and led to mixed survey responses. A strength of the Delphi process was the ability to gain clarity and consensus on a wide range of options taking into account various individual opinions.³⁰

Structuring information

Integrating a design team from the outset enhanced the design process, helping make sense of feedback and translating it into functional solutions. For example, time is an ever-present barrier to conversations on physical activity,^{23 49 50} and user groups recommended addressing this barrier at the outset of a resource designed to support clinical practice. The Delphi group recommended a time-based approach on conversations templates of 1, 5 and more minutes, reflecting behavioural change approaches recommended by the National Institute for Health and Care Excellence (NICE)¹⁰ and other physical activity initiatives.²¹ Working through solutions to this with the design team enabled the production of practical solutions that we then tested and refined through the Delphi process.

Given the long list of components required by clinicians (table 2), we were unclear on how to prioritise information. Although a novel approach to conversational design, ranking systems are a recommended and successfully used tool in Delphi studies.^{51 52} We used a drag and drop mechanism to develop a practical conversation sequence combining all the workshop groups' requirements, and a web-based solution helped us deliver on all aspects.^{6 53}

The overwhelming volume of evidence around physical activity in the management of long-term conditions can present an imposing barrier to the practice of evidence-based medicine.⁵⁴ Information is understood and retained better when delivered in small chunks following sound design principles.^{55 56} A web platform enabled the refinement of a system capable of publishing information in layers to address these two factors. An example was moving the supporting evidence base from long-text format to 'pop-ups' on the strength of Delphi feedback.

The Delphi group reinforced the importance of getting the wording right for a conversation guide to move away from a 'telling' language style and meet the healthcare requirements identified in the consultation phase. A traditional didactic style of consultation runs the risk of 'victim blaming' and fails to support successful behavioural change.⁴⁸ This shift in approach can also help healthcare practitioners foster supportive relationships and facilitate improvements in care delivery, benefitting users outside the realm of conversations on physical activity.⁵⁷

Limitations

The Delphi group's skill mix ensured a balance of clinical, behavioural and academic input. However, the group did not represent all healthcare practitioners, potentially limiting the resource's usefulness for unrepresented groups such as social prescribers. In addition, consultation was only undertaken with two groups of medical specialists. Therefore, it is possible that the structure developed to suit autoimmune rheumatic disease and musculoskeletal pain does not best support conversations in other long-term conditions. As a UK-focused study, we reviewed clinical guidelines published in English, but this may reduce applicability to global healthcare environments. We do not know if searching published manuscripts and clinical guidelines in other languages would have generated additional insights or messages that would have impacted this work.

Survey fatigue is an inherent risk of Delphi studies and may explain participants' observed dropout rate through the rounds.²⁸ Removing 10 questions for the second round had a minimal impact on the average completion time, which changed from 32 min in round 1 to 28 min in round 2. This may reflect that users put aside 30 min to fill out the questionnaire or that the 10 respondents who completed round 2 were more committed to giving feedback on the project. Despite being lower than the average reported dropout rate in Delphi studies,²⁸ the loss of five participants limited the range of opinions contributing to round 2. Dropout risks regression to the mean and may have contributed to the very high agreement levels seen in round 2.²⁹

Future research should seek to test the resources developed during this study to determine efficacy, understand implementation strategies and help improve the format and function of resources to better support conversations on physical activity in the management of long-term conditions. In addition, future Delphi studies focusing on similarly complex topics may benefit from recruiting a larger panel.

CONCLUSION

This mixed-methods study represents a unique effort to understand and address the requirements of healthcare professionals and people living with health conditions to improve their conversations on physical activity. The preparatory phase identified limited time, a lack of knowledge around physical activity and low confidence in behaviour change skills as fundamental challenges for healthcare professionals. Addressing these requirements, the Delphi phase led to the development of a resource offering '1-minute', '5-minute' and 'more minute' person-centred and evidence-based conversation templates for healthcare professionals. The resource is now freely available online at www.movingmedicine.ac.uk.

Author affiliations

¹Moving Medicine, Faculty of Sport And Exercise Medicine, Edinburgh, UK

²Advanced Wellbeing Research Centre (AWRC), Sheffield Hallam University, Sheffield, UK

³Imperial College Healthcare NHS Trust, London, UK

⁴Oxspart, Oxford University Hospitals NHS Foundation Trust Nuffield Orthopaedic Centre, Oxford, UK

Twitter Hamish Reid @drhamishreid

Acknowledgements We are grateful to our collaborating partners, Sport England and Public Health England, for their support of this work and all clinicians and patients who contributed to the workshops in the preparatory phase. We would like to thank David Nunan for his advice and support on how to address the aims of this study critically. The successful realisation of this project has been in large part due to the energy, skills and creativity of the design team One Ltd. We are hugely grateful for their tireless work and passionate commitment.

Collaborators We would like to thank the Moving Medicine development group who gave their time and expertise to this Delphi study: Andrew Murray, Beverley Hall, Clare Scott-Dempster, George Bownes, Jim Keress, Jo Foster-Stead, Joanna Lambert, John Rogers, Joseph Lightfoot, Jumbo Jenner, Lisa Stephens, Mark Batt, Martyn Standage, Paul Kelly and Vicky Lawson.

Contributors HR and NJ conceptualised, planned and led the delivery of this study. HR, RS and JB led the workshops. HR and JC designed and delivered the Delphi study. All authors contributed to decision making between Delphi rounds and the write up of the manuscript, which HR, JC and RC led. HR accepts full responsibility for the work and/or the conduct of the study, had access to the data, and controlled the decision to publish.

Funding Sport England provided funding to support this work through money from the National Lottery as part of the Moving Health Professionals Programme. £823 was spent during the preparatory phase of this project, with costs allocated to participant travel, consumables and hire of facilities. Staff costs totalled £17 000, while £408 was spent on software.

Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The research proposal was submitted to the UK National Health Service (NHS) Research Authority and Medical Research Council decision-making tool, which confirmed that NHS Research Ethics Committee review was not required. All participants of the Delphi and workshop groups provided informed consent by agreeing to participate in the study following a detailed description of what participation entailed. No research team or Delphi members stood to gain financially or otherwise from decisions taken in the Delphi study and all feature as authors of this manuscript. Participants gave informed consent to participate in the study before taking part.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement All data relevant to the study are included in the article or uploaded as supplementary information.

Supplemental material This content has been supplied by the author(s). It has not been vetted by BMJ Publishing Group Limited (BMJ) and may not have been peer-reviewed. Any opinions or recommendations discussed are solely those of the author(s) and are not endorsed by BMJ. BMJ disclaims all liability and responsibility arising from any reliance placed on the content. Where the content includes any translated material, BMJ does not warrant the accuracy and reliability of the translations (including but not limited to local regulations, clinical guidelines, terminology, drug names and drug dosages), and is not responsible for any error and/or omissions arising from translation and adaptation or otherwise.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID iD

Hamish Reid <http://orcid.org/0000-0003-2094-5506>

REFERENCES

- 1 Trost SG, Blair SN, Khan KM. Physical inactivity remains the greatest public health problem of the 21st century: evidence, improved methods and solutions using the '7 investments that work' as a framework. *Br J Sports Med* 2014;48:169–70.
- 2 Lee I-M, Shiroma EJ, Lobelo F, *et al*. Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *Lancet* 2012;380:219–29.
- 3 Kohl HW, Craig CL, Lambert EV, *et al*. The pandemic of physical inactivity: global action for public health. *Lancet* 2012;380:294–305.
- 4 WHO. WHO | Global recommendations on physical activity for health. Geneva : World Health Organization, 2010. Available: <http://www.who.int/dietphysicalactivity/publications/978924159979/en/> [Accessed 4 Aug 2015].
- 5 The International Society for Physical Activity and Health ISPAH. International Society for Physical Activity and Health's Eight Investments That Work for Physical Activity, 2020. Available: <https://www.ispah.org/wp-content/uploads/2020/11/English-Eight-Investments-That-Work-FINAL.pdf>
- 6 Brannan M, Bernardotto M, Clarke N, *et al*. Moving healthcare professionals - a whole system approach to embed physical activity in clinical practice. *BMC Med Educ* 2019;19:84.
- 7 Woodcock J, Franco OH, Orsini N, *et al*. Non-vigorous physical activity and all-cause mortality: systematic review and meta-analysis of cohort studies. *Int J Epidemiol* 2011;40:121–38.
- 8 Speake H, Copeland RJ, Till SH, *et al*. Embedding physical activity in the heart of the NHS: the need for a Whole-System approach. *Sports Med* 2016;46:939–46.
- 9 NICE. Behaviour change: individual approaches | guidance and guidelines | NICE. Natl insT heal care Excell 2014; pH 49. Available: <https://www.nice.org.uk/guidance/ph49> [Accessed 15 Feb 2018].
- 10 NICE. Physical activity: brief advice for adults in primary care primary care. Natl insT heal care Excell public heal Guidel, 2013. Available: nice.org.uk/guidance/ph44
- 11 NICE. *Physical activity : encouraging activity in all people in contact with the NHS*, 2015.
- 12 Lobelo F, de Quevedo IG. The evidence in support of physicians and health care providers as physical activity role models. *Am J Lifestyle Med* 2016;10:1559827613520120.
- 13 Sassen B, Kok G, Vanhees L. Predictors of healthcare professionals' intention and behaviour to encourage physical activity in patients with cardiovascular risk factors. *BMC Public Health* 2011;11:246.
- 14 Dacey ML, Kennedy MA, Polak R, *et al*. Physical activity counseling in medical school education: a systematic review. *Med Educ Online* 2014;19:24325.
- 15 Levy MD, Loy L, Zatz LY. Policy approach to nutrition and physical activity education in health care professional training. *Am J Clin Nutr* 2014;99:1194S–201S.
- 16 Kordi R, Moghadam N, Rostami M. Sports and exercise medicine in undergraduate medical curricula in developing countries: a long path ahead. *Med Educ Online* 2011;16. doi:10.3402/meo.v16i0.5962. [Epub ahead of print: 15 Feb 2011].
- 17 Joy EL, Blair SN, McBride P, *et al*. Physical activity counselling in sports medicine: a call to action. *Br J Sports Med* 2013;47:49–53.
- 18 Douglas F, Torrance N, van Teijlingen E, *et al*. Primary care staff's views and experiences related to routinely advising patients about physical activity. A questionnaire survey. *BMC Public Health* 2006;6:138.
- 19 Knox ECL, Musson H, Adams EJ. Knowledge of physical activity recommendations in adults employed in England: associations with individual and workplace-related predictors. *Int J Behav Nutr Phys Act* 2015;12:69.
- 20 Chatterjee R, Chapman T, Brannan MG, *et al*. Gps' knowledge, use, and confidence in national physical activity and health guidelines and tools: a questionnaire-based survey of general practice in England. *Br J Gen Pract* 2017;67:e668–75.
- 21 Sallis R, Franklin B, Joy L, *et al*. Strategies for promoting physical activity in clinical practice. *Prog Cardiovasc Dis* 2015;57:375–86.
- 22 Gagliardi AR, Abdallah F, Faulkner G, *et al*. Factors contributing to the effectiveness of physical activity counselling in primary care: a realist systematic review. *Patient Educ Couns* 2015;98:412–9.
- 23 Hébert ET, Caughy MO, Shuval K. Primary care providers' perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med* 2012;46:625–31.
- 24 Albert FA, Crowe MJ, Malau-Aduli AEO, *et al*. Physical activity promotion: a systematic review of the perceptions of healthcare professionals. *Int J Environ Res Public Health* 2020;17:1–36.
- 25 van C, McInerney P, Cooke R. Patients' involvement in improvement initiatives: a qualitative systematic review. *JBI Database System Rev Implement Rep* 2015;13:232–90.



- 26 Zaccaro HN, Atherton E, Singh G. Bright spots, physical activity investments that work-Complete streets: redesigning the built environment to promote health. *Br J Sports Med* 2018;52:22–34.
- 27 Batalden M, Batalden P, Margolis P, et al. Coproduction of healthcare service. *BMJ Qual Saf* 2016;25:509–17.
- 28 Day J, Bobeva M. A generic toolkit for the successful management of Delphi studies. *Electron J Bus Res* 2005;3:103–16 <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.126.426>
- 29 Thompson M. *Considering the implication of variations within Delphi research miles Thompson*, 2009.
- 30 Powell C. The Delphi technique: myths and realities. *J Adv Nurs* 2003;41:376–82.
- 31 de Villiers MR, de Villiers PJT, Kent AP. The Delphi technique in health sciences education research. *Med Teach* 2005;27:639–43.
- 32 Jünger S, Payne SA, Brine J, et al. Guidance on conducting and reporting Delphi studies (CREDES) in palliative care: recommendations based on a methodological systematic review. *Palliat Med* 2017;31:684–706.
- 33 Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol* 2005;8:19–32.
- 34 Tricco AC, Lillie E, Zarin W. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation, 2018. Available: <https://doi.org/107326/M18-0850>
- 35 Reid H, Caterson J, Copeland RJ. What makes a good clinical conversation on physical activity? A scoping review exploring what is known to inform the development of physical activity resources to support healthcare professionals in routine practice. *OSF Prepr* 2021.
- 36 Avery AJ, Savelyich BSP, Sheikh A, et al. Identifying and establishing consensus on the most important safety features of GP computer systems: e-Delphi study. *Inform Prim Care* 2005;13:3–12.
- 37 Meshkat B, Cowman S, Gethin G, et al. Using an e-Delphi technique in achieving consensus across disciplines for developing best practice in day surgery in Ireland. *J Hosp Adm* 2014;3:1.
- 38 SurveyMonkey: The World's Most Popular Free Online Survey Tool.
- 39 Jünger S, Payne S, Brearley S, et al. Consensus building in palliative care: a Europe-wide Delphi study on common understandings and conceptual differences. *J Pain Symptom Manage* 2012;44:192–205.
- 40 Ben-Nun P. Respondent Fatigue. In: Lavrakas PJ, ed. *Encyclopedia of survey research methods*. 2455 Teller Road, Thousand Oaks California 91320 United States of America: Sage Publications, Inc, 2008: 743–743..
- 41 McMillan SS, King M, Tully MP. How to use the nominal group and Delphi techniques. *Int J Clin Pharm* 2016;38:655–62.
- 42 Linstone HA, Turoff M, Helmer O. The Delphi method 2002.
- 43 NICE. Physical activity overview, 2016. Available: <http://pathways.nice.org.uk/pathways/physical-activity>
- 44 Blair SN. Physical inactivity: the biggest public health problem of the 21st century. *Br J Sports Med* 2009;43:1–2.
- 45 Ding D. Surveillance of global physical activity: progress, evidence, and future directions. *Lancet Glob Health* 2018;6:e1046–7.
- 46 Douglas F, van Teijlingen E, Torrance N, et al. Promoting physical activity in primary care settings: health visitors' and practice nurses' views and experiences. *J Adv Nurs* 2006;55:159–68.
- 47 Singh G, Owens J, Cribb A. What are the professional, political, and ethical challenges of co-creating health care systems? *AMA J Ethics* 2017;19:1132–8.
- 48 Laverack G. The Challenge of the 'Art and Science' of Health Promotion. *Challenges* 2017;8:22.
- 49 McKenna J, Naylor PJ, McDowell N. Barriers to physical activity promotion by general practitioners and practice nurses. *Br J Sports Med* 1998;32:242–7.
- 50 Clark RE, McArthur C, Papaioannou A, et al. "I do not have time. Is there a handout I can use?": combining physicians' needs and behavior change theory to put physical activity evidence into practice. *Osteoporos Int* 2017;28:1953–63.
- 51 Halvorsrud K, Flynn D, Ford GA, et al. A Delphi study and ranking exercise to support commissioning services: future delivery of thrombectomy services in England. *BMC Health Serv Res* 2018;18:135.
- 52 Paré G, Cameron A-F, Poba-Nzaou P, et al. A systematic assessment of rigor in information systems ranking-type Delphi studies. *Inf Manage* 2013;50:207–17.
- 53 Phillips E, Pojednic R, Polak R, et al. Including lifestyle medicine in undergraduate medical curricula. *Med Educ Online* 2015;20:26150.
- 54 Greenhalgh T, Howick J, Maskrey N, et al. Evidence based medicine: a movement in crisis? *BMJ* 2014;348:g3725.
- 55 Reid H, Milton K, Bownes G. Making physical activity evidence accessible: are these infographics the answer? *Br J Sports Med* 2016.
- 56 Stones C, Gent M. 7 graphic principles of public health infographic design. Leeds, 2015. Available: <https://visualisinghealth.com/design-guidelines/>
- 57 Jordan ME, Lanham HJ, Crabtree BF, et al. The role of conversation in health care interventions: enabling sensemaking and learning. *Implement Sci* 2009;4:15.

Supplementary file 1. Summary of relevant findings from scoping review¹

Current practice
<ul style="list-style-type: none">• Healthcare professionals view physical activity as an important part of clinical care ²⁻⁵.• Healthcare professionals frequently lack knowledge and skills around physical activity and behavioural change counselling ^{3,6-8} reflecting historically inadequate training and education ⁹⁻¹⁵• Healthcare professionals with low confidence in behaviour change skills seldom talk about physical activity, missing most of the opportunities they identify ^{4,7,16-18} often avoiding them for fear of offending people ^{3,17,19,20}• Physically active healthcare professionals talk more frequently and effectively about physical activity ^{6,16,17,19}• Many healthcare professionals resort to communication styles that make people less likely to become active and engage with support ⁴• Physical activity conversations are observed less frequently with lower socioeconomic groups, non-white ethnic groups, and those without private health insurance in countries without state-delivered healthcare ^{3,21,22}
Patient perspective
<ul style="list-style-type: none">• The majority of people attending healthcare are interested in physical activity and welcome conversations ¹⁶• Patients value integrated multidisciplinary support, the use of common language and consistent messaging ^{19,23,24}• Patients recommend healthcare professionals avoid a 'preaching' style of conversation or give unsolicited advice to reduce defensive responses ^{19,25,26}• Patient initiation promotes more frequent conversations on physical activity and increases exploration of individual values and agendas.²⁶• Being non-judgemental and spending time to build confidence are skills that patients value ^{19,27}
Training considerations
<ul style="list-style-type: none">• Time is the primary barrier to conversations on physical activity ^{3,5,7,16,17,28}• Lack of training on behaviour change skills is a more prevalent barrier for healthcare professionals than knowledge around physical activity and disease ^{3,7,17,19,28}• Healthcare professionals are typically trained to provide information and direction rather than to establish collaborative relationships with patients ²⁵• Traditional training and engrained consulting models make it hard for clinicians to change their consultation approach ²⁹• Healthcare professionals value counselling strategies such as motivational interviewing, but many have reservations that they too complicated and time consuming ^{29,30}• Well-designed post-graduate education on physical activity is well received by healthcare professionals and can be transformative in the way they approach conversations.^{30,31}• Professional leaders, personal contacts and partnerships with professional bodies improve engagement in education programmes ^{16,32}
Conversational structure

- A flexible approach addressing knowledge and skill deficits and balancing physical activity conversations with other clinical objectives is of fundamental importance ⁷
- A range of conceptual frameworks exists to support physical activity conversations. It remains unclear what is most effective or the best fit for clinical practice^{33–38}
- Reported approaches include motivational interviewing, physical activity screening tools, behaviour change techniques, multimodal approaches and consultation constructs such as the '5As' strategy ^{30,32,39–41}
- Motivational interviewing is an effective and increasingly popular framework to support the development of self-efficacy and patient-led behavioural change in clinical practice ^{42–44}
- Screening tools can provide useful prompts for physical activity and can help systems capture physical activity data ^{16,39,45}

Clinical practice

- Prompt strategies can be useful for both healthcare professionals and patients ^{3,26,46,47}
- Patients and clinicians value information booklets, workbooks and practical instructions to support consultation ^{3,30,39,41,46}
- Walking interventions and motivational support appear to be the most efficacious and time-efficient interventions ^{30,43,47–52}
- Integration of physical activity counsellors into care pathways can help save clinical time, impart physical activity and health knowledge that healthcare professionals may not have, and deliver good quality behavioural change support ^{24,53,54}
- Healthcare professionals using frameworks such as 5 As and FRAMES generally focus on Assess and Advise stages, delivering premature, clinician-driven plans. This approach omits key steps for long term behavioural change, such as building self-efficacy and confidence ^{2,26,27,55}
- The confidence around the risks of physical activity is low for both healthcare professionals and people living with health conditions ^{27,56,57}

Designing pathways

- Keeping workload low and considering time implications is critical for acceptability amongst healthcare professionals ^{16,20,45,58} so interventions should integrate with existing care pathways ^{7,50}
- Straightforward, time-efficient protocols are well received and may be vital for supporting healthcare professionals with limited skills and experience ^{3,16,46,59,60}
- Care pathways benefit from simplicity and intersectoral cooperation ^{30,54,61}
- Healthcare professionals need their role in physical activity pathways clarified ^{7,17,54}

System considerations

- Blanket physical activity promotion and over-reliance on the impact of individual practitioner advice (particularly physicians) are ineffective strategies when employed in isolation ^{25,27,53}
- Strategic and organisationally driven approaches are essential to achieve an extensive cultural shift in healthcare ^{3,62,63}
- System reimbursement is essential, driving adequate resourcing and powerfully impacting healthcare professional behaviour ^{3,20,64}
- Interventions costing less than £30,000 per Quality of Life Year (QALY) are considered cost-effective to commission. NICE estimate that the cost of a QALY through a brief physical activity conversation is between £20 and £440, making it a highly cost-effective intervention compared to usual care ^{21,25,35,49,51,65–67}

References

1. Reid H, Caterson J, Copeland RJ. What makes a good clinical conversation on physical activity? A Scoping review exploring what is known to inform the development of physical activity resources to support healthcare professionals in routine practice. *OSF Prepr.* 2021. doi:10.31219/OSF.IO/WBPXA
2. Diehl K, Mayer M, Mayer F, et al. Physical activity counseling by primary care physicians: attitudes, knowledge, implementation, and perceived success. *J Phys Act Health.* 2015;12(2):216-223. doi:10.1123/jpah.2013-0273
3. Huijg JM, van der Zouwe N, Crone MR, et al. Factors Influencing Primary Health Care Professionals' Physical Activity Promotion Behaviors: A Systematic Review. *Int J Behav Med.* 2015;22(1):32-50. doi:10.1007/s12529-014-9398-2
4. Hunter C, Chew-Graham CA, Langer S, et al. "I wouldn't push that further because I don't want to lose her": A multiperspective qualitative study of behaviour change for long-term conditions in primary care. *Heal Expect.* 2015;18(6):1995-2010. doi:10.1111/hex.12304
5. Patel A, Schofield GM, Kolt GS, Keogh JWL. General practitioners' views and experiences of counselling for physical activity through the New Zealand Green Prescription program. *BMC Fam Pract.* 2011;12:119. doi:10.1186/1471-2296-12-119
6. Lobelo F, de Quevedo IG. The Evidence in Support of Physicians and Health Care Providers as Physical Activity Role Models. *Am J Lifestyle Med.* 2014;10(1):1559827613520120-. doi:10.1177/1559827613520120
7. Albert FA, Crowe MJ, Malau-Aduli AEO, Malau-Aduli BS. Physical activity promotion: A systematic review of the perceptions of healthcare professionals. *Int J Environ Res Public Health.* 2020;17(12):1-36. doi:10.3390/ijerph17124358
8. Chatterjee R, Chapman T, Brannan MG, Varney J. GPs' knowledge, use, and confidence in national physical activity and health guidelines and tools: a questionnaire-based survey of general practice in England. *Br J Gen Pract.* 2017;67(663):e668-e675. doi:10.3399/bjgp17X692513
9. Levy MD, Loy L, Zatz LY. Policy approach to nutrition and physical activity education in health care professional training. *Am J Clin Nutr.* 2014;99(5 Suppl):1194S-201S. doi:10.3945/ajcn.113.073544
10. Dacey ML, Kennedy MA, Polak R, Phillips EM. Physical activity counseling in medical school education: a systematic review. *Med Educ Online.* 2014;19:24325. doi:10.3402/MEO.V19.24325
11. Kordi R, Moghadam N, Rostami M. Sports and exercise medicine in undergraduate medical curricula in developing countries: a long path ahead. *Med Educ Online.* 2011;16. doi:10.3402/meo.v16i0.5962
12. Weiler R, Chew S, Coombs N, Hamer M, Stamatakis E. Physical activity education in the undergraduate curricula of all UK medical schools: are tomorrow's doctors equipped to follow clinical guidelines? *Br J Sports Med.* 2012;46(14):1024-1026. doi:10.1136/bjsports-2012-091380
13. Connaughton A V, Weiler RM, Connaughton DP. Graduating medical students' exercise

- prescription competence as perceived by deans and directors of medical education in the United States: implications for Healthy People 2010. *Public Health Rep.* 2001;116(3):226-234. doi:10.1093/phr/116.3.226
14. Cardinal BJ, Park EA, Kim M, Cardinal MK. If Exercise Is Medicine, Where Is Exercise in Medicine? Review of U.S. Medical Education Curricula for Physical Activity-Related Content. *J Phys Act Heal.* 2015;12(9):1336-1343. doi:10.1123/jpah.2014-0316
 15. Milton K, Larner J, Hanson S, Jones A. Embedding Physical Activity into the Healthcare Curriculum—A Case Study. *Educ Prim Care.* 2020;31(3):176-179. doi:10.1080/14739879.2020.1744193
 16. Allenspach EC, Handschin M, Kutlar Joss M, et al. Patient and physician acceptance of a campaign approach to promoting physical activity: the “Move for Health” project. *Swiss Med Wkly.* 2007;137(19-20):292-299.
 17. Hebert ET, Caughy MO, Shuval K. Primary care providers’ perceptions of physical activity counselling in a clinical setting: a systematic review. *Br J Sports Med.* 2012;46:625-631. doi:10.1136/bjsports-2011-090734
 18. Bull FC, Schipper EC, Jamrozik K, Blanksby BA. How can and do Australian doctors promote physical activity? *Prev Med (Baltim).* 1997;26(6):866-873. doi:10.1006/pmed.1997.0226
 19. Keyworth C, Epton T, Goldthorpe J, Calam R, Armitage CJ. Perceptions of receiving behaviour change interventions from GPs during routine consultations: A qualitative study. *PLoS One.* 2020;15(5). doi:10.1371/journal.pone.0233399
 20. Eakin EG, Smith BJ, Bauman AE. Evaluating the Population Health Impact of Physical Activity Interventions in Primary Care—Are We Asking the Right Questions? *J Phys Act Heal.* 2005;2(2):197-215. doi:10.1123/jpah.2.2.197
 21. Lamming L, Pears S, Mason D, et al. What do we know about brief interventions for physical activity that could be delivered in primary care consultations? A systematic review of reviews. *Prev Med (Baltim).* 2017;99:152-163. doi:10.1016/J.YPMED.2017.02.017
 22. Heaton PC, Frede SM. Patients’ need for more counseling on diet, exercise, and smoking cessation: results from the National Ambulatory Medical Care Survey. *J Am Pharm Assoc (2003).* 2006;46(3):364-369. doi:10.1331/154434506777069516
 23. Birtwistle SB, Ashcroft G, Murphy R, Gee I, Poole H, Watson PM. Factors influencing patient uptake of an exercise referral scheme: a qualitative study. *Health Educ Res.* 2019;34(1):113-127. doi:10.1093/her/cyy038
 24. Berra K, Rippe J, Manson JE. Making Physical Activity Counseling a Priority in Clinical Practice. *JAMA.* 2015;314(24):1. doi:10.1001/jama.2015.16244
 25. Galaviz KI, Estabrooks PA, Ulloa EJ, et al. Evaluating the effectiveness of physician counseling to promote physical activity in Mexico: an effectiveness-implementation hybrid study. *Transl Behav Med.* 2017;7(4):731-740. doi:10.1007/s13142-017-0524-y
 26. Carroll JK, Fiscella K, Meldrum SC, et al. Clinician-patient communication about physical activity in an underserved population. *J Am Board Fam Med.* 2008;21(2):118-127. doi:10.3122/jabfm.2008.02.070117
 27. Hillsdon M, Thorogood M, White I, Foster C. Advising people to take more exercise is ineffective: A randomized controlled trial of physical activity promotion in primary care. *Int J Epidemiol.* 2002;31(4):808-815. doi:10.1093/ije/31.4.808

28. Eakin E, Brown W, Schofield G, Mummery K, Reeves M. General practitioner advice on physical activity--who gets it? *Am J Health Promot.* 2007;21(4):225-228. doi:10.4278/0890-1171-21.4.225
29. Persson G, Brorsson A, Ekvall Hansson E, et al. Physical activity on prescription (PAP) from the general practitioner's perspective - a qualitative study. *BMC Fam Pract.* 2013;14(1):1. doi:10.1186/1471-2296-14-128
30. Beighton C, Victor C, Normansell R, et al. "It's not just about walking.....it's the practice nurse that makes it work": a qualitative exploration of the views of practice nurses delivering complex physical activity interventions in primary care. *BMC Public Health.* 2015;15:1236. doi:10.1186/s12889-015-2568-6
31. Costa EF, Guerra PH, Santos TI Dos, Florindo AA. Systematic review of physical activity promotion by community health workers. *Prev Med (Baltim).* 2015;81:114-121. doi:10.1016/j.ypmed.2015.08.007
32. Brannan M, Bernardotto M, Clarke N, Varney J. Moving healthcare professionals - a whole system approach to embed physical activity in clinical practice. *BMC Med Educ.* 2019;19. doi:10.1186/s12909-019-1517-y
33. Michie S, van Stralen MM, West R. The behaviour change wheel: a new method for characterising and designing behaviour change interventions. *Implement Sci.* 2011;6:42. doi:10.1186/1748-5908-6-42
34. Campbell A, Foster J, Stevinson C, Cavill N. *Macmillan: Promote Physical Activity.*; 2012.
35. Webb J, Foster J, Poulter E. Increasing the frequency of physical activity very brief advice for cancer patients. Development of an intervention using the behaviour change wheel. *Public Health.* 2016;133:45-56. doi:10.1016/j.puhe.2015.12.009
36. NICE. Behaviour change: individual approaches | Guidance and guidelines | NICE. *Natl Inst Heal Care Excell.* 2014;PH 49. <https://www.nice.org.uk/guidance/ph49>. Accessed February 15, 2018.
37. NICE. *Behaviour Change: General Approaches PH6.* London; 2007. <https://www.nice.org.uk/guidance/PH6>.
38. NICE. Physical activity: brief advice for adults in primary care primary care. *Natl Inst Heal care Excell Public Heal Guidel 44.* 2013;PH44(May 2013). [nice.org.uk/guidance/ph44](https://www.nice.org.uk/guidance/ph44).
39. Fowles JR, O'Brien MW, Solmundson K, Oh PI, Shields CA. Exercise is Medicine Canada physical activity counselling and exercise prescription training improves counselling, prescription, and referral practices among physicians across Canada. *Appl Physiol Nutr Metab.* 2018;43(5):535-539. doi:10.1139/apnm-2017-0763
40. Gallegos-Carrillo K, García-Peña C, Salmerón J, Salgado-de-Snyder N, Lobelo F. Brief Counseling and Exercise Referral Scheme: A Pragmatic Trial in Mexico. *Am J Prev Med.* 2017;52(2):249-259. doi:10.1016/j.amepre.2016.10.021
41. Windt J, Windt A, Davis J, Petrella R, Khan K. Can a 3-hour educational workshop and the provision of practical tools encourage family physicians to prescribe physical activity as medicine? A pre-post study. *BMJ Open.* 2015;5(7). doi:10.1136/bmjopen-2015-007920
42. Rubak S, Sandbaek A, Lauritzen T, Christensen B. Motivational interviewing: a systematic review and meta-analysis. *Br J Gen Pract.* 2005;55(513):305-312. <http://www.ncbi.nlm.nih.gov/pubmed/15826439>. Accessed April 17, 2018.

43. O'Halloran PD, Blackstock F, Shields N, et al. Motivational interviewing to increase physical activity in people with chronic health conditions: A systematic review and meta-analysis. *Clin Rehabil.* 2014;28(12). doi:10.1177/0269215514536210
44. Morton K, Beauchamp M, Prothero A, et al. The effectiveness of motivational interviewing for health behaviour change in primary care settings: a systematic review. *Health Psychol Rev.* 2015;9(2). doi:10.1080/17437199.2014.882006
45. Sallis R, Franklin B, Joy L, Ross R, Sabgir D, Stone J. Strategies for promoting physical activity in clinical practice. *Prog Cardiovasc Dis.* 2015;57(4):375-386. doi:10.1016/j.pcad.2014.10.003
46. Ackermann RT, Deyo RA, LoGerfo JP. Prompting primary providers to increase community exercise referrals for older adults: a randomized trial. *J Am Geriatr Soc.* 2005;53(2):283-289. doi:10.1111/j.1532-5415.2005.53115.x
47. Dubbert PM, Cooper KM, Kirchner KA, Meydrech EF, Bilbrew D. Effects of nurse counseling on walking for exercise in elderly primary care patients. *J Gerontol A Biol Sci Med Sci.* 2002;57(11):M733-40. doi:10.1093/gerona/57.11.m733
48. Van Hoecke A-S, Delecluse C, Bogaerts A, Boen F. The long-term effectiveness of need-supportive physical activity counseling compared with a standard referral in sedentary older adults. *J Aging Phys Act.* 2014;22(2):186-198. doi:10.1123/japa.2012-0261
49. Pears S, Morton K, Bijker M, Sutton S, Hardeman W. Development and feasibility study of very brief interventions for physical activity in primary care. *BMC Public Health.* 2015;15:333. doi:10.1186/s12889-015-1703-8
50. Cooke AB, Pace R, Chan D, Rosenberg E, Dasgupta K, Daskalopoulou SS. A qualitative evaluation of a physician-delivered pedometer-based step count prescription strategy with insight from participants and treating physicians. *Diabetes Res Clin Pract.* 2018;139:314-322. doi:10.1016/j.diabres.2018.03.008
51. Pears S, Bijker M, Morton K, et al. A randomised controlled trial of three very brief interventions for physical activity in primary care. *BMC Public Health.* 2016;16(1):1033. doi:10.1186/s12889-016-3684-7
52. Gagliardi AR, Faulkner G, Ciliska D, Hicks A. Factors contributing to the effectiveness of physical activity counselling in primary care: a realist systematic review. *Patient Educ Couns.* 2015;98(4):412-419. doi:10.1016/j.pec.2014.11.020
53. Tulloch H, Fortier M, Hogg W. Physical activity counseling in primary care: who has and who should be counseling? *Patient Educ Couns.* 2006;64(1-3):6-20. doi:10.1016/j.pec.2005.10.010
54. Leemrijse CJ, de Bakker DH, Ooms L, Veenhof C. Collaboration of general practitioners and exercise providers in promotion of physical activity a written survey among general practitioners. *BMC Fam Pract.* 2015;16(1):96. doi:10.1186/s12875-015-0316-8
55. McKenna J, Naylor PJ, McDowell N. Barriers to physical activity promotion by general practitioners and practice nurses. *Br J Sports Med.* 1998;32(3):242-247. <http://www.ncbi.nlm.nih.gov/pubmed/9773175>. Accessed August 22, 2018.
56. Hirvensalo M, Heikkinen E, Lintunen T, Rantanen T. Recommendations for and warnings against physical activity given to older people by health care professionals. *Prev Med (Baltim).* 2005;41(1):342-347. doi:10.1016/j.ypmed.2004.11.020
57. Orrow G, Kinmonth A-L, Sanderson S, Sutton S. Effectiveness of physical activity promotion based in primary care: systematic review and meta-analysis of randomised controlled trials.

- BMJ. 2012;344(mar26_1):e1389. doi:10.1136/bmj.e1389
58. Keyworth C, Epton T, Goldthorpe J, Calam R, Armitage CJ. Are healthcare professionals delivering opportunistic behaviour change interventions? A multi-professional survey of engagement with public health policy. *Implement Sci*. 2018;13(1):122. doi:10.1186/s13012-018-0814-x
 59. Eakin EG, Brown WJ, Marshall AL, Mummery K, Larsen E. Physical activity promotion in primary care: bridging the gap between research and practice. *Am J Prev Med*. 2004;27(4):297-303. doi:10.1016/j.amepre.2004.07.012
 60. Houde SC, Melillo KD. Physical activity and exercise counseling in primary care. *Nurse Pract*. 2000;25(8):8,11-14,17-19. doi:10.1097/00006205-200025080-00001
 61. Persson G, Brorsson A, Hansson EE, Troein M, Strandberg EL. Physical activity on prescription (PAP) from the general practitioner's perspective - a qualitative study. *BMC Fam Pract*. 2013;14. doi:10.1186/1471-2296-14-128
 62. Hunter RF, Tully MA, Donnelly P, Stevenson M, Kee F. Knowledge of UK physical activity guidelines: Implications for better targeted health promotion. *Prev Med (Baltim)*. 2014;65:33-39. doi:10.1016/j.yjpm.2014.04.016
 63. Robertson R, Jochelson K. Interventions that change clinician behaviour: Mapping the literature. *King's Fund, London*. 2006;(November). <https://www.nice.org.uk/media/default/about/what-we-do/into-practice/support-for-service-improvement-and-audit/kings-fund-literature-review.pdf>. Accessed January 30, 2018.
 64. Märki A, Bauer GB, Angst F, Nigg CR, Gillmann G, Gehring TM. Systematic counselling by general practitioners for promoting physical activity in elderly patients: a feasibility study. *Swiss Med Wkly*. 2006;136(29-30):482-488.
 65. NICE. *Four Commonly Used Methods to Increase Physical Activity*. UK: NICE Guidance; 2015. <https://www.nice.org.uk/guidance/PH2>. Accessed July 31, 2018.
 66. GC V, Wilson ECF, Suhrcke M, Hardeman W, Sutton S. Are brief interventions to increase physical activity cost-effective? A systematic review. *Br J Sports Med*. 2016;50(7):408-417. doi:10.1136/bjsports-2015-094655
 67. Stead LF, Buitrago D, Preciado N, Sanchez G, Hartmann-Boyce J, Lancaster T. Physician advice for smoking cessation. In: Stead LF, ed. *Cochrane Database of Systematic Reviews*. Chichester, UK: John Wiley & Sons, Ltd; 2013:CD000165. doi:10.1002/14651858.CD000165.pub4

Supplementary file 2. Consultation phase methods and results

Methods

Workshop 1

The aim of this workshop was to define what content healthcare professionals want from a resource supporting conversations on physical activity. The approach and questions were informed by a scoping review of the context of physical activity conversations in healthcare and deliberately kept open to avoid biasing responses. Prior to the workshop a narrative evidence review was undertaken on physical activity in inflammatory rheumatic disease and distributed to the group prior to the workshop.

The workshop was undertaken at a regional meeting for healthcare professionals specialising in the management of inflammatory rheumatic disease in England. 32 attendees came from 8 different rheumatology services regionally and comprised consultant rheumatologists, specialist registrars, specialist nurses, specialist physiotherapists, clinical academics and research nurses. In addition, four patients attended from the local patient group of the National Rheumatoid Arthritis Society.

The workshop was split into three sessions and the attendees were split into four mixed discipline groups, with a patient representative and facilitator allocated to each.

Session 1

The following question was put to the groups:

- *What are the main headings that should be included in a resource to support your conversations on physical activity? Please list 5 and prioritise them*

Session 2

The following headings were identified from session 1 and shared across the four groups in session

2. Each group presented how they felt a particular heading should be addressed prior to group discussion on each section.

- *Benefits and how to frame the messages around them*
- *Safety messages including risk of harm*
- *Directive messaging*
- *Myth busters*

Session 3

All groups worked on the following questions during the final session and results were recorded by a group scribe:

- *What types/ categories of activity should be recommended?*
- *What practical aspects of activity should be addressed for people with inflammatory disease?*
- *What recommendation should be made?*
- *What would be an appropriate title?*

Following the workshop, summary points were shared with the group for further comments via email.

Workshop 2

Workshop 2 built on conclusions made in workshop 1, aiming to refine the content valued by clinicians in the resource. Workshop 2 was undertaken at a regional meeting for healthcare professionals specialising in the management of musculoskeletal pain in England. 34 people attended the workshop, representing a broad range of healthcare professionals in the care of

musculoskeletal pain including pain consultants, sport and exercise medicine consultants, specialist registrars, specialist physiotherapists, specialist nurses and patient representatives.

As with workshop 1, a narrative evidence review of physical activity in musculoskeletal pain was shared with attendees prior to the meeting. Attendees were split into four groups and the workshop was split into the following sessions:

Session 1

This session was split into two phases. In the first, all groups were asked to consider the following question:

- *What are the most important physical activity questions to address during a clinical consultation? Please list five and prioritise them*

Subsequently the groups considered the following questions separately prior to presenting to the other groups:

- *Groups 1 and 2 – What key information should clinicians relay to patients with MSK pain about physical activity? Please list the 5 points you feel are most important*
- *Groups 3 and 4 – What key information would a patient with MSK pain like to know when discussing physical activity with their clinician? Please list the 5 points you feel are most important*

Session 2

During this session individuals broke from group work. They were given a series of stickers with statements on them taken from the qualitative and quantitative evidence review. Posters defining the six key areas for the resource identified during workshop 1 were displayed around the room. Participants stuck the stickers to relevant areas of the resource and rated the item 1-5 according to their opinion on the importance of the statement. The rationale for this was to identify where

specific components should sit in the resource and how they should be prioritised. The action areas were:

1. *Physical activity history*
2. *Why PA – Benefits*
3. *Why PA – Mechanisms*
4. *Risk and Safety*
5. *What to do & where*
6. *Condition specific advice*

Posters were collated, and summary statement distribution and weighting analysed.

Session 3

This session was split into two tasks:

- *What specific messages would help you counsel patients on physical activity? E.g. Cycle of decline/mechanisms, aerobic vs resistance vs both, motivators/barriers, CMO guidance, general health physical activity benefits, Others*
- *Are there any safety considerations we need to include? E.g. co-morbidities, significant adverse events, how do we frame any safety messages?*

Each task was opened to facilitated discussion after group work. Results from this workshop informed the development of the draft resource for phase 1 of the Delphi study.

Results

Workshop 1

Background work from the narrative evidence review was shared with the group prior to the workshop and presented along with the aims of the project at the start of the session on 2nd November 2017.

Session 1

What are the main headings we should have on this infographic? Please list 5 and prioritise them

Key headings were defined by groups, ranked and shared. Agreement levels were high on the most important components, but participants found it very hard to rank them as they felt they should all feature.

Table 1. Key headings identified in session 1, workshop 1 with rankings

Core component	Ranking of importance
Benefits including symptoms (positive and negative)	1 st equal
Directive message & myth busters	
Safety messages	
Type of activity (including what counts, practical suggestions, logistics)	2 nd equal
Tools and resources to give to patients	
Define Categories of activity – Medically framed reflecting disease activity	
Current activity levels and recommendation	3 rd equal
Physical activity history	
Perceived barriers and negative aspects e.g. financial /access /time	

The group were adamant that all these components needed to be included when challenged about how they would fit into a single infographic, as was the intention of the project at that stage. This was a strong suggestion that the objective of producing disease specific infographics was unlikely to be able to deliver what clinical staff and patients want in clinical practise to support physical activity

consultations. A further suggestion from this session was that the resource should prompt clinicians to think about what their patients would like to do.

Session 2

Consensus on key components for each topic heading was achieved through moderated group discussion.

Benefits

Specific:

- Fights fatigue (no. 1 symptom)
- Combats pain
 - Natural pain killer (Equivalent to medication)
- Promotes independence
 - Improved Function
 - More mobile
 - Stronger
- Tackles stiffness
- Live Better and Longer
- Reduces Co-Morbidities

General:

- Self esteem
- Depression (mood)
- Promotes restorative sleep

Safety messages including risk of harm

N.B. A strong emphasis was made that safety messages should be positively framed

- No evidence of harm

- Doesn't damage joints
- Works well with medicine you take
- Additional considerations:
 - Avoid strenuous exercises during acute flares
 - Progression in duration of activity should be emphasized over increased intensity
 - Adequate warm up and cool down can help minimise pain
 - Discomfort during or immediately after exercise can be expected and does not mean your joints are being further damaged
 - Encourage individual with Arthritis to exercise during the time of day when pain is typically least severe and in conjunction with peak activity of pain medication
 - Appropriate shoes and clothing

Directive messaging & 'myth busters'

Important messages were grouped into themes:

- Start at low level and build up gradually (Reassurance - build your confidence - 'Do your best', Do the best you can)
- Enjoyment (Make it fun, it can be fun, do it with friends)
- Personalisation enable advice specific to patient (realistic/tailored 'Something for everyone'/Start somewhere/Something is better than nothing)
- PA in context of your treatment – core component, as good as medicines
- Don't worry if it hurts - hurt doesn't mean harm
- Find something you like – Range of PA ideas, redefine what exercise is – PA not exercise, Find a (virtual)friend)
- Empowerment message: 'take control' 'get back function'. Permission to get back to 'normal' activity ('Restart' - but need to be careful it's not too positive!)

- Tailored PA level advice – what do they want? - ‘start somewhere’ Something is better than nothing’

Session 3

All groups worked on the following questions during the final session:

What types/ categories of activity should be recommended?

- Walk
- Climb stairs
- Cycle
- Swim
- Nordic walking
- Yoga
- Pilates
- Tai chi
- Carry bags
- Bowls
- Golf
- Specific muscles e.g. quads
- SARA exercise (hand exercise from physiotherapist and OTs)

What practical aspects of activity should be addressed for people with inflammatory disease?

- Anything and Everything: Examples:
 - Variety of types of activity (including day to day) (e.g. Shopping bag, gardening, stairs)
 - Individual or Group based
- Intensity message
 - Talk test, pulse rate, sweaty
- Time: Start with 5-minute bouts building up ten

- Local, enjoyable, affordable
- Joint specific advice (see patient education)

What recommendation should be made?

- Strong opinion emerged against using the 150-minute recommendation as this was felt to be a significant barrier when talking to patients
- Challenge 5 - ask patient to do an additional 5 minutes on top of what they currently do.
- Ask patients what they can agree to do (not using the word commit) that day to start the change.

What would be an appropriate title?

The most popular title was voted as “Physical Activity for People with inflammatory Rheumatic Disease”. Debate focussed around how specific the title should be and it was decided that a title that spoke specifically to the patient group would add weight and importance for clinicians and patients.

Further suggestions included:

- Get going
- Moment to move
- Rheum to improve/move
- Benefit of PA for people with rheumatic conditions
- Get off your R’s
- Jiggle your joints
- Get up and go

Conclusions from Workshop 1

The group were adamant that the full range of topics recorded above need to feature in the resource to make it valuable to clinical practise. A resource that cut out important information due to an arbitrary design consideration would significantly reduce usefulness and uptake amongst

clinical staff. The discussion was taken to the design team and Moving Medicine working group and a decision made to deliver an interactive website rather than a series of infographics.

Promoting patient centred decision making was emphasised as something that people find difficult when influencing physical activity behaviours. The group would value guidance on this in the resource as well and were not familiar with published behavioural change frameworks like the 5As (NICE, 2014a).

Following the workshop, the key themes and core content was built into the brief for workshop 2 with the aim of testing the ideas amongst another group of clinicians and moulding the shape of the resource.

Workshop 2

Building on workshop 1, workshop 2 was undertaken on 6th December 2017 with a multidisciplinary group of healthcare professionals specialising in musculoskeletal pain management. As with workshop 1 evidence summaries were presented to the group prior and at the start of the session. Participants were advised that the objective was to create a website to support physical activity consultations.

Session 1

What are the most important physical activity questions to address during a clinical consultation and what are patient and clinical priorities?

Between the groups a wide range of questions and priorities were identified. The group declined to prioritise questions emphasising that all components were equally important to be included in the resource. Groups concentrating on patient perspectives emphasised symptoms and the challenges of behaviour change whilst clinician perspectives also reported the importance of meeting expectations and restraints of practise. Responses included:

- Current activity and physical activity history

- Previous attempts
 - Enjoyment
 - FITT
- Life goals
 - Values based
- Current understanding
 - Benefits
 - Recommendations
 - Local resources
 - Pathway and follow up
 - What is physical activity?
- Behavioural change stage
- Personalise pathway options
- Risk/safety
- Motivators
 - Symptom based
- Barriers
- Relationships and support
- Clinician engagement and where to go
- Training and skills
- What can I do today?
- What would you like to be doing?
- Where would you like to be?

Session 2

Results from sticker identification and weighting were analysed the importance of different qualitative and quantitative evidence statements ranked. A key output for resource development was the allocation of evidence statements to the key domains identified in workshop 1. Committing group members to allocate statements to domains indicates how the contents should be distributed through the resource to make it most useful and intuitive for users in clinical practise. See table 2.

Table 2. Mapping evidence statements to proposed resource domains

	Why physical activity?	Why physical activity? Mechanisms	What to do and where	PA History	Risk and safety	Condition specific messages
	Total score	Total score	Total score	Total score	Total score	Total score
Theme: Severity of Pain	12	1	0	7	1	3
Theme: Frequency/Exacerbations of Pain	6	1	1	5	4	3
Theme: Stiffness	10	2	0	0	0	5
Theme: Fatigue	10	2	1	2	2	6
Theme: Quality of Life	15	2	0	1	1	1
Theme: Self Efficacy	6	4	0	2	1	2
Theme: Wellbeing	11	1	0	2	0	2
Theme: Fitness	7	6	0	3	0	2
Theme: Mental Health	9	3	0	2	0	5
Theme: Physical Function	9	1	0	3	0	2
Theme: Absence of Adverse Events	1	0	0	1	17	0
Theme: Work Absence	8	0	0	2	2	2
Theme: Improved Pain	13	4	0	0	0	2

<i>Improved Wellbeing</i>	8	5	0	0	1	1
<i>Improved Self Esteem</i>	8	8	1	0	1	0
<i>Improved Fitness</i>	6	6	0	1	0	1
<i>Improved Self Confidence</i>	10	5	1	0	0	1
<i>Improved Self Efficacy</i>	8	9	2	0	0	1
<i>HCP Support</i>	0	2	11	0	2	1
<i>Social Support</i>	0	0	14	4	0	0
<i>Meeting Others</i>	5	3	10	2	0	0
<i>Access to Facilities</i>	0	0	22	2	1	0
<i>Appropriate PA</i>	0	2	11	0	4	1
<i>Education</i>						
<i>Personalised</i>	0	1	15	1	1	2
<i>Programmes</i>						
<i>Fun/Enjoyment</i>	10	4	7	2	0	0
<i>Positive Prior Experience</i>	1	3	4	14	2	1
<i>Return to Previous</i>	9	2	0	8	0	3
<i>Function</i>						
<i>Symptom - Pain</i>	4	0	0	7	6	3
<i>Symptom - Fatigue</i>	3	2	0	4	3	6
<i>Symptom - Stress</i>	4	5	2	4	3	1
<i>Fear of Exacerbating</i>	0	0	0	4	15	4
<i>Symptoms</i>						
<i>Low Self Efficacy</i>	0	3	2	4	4	0
<i>Inadequate Education</i>	0	0	7	1	12	2
<i>About PA</i>						
<i>Co-morbidities</i>	1	0	0	4	10	5
<i>Inadequate Resources</i>	1	0	16	1	3	0
<i>Lack of Time</i>	0	0	11	6	5	0

<i>Lack of Previous Experience</i>	1	0	6	9	4	0
<i>Lack of Interest</i>	1	1	0	9	4	0
<i>Belief Pain is Bad and Irreversible</i>	0	0	0	3	10	8
<i>Lack of Support/Personalisation</i>	1	1	9	3	3	0
<i>Cost</i>	1	1	14	1	3	0

Differences between patient and clinician perspectives were also analysed in the sticker feedback session by looking at difference in importance rating between groups. Domains with large differences (defined as a greater than 5-point difference in cumulative clinician vs patient scores) were self-efficacy, inadequate resources, lack of support/personalisation and cost. All these factors were weighted as more important by patients.

Session 3

What specific messages would help you counsel patients on physical activity?

Key messages that were deemed important to include by the group are listed below. They were keen for the resource to explore alternative information delivery strategies such as metaphor and clinical reports. Helping clinicians explain why and how physical activity can improve pain was felt as important and the group agreed that explaining this by cycles of conditioning/deconditioning would be a good way to do this as has been done by the British Lung Foundation to explain the relationship between breathlessness and physical activity in COPD (Spathis *et al.*, 2017).

- Personalisation
 - Find enjoyable and low-cost activities
 - If the first doesn't work, try another
 - What happens to people like me? (+ answers)

- Something is better than nothing
- Start small and build gradually
 - Possibly reflect/suggest percentage increases
- Pain does not have to mean bad
- Improved function and reduced pain and improved pain perception
- PA is a better treatment than any drug/injection
- Being active is medicine
 - Natural healing
 - Stimulate regeneration
- You might feel worse when you start
- Function improves before pain
 - Stronger before better
- Hard work
 - Not a quick fix
- Don't stop because of bad days

Are there any safety considerations we need to include?

Clinicians felt comfortable recommending physical activity as safe for the vast majority of people and felt this should be made clear. However, they felt the wording around this needs to be very clear and qualified with advice on when it is not safe.

- Choose words carefully
 - Clear messaging against words like degeneration, damage, crumbling spine
 - Structural change language
- Symptoms can change even if...
- You won't make your condition worse by being active
- PA is safe

- Very few contra-indications
 - List these on the resource
- Safe compared to other treatments
- The risk from inactivity is greater

Workshop 2 Conclusions

Session one confirmed that the domains identified during workshop 1 were both appropriate and important to be included in the resource. The group went further than workshop 1 in recommending that core components should not be prioritised as they are all equally important in supporting clinical consultations.

The ability to prioritise information according to the individual patient and helping clinicians facilitate patient driven consultations were strong themes throughout the workshop.

Supplementary file 3: Results from Delphi phase 1

No.	Question	% agreement	Any disagreement?	Consensus criteria met?	Freetext feedback	Action taken
1	<i>The information is laid out in a coherent manner that supports clinical consultation</i>	77	yes	no	<ul style="list-style-type: none"> Multiple browsers did not work. Too much text 	<ul style="list-style-type: none"> Use graphics where possible
2	<i>Using patient quotes is an engaging way to make the content clinically meaningful</i>	86	yes	no	<ul style="list-style-type: none"> Some clinicians find these strongly negative Recognised as an important part of the patient journey 	<ul style="list-style-type: none"> Display patient quotes in an expandable speech bubble
3	<i>Navigation of the resource is straightforward</i>	79	yes	no	<ul style="list-style-type: none"> "high number of tabs some of which are more relevant than others - too many choices to gauge what is most useful without spending a lot of time on the site deciding what is most useful to me at this point in time" Browser incompatibility a problem 	<ul style="list-style-type: none"> consider options to simplify layout Is browser compatibility going to be such a problem for website?
4	<i>The theory and evidence page contains a satisfactory amount of educational information</i>	85	no	yes	<ul style="list-style-type: none"> Include NICE guidance on individual behaviour change Style not person centred enough – telling not MI focussed Signpost from this page Too text heavy - infographicalise Remove stages of change as per NICE individual behaviour change Add a contact us section 	<ul style="list-style-type: none"> Discuss options for contact us capability Need to review content How will we improve navigation of this section – ? menu links up and down page ?break into sections. Links need to go to particular areas
5	<i>Presenting the options "no minutes consultation", "2-minute consultation" and "more minutes consultation" is a useful approach for the busy clinician</i>	94	no	yes	<ul style="list-style-type: none"> Overall popular 'adds to complexity of navigating the site' Could put no minutes on previous page 30s may be better than 0 mins 	<ul style="list-style-type: none"> brainstorm options to modify this. Ideas include 2 rather than three options or bringing 0 minutes to front of resource Decide if we still like 0 mins

6	<i>The menu page makes it clear what to expect from the resource</i>	77	yes	no	<ul style="list-style-type: none"> • “Think it could be clearer with a direct message to clinicians on the front page stating what the project aim is rather than the info about Faculty/sport england involvement which Drs won't be as interested in” • “I would have the 'no minutes', 'two minutes', 'more minutes' as subheadings with one heading to encompass all as initially it is unclear what is meant by these. For example, main heading could be 'Consultation Reviews' or something along those lines and then underneath the 3 subheadings” • i'd make sure it remains as least cluttered as possible 	<ul style="list-style-type: none"> • Provide more clarity about what to expect from the resource from headings and navigation prompts eg find out more about giving brief advice to your patients with... on PA • Change front page message • Discuss banners – do these need to explain resource?
7	<i>The 'no minutes consultation' contains the most important messages for a healthcare professional to share in a very short space of time</i>	85	no	yes	<ul style="list-style-type: none"> • Review mcmillan phrases for alternatives • Can it link to a patient take away? • Could include this in the homepage • Rephrase risks • As important for treating their condition as medications or surgery • Consider signposting PA guidelines 	<ul style="list-style-type: none"> • Review wording • consider moving to homepage
8	<i>The 'no minutes consultation' page includes an appropriate amount of information</i>	85	yes	no	<ul style="list-style-type: none"> • This does not take no minutes 	<ul style="list-style-type: none"> • Reconsider wording
9	<i>The 'two minutes consultation' contains appropriate information</i>	91	no	yes	<ul style="list-style-type: none"> • Suggest removing PA assessment as this is not achievable • Everyone needs to move more • Drop down dead not ideal 	<ul style="list-style-type: none"> • remove PA calculator • Review VBI literature - HR
10	<i>Covering these objectives is achievable in a two-minute consultation</i>	80	yes	no	<ul style="list-style-type: none"> • Yes achievable without PA calculator • Consider a message to reassure HCPs it can be done in 2 mins • Prompt listening prior to sharing benefits • Consider quick link buttons 'in pain?' 'worried about joints?' 	<ul style="list-style-type: none"> • remove PA calculator • consider trimming address concerns • Prompts for share benefits section
11	<i>The subheadings of the more minutes consultation (Ask, Share Benefits, explain how it works, Address concerns, plan, Next steps) clearly signpost the content of each page</i>	91	no	yes	<ul style="list-style-type: none"> • Consider standardising language eg 5 As • Make more MI consistent – review lets get moving and macmillan • The one thing that was missing for me was how to harness the power of social support, and what the implications/benefits of a more active life would be on social connections 	<ul style="list-style-type: none"> • Review where social support messages can be improved

12	<i>The four questions provide useful prompts for eliciting a patient-focussed physical activity history</i>	91	no	yes	<ul style="list-style-type: none"> Well supported Patient activation measure could be important here Strength and balance are v important for some conditions Maybe could offer some support how clinicians could respond if they get a negative response to the first question? E.g. some patients are going to never have been very active, and/or their illness perceptions are going to colour their memory of this. Sometimes patients do hold a very strong 'I'm not a physically active person' identity which can be a barrier and off putting to clinicians not used to this. 	<ul style="list-style-type: none"> edit intro question & improve wording consider how we can include strength and balance – is this condition specific?
13	<i>The 'physical activity vital sign' is a useful screening tool for a brief intervention in physical activity</i>	83	yes	no	<ul style="list-style-type: none"> Is screening question a barrier? Conversation opener? What's the purpose? How will it be recorded? ?print out Do people understand graphs? 	<ul style="list-style-type: none"> Update on latest plans for calculator build
14	<i>It is useful to present symptom reduction as primary benefits and prevention of further morbidity as secondary benefits</i>	87	no	yes	<ul style="list-style-type: none"> Get back control if previously active, but message doesn't work if previously inactive. Add headline of MI prompt to frame language Risk of frightening people into inactivity Anything that can be personalised is useful "Yes but does this need to be more MI orientated? Would have a slight concern clinicians will get into a 'yes but' tennis match with their patients, trying to convince them of all the benefits but actually resulting in greater resistance. Needs to be very patient led and at the very least framed as 'other patients have told us xxx I'm wondering if those are the sort of benefits you would be hoping for?' type dialogue" Important to include prevention 	<ul style="list-style-type: none"> Reformat section with additional wording to present options for solutions Display relative risks for disease prevention ? as per improvement academy
15	<i>It is necessary to display individual references at the bottom of the benefits page in addition to a clear link through to an explanation of the evidence with references on the 'evidence and theory' page</i>	82	yes	no	<ul style="list-style-type: none"> Will people be updated with new research Could be a dropdown link Offputting in the consultation section Makes page too busy Yes definitely 	<ul style="list-style-type: none"> review method of presenting references ? just show in evidence and theory or have expandable box

16	<i>The positive/negative cycle of activity graphics will help healthcare professionals explain to their patients how physical activity will benefit their symptoms</i>	91	no	yes	<ul style="list-style-type: none"> • Yes good • Can we use ask section to explore what might be stopping them from engaging in activity? • Visual imagery is taken up 6x as often as text- the more of this the better- think of air safety cards etc- signpost the critical moves • Include mood • Dropdowns confusing • Thumbs up/down not clear to all 	<ul style="list-style-type: none"> • discuss linking to other sections eg Ask, review dropdown menu as method for displaying symptoms
17	<i>This information is presented in a clinically meaningful way</i>	79	yes	no	<ul style="list-style-type: none"> • Needs to be presented in person centred way using MI style • Needs design and graphics to improve engagement • Maybe have more flex in the order of the questions • ? put before explain how it works to focus on listening • I don't think we know enough about how to translate PA in a clinically meaningful way to answer this question • The content is ok- but straight text doesnt work on websites. suggest avoid straight text- perhaps speech bubbles • Again, slightly concerned might get in to a back and forth tennis match with patient about this. I think sometimes framing this as being curious and experimenting with PA and seeing if it makes a differences/has negative consequences. Would also suggest that important for clinician and patient to make a clear plan about how the patient can get practical and psychological support for increased activity. All of this needs to be clearly linked back to goal setting and self monitoring 	<ul style="list-style-type: none"> • review language & MI framing • how can we improve presentation? • How can we address visibility of questions? • Include links to goal setting, self-monitoring and pacing
18	<i>Key safety messages, such as addressing cardiac risk, are adequately addressed and explained</i>	86	no	yes	<ul style="list-style-type: none"> • It's a good stat- maybe have a traffic light with a green light next to it or something like that 	<ul style="list-style-type: none"> • improve graphic for CV risk
19	<i>This is a logical sequence of questions to support individualised physical activity prescription</i>	82	yes	no	<ul style="list-style-type: none"> • Review lets get moving pack. • Need to be able to manage those who aren't ready to change • At the moment It's a telling style "if you were to become more active, what would life look like to you, what would the benefits to you of becoming more active, what are the benefits of not changing; how motivated are you to make a 	<ul style="list-style-type: none"> • Rethink presentation of info to address questions, actions, goal-setting, setbacks • HR to review literature and discuss further with experts

					<p>change, how confident are you that you can make that change ... all before setting goals</p> <ul style="list-style-type: none"> • Include dance • Address setbacks/hurdles and action planning • Tie in to social support/connections • More on self monitoring/ rewards • "Play" might seem childish to some. Not sure? Is "leisure-time" too American? 	
20	<i>"Building activity into all aspects of daily life" is an appropriate premise upon which to base physical activity prescription</i>	95	no	yes	<ul style="list-style-type: none"> • Very positive response to this Q • Include specific examples • Also perhaps some advice on how people can track/self monitor both the activity and also outcomes (positive, negative and neutral) 	<ul style="list-style-type: none"> • Review goal setting component
21	<i>"General Practice, the local social prescribing network, and county sports partnerships" are important organisations to signpost for further support</i>	83	yes	no	<ul style="list-style-type: none"> • Local gov leisure departments, walking groups, CSPs only in England • Consider youtube/Instagram accounts • Can we broaden out into local gyms, networks and other areas • Suggestion to name and shame all CSPs who don't engage or offer list • Follow up option • suggest a load of icons- that click through 	<ul style="list-style-type: none"> • ?interactive map for CSPs if we can get details of all their catalogues • Add follow up plan prompt
22	<i>Do you have any suggestions for other national physical activity providers or resources we should signpost?</i>	Freertext response			<ul style="list-style-type: none"> • All health charity patient resources about physical activity • macmillan.org.uk/movemore • Social care web offers locally • 23.5 hrs video • CMO infographics • National organisations that promote walking- examples rambles, paths for all • UK Cycling • BBC Get Inspired campaign online • BBC Get Inspired Activity Finder 	<ul style="list-style-type: none"> • HR review these resources • Discuss how we can present these options. This page seems to be splitting into Charities supporting people being active with your disease, and finding local options
23	<i>Please arrange the following by the importance of including them in a patient information leaflet - DRAG</i>	Freertext response			<ul style="list-style-type: none"> • [Graph of results] 	

	<i>& DROP each component to your preferred position</i>					
24	<i>Do you have any recommendations/comments for the patient information section?</i>	Freetext response			<ul style="list-style-type: none"> • Make person centred, use existing resources • Make it infographic pictorial style information • Provide some concrete actions that can help eg 'take the stairs, sit less, walk more' 	<ul style="list-style-type: none"> • Discuss patient facing infographic development plan • Agree on components and format for this
25	<i>The general 'look and feel' of the designed pages make the resource:</i>					
	<i>a) credible</i>	81	yes	no	<ul style="list-style-type: none"> • Not yet way to go • NHS logo would help • Excellent visuals • Very attractive • Looks like an advert for the partner orgs, I'd make the logos smaller and on one line if poss. Also they don't need to be on every page 	<ul style="list-style-type: none"> • Discuss representation of logos and partner organisations ? only show some at front • Discuss image bank and how we can display variety • Revisit NHS central branding
	<i>b) distinctive</i>	82	yes	no	<ul style="list-style-type: none"> • Not yet – way to go • Needs more colour 	
	<i>c) inclusive</i>	79	yes	no	<ul style="list-style-type: none"> • Recommend images of very frail older adults, BME groups • Sorry can't see what you're referring to • Found it easy to use and liked it very much • The models are all a similar body size (slim) and looks a tiny it couple or family skewed 	
	<i>d) energetic</i>	82	yes	no	<ul style="list-style-type: none"> • But at a realistic level • Not yet – way to go • More colour • Might be a little bit daunting... 	
26	<i>The design helps discriminate between different types of information, for example core content and patient quotes</i>	81	yes	no	<ul style="list-style-type: none"> • I found the page a bit muddled, I found the patients quotes and facts easy to skip over and not notice as the page was already so colourful and busy • Patient quotes lost a bit 	<ul style="list-style-type: none"> • Signpost to patient quotes ? popout speech bubbles

27	<i>The design helps prioritise information</i>	87	yes	no	<ul style="list-style-type: none">• Generally agree• When it goes live will it be on different pages? found scrolling down a bit confusing, i wasn't sure if i was missing anything• But I'm not fully convinced of the order to maximise engagement. Listening first/more.. is what the evidence is saying.. then give the info.	
----	--	----	-----	----	---	--

Supplementary file 4. Results from Delphi phase 2

No.	Question	% agreement	Level of agreement	Feedback theme	Action taken
1	The information is laid out in a coherent manner that supports clinical consultation	83	High agreement	Compatibility with multiple browsers Much more user-friendly Home return button on each page Lots of clicks to navigate Lots of scrolling	N/A
2	Using patient quotes is an engaging way to make the content clinically meaningful	85	High agreement	Helps as a prompt Use “physical activity” instead of “exercise”	N/A
3	Navigation of the resource is straightforward	77	Moderate agreement	Need to be able to return to the home page, or get back to the previous page Lots of clicks to navigate Add a back button	<ul style="list-style-type: none"> • ‘Back’ button • Reference to current disease area to be ever-present and work as a resource • ‘home’ button • Upper level navigation to be added with drop down menus • ‘How to use this resource’ added •
4	The information pop-ups contain a satisfactory amount of educational information	82	High agreement	A lot to digest if new to physical activity as a healthcare professional Very helpful, makes pages a lot less overwhelming	N/A
5	The menu page makes it clear what to expect from the resource	77	Moderate agreement	Lots of scrolling on the page Covers everything, comprehensive	<ul style="list-style-type: none"> • Landing page of each disease resource changed with more direct instructions • To capitalise on navigation revisions, supporting elements added to the website including materials, campaign resources and other components such as an ‘about us’ page.
6	The 'no minutes consultation' page includes an appropriate amount of information	75	Moderate agreement	Still a lot to cover in “0” minutes “1 minute” seems a lot more reasonable	<ul style="list-style-type: none"> • “0 minutes” changed to “1-minute conversation”
7	Covering these objectives is achievable in a two-minute consultation	77	Moderate agreement	Covering in 2 minutes might not be achievable In 2 minutes would be superficial conversations	<ul style="list-style-type: none"> • “2 minutes” changed “5-minute conversation”

8	The subheadings of the more minutes consultation (Ask, Explore Benefits, Explore Concerns, Build Readiness, agree a Plan, Arrange Support) clearly signpost the content of each page	87	High agreement	Difficulty navigating back to the home page A lot of information, but this is helpful to tailor to the individual A good flow of information	See point 3
9	The 'physical activity calculator' is a useful screening tool for a brief intervention in physical activity	78	Moderate agreement	Not easy to input information for every patient's needs Great visual	
10	The summary evidence statements and referencing are useful and appropriate	83	High agreement	Some icons not appropriate	Changed icons for certain text boxes
11	This information in 'explore concerns' is presented in a clinically meaningful way	85	High agreement	Very good section	N/A
12	This is a logical sequence to support individualised physical activity prescription	87	High agreement	Appropriateness of terminology e.g. "play" - would leisure time be better?	N/A
13	Key organisations are appropriately signposted to help arrange further support	77	Moderate agreement	Good to have locally based referral schemes Hyperlinks instead of URLs	
14	Do you have any further recommendations/comments for the patient information section?	Freetext response		Different colours for different diseases	<ul style="list-style-type: none"> • Patient action planning, goal setting and stepping workbooks added to information for patients
15	The general 'look and feel' of the designed pages make the resource:				
	a) credible	83	High agreement	Some icons not appropriate More quotes	Change certain icons to be more appropriate
	b) distinctive	81	High agreement	-	N/A
	c) inclusive	59	Low agreement	Some uncertainty who the website was targeted for by the images	Change stock images to match diseases/purpose of website more appropriately
	d) energetic	81	High agreement	Really like the graphics and pictures	N/A
16	The design helps discriminate between different types of information, for example core content and patient quotes	82	High agreement	-	Increase colour variety added to resources and greater contrast to patient information leaflets
17	The design helps prioritise information	82	High agreement	Navigation still a bit complicated	See point 3

As with phase 1, free text feedback was very influential in refining the tool. It also helped to illustrate why some domains had scored moderate or low agreement.

Fundamental changes, including resolution of cases low to moderate agreement, following phase 2 were as follows:

- Rethink of navigation of the site to include:
 - 'Back' button
 - Reference to current disease area to be ever-present and work as a resource 'home' button
 - Upper level navigation to be added with drop down menus
- To capitalise on navigation revisions, supporting elements added to the website including materials, campaign resources and other components such as an 'about us' page.
- Conversation components re-written to improve the flow between the 'envelope' of the conversation common content and the 'stuffing' of the page details
- Landing page of each disease resource changed with more direct instructions
- 'How to use this resource' added
- "0 minutes" changed to "1-minute conversation"
- "2 minutes" changed "5-minute conversation"
- Increase colour variety added to resources and greater contrast to patient information leaflets
- Patient action planning, goal setting and stepping workbooks added to information for patients
- Site review and standardisation by external scientific editor