



Development of a theoretically informed behavioural physiotherapy intervention to optimise physical activity adherence in patients with lower-limb osteoarthritis: A qualitative study

Matthew Willett,^{1,2} Carolyn Greig,² David Rogers,³ Sally Fenton,² Joan Duda,² Alison Rushton^{1,2}

Author affiliations

- 1) Centre of Precision Rehabilitation for Spinal Pain, University of Birmingham, Birmingham, UK.
- 2) School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, Birmingham, UK.
- 3) Centre for Musculoskeletal Medicine, Royal Orthopaedic Hospital NHS Foundation Trust, Birmingham, UK.

Introduction

In the United Kingdom, lower-limb osteoarthritis (OA) causes high levels of pain and disability for almost 9 million people.¹ International guidelines recommend interventions should incorporate physical activity (PA) strategies to aid patients with lower-limb OA to moderate their symptoms.²⁻⁴ However patients with lower-limb OA are generally less active than the general populace and programmes delivered by healthcare professionals are generally only effective at ameliorating clinical symptoms while the patient is under care. The primary reason for reduced long-term moderation of clinical symptoms is thought to be associated with decreased adherence to PA recommendations after the patient with lower-limb OA is discharged from care.

It is theorised that individuals undergo several 'phases' of behaviour change when integrating new behaviours (such as PA adherence) into their lifestyle.⁵ When considering a healthcare programme, behaviour 'adoption' would commence while under care and 'maintenance' would occur post-treatment (i.e. after discharge). The skills required to adopt PA behaviours are likely distinct from the those needed to maintain them,⁶ and a health professional programme therefore requires specific behaviour change techniques (BCTs) across these phases.⁷ This may in part explain the drop off in effectiveness in clinical outcomes post-treatment.

Physiotherapists are the most common healthcare practitioners who deliver PA programmes within the NHS. However, physiotherapists and patients with lower-limb OA do not necessarily agree with the most effective BCTs to promote PA adherence.⁸ Furthermore, patients with lower-limb OA believe they require more support and perceive prescribed PA (e.g. exercise) as unsafe,⁹ and physiotherapists generally do not have sufficient understanding of BCTs to deliver them effectively in clinical practice.¹⁰

The Medical Research Council recommends using theory to inform the development of interventions that target patient behaviours.¹¹ Theoretical interventions use prespecified BCTs to target behavioural determinants (e.g. self-efficacy) that conceptually modify the behaviour of interest.¹²

This enables a greater understanding of the interventions mechanism of action and iterative refinement of the theory with subsequent increased clinical effectiveness.¹³ The Theoretical Domains Framework (TDF) is a validated framework of behaviour change that enables barriers and facilitators to be mapped against theoretically derived domains that influence patient behaviours.¹⁴ Intervention BCTs can then be coded from the TDF domains using validated methods.^{15 16}

To date, no study has gained an in-depth understanding of the barriers and facilitators to adherence to physiotherapist prescribed PA during the treatment and post-treatment time periods to develop a theoretically informed physiotherapy intervention in patients with lower-limb OA. Therefore, the aims of this study were to:

- 1) Identify barriers and facilitators to physiotherapy prescribed PA in patients with lower-limb OA in the treatment and post-treatment time periods.
- 2) Identify BCTs to enable design of a physiotherapy intervention that aims to optimise adherence to PA in the treatment and post-treatment time periods.
- 3) Determine the feasibility of physiotherapists delivering the theoretically informed intervention in a real-world NHS setting.

Methods

This phenomenological qualitative study followed a published protocol,¹⁷ was reported using the Consolidated criteria for reporting qualitative research (COREQ) guidelines,¹⁸ and consisted of 2 sequential phases:

Phase 1) A purposive sample of 13 people with lower-limb OA who attended physiotherapy participated in 1-to-1 semi-structured interviews. The interview schedule was piloted on the study patient and public representative who has lower-limb OA and included open ended questions to gain participants in-depth opinions on: the physiotherapy intervention they had received, key barriers and facilitators to any prescribed PA, and thoughts on BCTs that they considered would optimise their adherence to PA in the treatment and post-treatment time points. Inductive analysis¹⁹ identified key themes which were refined iteratively through discussions with the study steering committee. Barriers and facilitators to adherence to prescribed PA during the treatment and post-treatment periods were identified and mapped onto the *theoretical domains framework* (TDF).¹⁴ BCTs were identified following Michie's *V1 taxonomy* guidelines.^{15 16} Deductive analysis of transcripts was also used to identify potential BCTs that were explicitly described and to enable testing of those identified by the inductive analysis. Two researchers piloted transcript coding, TDF mapping, and BCT coding. One researcher completed each stage which was then audited by a second researcher.

Phase 2) A theoretically informed behavioural physiotherapy intervention, addressing barriers and using facilitators and incorporating identified BCTs was developed. Two focus groups, comprising a convenience sample of 12 physiotherapists, explored the feasibility of delivering the intervention. The pilot version of the theoretically informed intervention was presented to the trust physiotherapists to gain their opinions on the its feasibility, acceptability and practicality²⁰ of delivery at the ROH. Opinions were sought on the intervention structure, including any perspectives on BCT content, timing, or mode of delivery and potential barriers to delivery or additional support or resources needed to deliver it in practice. Further inductive and deductive thematic analysis identified key barriers and facilitators to enable delivery of the intervention.

Results

Phase 1)

Themes were grouped into three overarching clusters that influenced adherence to prescribed PA: 'personal factors' and the 'treatment' and 'post-treatment' phases respectively.

Personal Factors) Patient confidence and motivation were primary determinants of PA adherence and were influenced by the patients' arthritic symptoms and their previous experiences of PA. The TDF domain '*beliefs about capabilities*' was influential on all personal factors.

Treatment phase) Developing a positive physiotherapist-patient relationship through a collaborative approach, personalised treatment and enhancing access to, and the value of, treatment sessions were interrelated themes to enable routine formation and engaging with PA. Several TDF domains were highlighted as influential during this phase including '*knowledge*', '*skills*', '*intentions*', '*goals*' '*environmental context and resources*', '*social influences*' and '*behavioural regulation*'.

The interaction between themes relating to the participants' personal factors and their physiotherapy treatment are detailed in Figure 1. The bi-directional arrows of physiotherapy treatment phase themes serve to outline their interrelation and importance in the formation of PA routine. PA routine influences the patients' confidence and subsequent motivation to engage with PA. The model also demonstrates the ongoing interaction between the patient confidence and motivation and interrelationship with the patients' arthritic symptoms and their experiences of PA.

Post-Treatment Phase) During the post-treatment phase, the patients' physical capability, psychosocial well-being, and ongoing access to resources emerged as important themes. The TDF domains '*beliefs about capabilities*', '*environmental context and resources*', '*social influences*' were most influential at this time point.

Pilot intervention) The pilot intervention was constructed from the coded BCTs with sequencing informed from the treatment and post-treatment phases. The pilot intervention was segmented into three conceptual phases to reflect the behaviour change literature that summarised the needs of the phase 1 participants. These were: adoption, routine formation, and maintenance respectively. The pilot intervention is outlined in Figure 2.

Phase 2) Physiotherapists found the proposed intervention highly acceptable and noted a demand for such a programme in their current service. They identified time with patients, access to appropriate material resources, training in behaviour change theory and BCT delivery, and getting buy in through a collaborative relationship with the patient, as key factors to enable successful operationalisation of the intervention.

Discussion

The results highlight that adherence to PA in patients with lower-limb OA is multidimensional and involves interactions between personal (internal) and social and environmental factors (external factors). PA adherence in patients with lower-limb OA is primarily influenced by their confidence,²¹⁻²⁵ motivation,^{6 21 23 26 27} severity of arthritic symptoms,²⁷⁻²⁹ and experiences of PA^{6 23 24} which is consistent with the established literature.

Physiotherapists can help patients with lower-limb OA adopt PA behaviours by aiding the formation of routine with a detailed treatment plan which incorporates activities that are set at the correct

level initially, progressed slowly, and personally meaningful. Patients beliefs about their capabilities can be further enhanced by providing a supportive and encouraging treatment environment and developing a collaborative relationship.

Towards the end of treatment, physiotherapists should explore factors that affect patients access to appropriate PA facilities and their social support systems to facilitate maintenance of PA post-discharge.

Strengths and limitations

This is the first qualitative study to gain the in-depth perspectives of patients with lower-limb OA of the barriers and facilitators to physiotherapist prescribed PA during the treatment and post treatment phases. It is also the first to use the TDF to develop a theoretically informed physiotherapy intervention aimed at optimising adherence to PA that was deemed acceptable and feasible to deliver by key stake holders (i.e. musculoskeletal physiotherapists working clinically). Patient and public involvement was utilised in the design of the study and informed data analysis which ensured that the perspectives of patients with lower-limb OA were captured throughout the study.

Figure 1: Model representing the interrelated personal and treatment phase themes influencing physical activity adherence in patients with lower-limb osteoarthritis

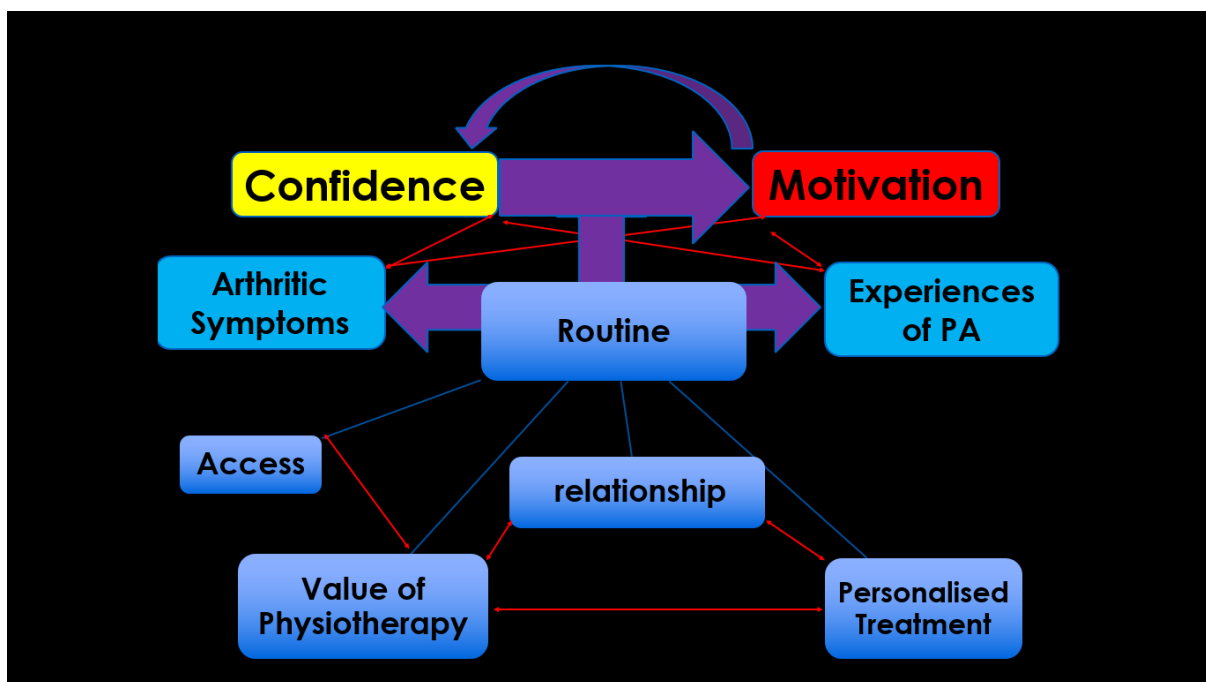


Figure 2: Theoretically Informed Intervention

Session number	Specific BCTs	Recurring BCTs
Session 1-2 Adoption	1.3 Goal Setting (behaviour) 1.4 Action Planning 5.1 Information on health consequences 5.3 Information about social and environmental consequences 10.6 Non-specific Incentive	1.1 Goal setting Behaviour 1.7 Review behavioural goals 2.2 Feedback on behaviour 2.3 Self-monitoring of behaviour 3.1 Social Support (unspecified) 3.2 Social support (Practical) 4.1 instruction in how to perform the behaviour
Session 3-4 Habit formation	7.1 Prompts and Cues 12.5 Adding objects to the environment 8.3 Habit Formation 8.6 Generalisation of target behaviour	6.1 Demonstration of the behaviour 8.1 Behavioural practice/rehearsal 8.7 Graded Tasks
Session 5- 6 Maintenance	1.2 Problem solving 1.8 Behavioural contract 11.2. Reduce negative emotions 12.2 restructuring of the social environment 15.1. Verbal persuasion about capability 15.3. Focus on past success 10.10 Reward (outcome)	

However, the lead investigator, who conducted the interviews and was the primary researcher involved in the data analysis, is a musculoskeletal physiotherapist with extensive clinical experience. Therefore, some researcher bias is expected. As this study focused on patients with lower-limb OA who have already attended physiotherapy, it did not identify barriers that patients with lower-limb OA who are invited but do not attend physiotherapy sessions experience. Therefore, specific BCTs that could facilitate patients with lower-limb OA attending physiotherapy could be explored in future studies. Furthermore, this study had a relatively small sample size and excluding patients with lower-limb OA who do not speak English further limited its generalisability and applicability.

Conclusion

Physiotherapists should develop a collaborative relationship with patients with lower-limb OA to help build a PA routine and develop confidence and motivation to adhere to recommendations. Physiotherapists should utilise BCTs that encourage patient-led goal setting, self-monitoring and developing PA habits initially, and educate patients on appropriate social support systems to assist maintenance of adherence to PA in the post-treatment time periods.

Next Steps

The theoretically informed behavioural physiotherapy intervention will now be assessed in a feasibility study.

Ethics approval

The study received NHS ethical and HRA approval and site capacity and capability was obtained prior to the commencement (IRAS 247904).

Funding

This study was supported by the Musculoskeletal Association of Chartered Physiotherapists level 3 research award.

References

1. Arthritis Research UK and Imperial College London (December 2014). The Musculoskeletal Calculator. Available from www.arthritisresearchuk.org/mskcalculator. 2014.
2. NICE. National Institute for Health and Care Excellence 2014. Care and Management in adults. clinical guideline CG177 methods, evidence and recommendations. 2014.
3. Pereira D, Peleteiro B, Araujo J, et al. The effect of osteoarthritis definition on prevalence and incidence estimates: a systematic review. *Osteoarthritis and cartilage* 2011;**19**(11):1270-85.
4. Hochberg MC, Altman RD, April KT, et al. American College of Rheumatology 2012 recommendations for the use of nonpharmacologic and pharmacologic therapies in osteoarthritis of the hand, hip, and knee. *Arthritis care & research* 2012;**64**(4):465-74.
5. Prochaska JO, Di Clemente CC, Norcross JC. In search of how people change: Applications to addictive behaviors. *American Psychologist* 1992; **47**(9):1102-111.
6. Kanavaki AM, Rushton A, Efstathiou N, et al. Barriers and facilitators of physical activity in knee and hip osteoarthritis: a systematic review of qualitative evidence. *BMJ open* 2017;**7**:e017042.
7. Marcus BH, Dubbert PM, McKenzie TL, et al. Physical activity behavior change: issues in adoption and maintenance. *Health Psychol* 2000;**19**(1):32-41.
8. Nicolson PJA, Hinman RS, French SD, et al. Improving Adherence to Exercise: Do People With Knee Osteoarthritis and Physical Therapists Agree on the Behavioral Approaches Likely to Succeed? *Arthritis care & research* 2018;**70**(3):388-97.
9. Holden MA, Nicholls EE, Young J, et al. Role of exercise for knee pain: what do older adults in the community think? *Arthritis care & research* 2012;**64**(10):1554-64.
10. Alexanders J, Anderson A, Henderson S. Musculoskeletal physiotherapists' use of psychological interventions: a systematic review of therapists' perceptions and practice. *Physiotherapy* 2015;**101**(2):95-102.
11. Craig P, Dieppe P, Macintyre S, et al. Developing and evaluating complex interventions: the new Medical Research Council guidance. *Bmj* 2008;**337**:a1655.
12. Michie S, Prestwich A. Are interventions theory-based? Development of a theory coding scheme. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association* 2010;**29**(1):1-8.
13. Prestwich A, Snihotta FF, Whittington C, et al. Does theory influence the effectiveness of health behavior interventions? Meta-analysis. *Health psychology : official journal of the Division of Health Psychology, American Psychological Association* 2014;**33**(5):465-74.
14. Cane J, O'Connor D, Michie S. Validation of the theoretical domains framework for use in behaviour change and implementation research. *Implement Sci* 2012;**7**(37).
15. Cane J, Richardson M, Johnston M, et al. From lists of behaviour change techniques (BCTs) to structured hierarchies: comparison of two methods of developing a hierarchy of BCTs. *British journal of health psychology* 2015;**20**(1):130-50.
16. Michie S, Richardson M, Johnston M, et al. The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: building an international consensus for the reporting of behavior change interventions. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine* 2013;**46**(1):81-95.
17. Willett MJ, Greig C, Rogers D, et al. Barriers and facilitators to recommended physical activity in lower-limb osteoarthritis: protocol for a qualitative study exploring patients and physiotherapist perspectives using the theoretical domains framework and behaviour change taxonomy. *BMJ Open* 2019;**9**:e029199. doi: [10.1136/bmjopen-2019-029199](https://doi.org/10.1136/bmjopen-2019-029199)

18. Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *Int J Qual Health Care* 2007;**19**(6):349-57.
19. Braun V, Clarke V. Using thematic analysis in psychology. *Qualitative Research in Psychology* 2006;**3**(2):77-101.
20. Bowen DJ, Kreuter M, Spring B, et al. How we design feasibility studies. *American journal of preventive medicine* 2009;**36**(5):452-7.
21. Hammer NM, Bieler T, Beyer N, et al. The impact of self-efficacy on physical activity maintenance in patients with hip osteoarthritis - a mixed methods study. *Disability and rehabilitation* 2016;**38**(17):1691-704.
22. Campbell R, Evans M, Tucker M, et al. Why don't patients do their exercises? Understanding non-compliance with physiotherapy in patients with osteoarthritis of the knee. *J Epidemiol Community Health* 2001;**55**:132-38.
23. Petursdottir U, Arnadottir SA, Halldorsdottir S. Facilitators and Barriers to Exercising Among People With Osteoarthritis: A Phenomenological Study. *Physical therapy* 2010;**90**(7):1014–25.
24. Stone RC, Baker J. Painful Choices: A Qualitative Exploration of Facilitators and Barriers to Active Lifestyles Among Adults With Osteoarthritis. *Journal of applied gerontology : the official journal of the Southern Gerontological Society* 2017;**36**(9):1091-116.
25. Veenhof C, van Hasselt TJ, Köke AJA, et al. Active involvement and long-term goals influence long-term adherence to behavioural graded activity in patients with osteoarthritis: a qualitative study. *Australian Journal of Physiotherapy* 2006;**52**(4):273-78.
26. Fiske AL, Waters DL, Hing WA, et al. Perceptions towards aqua-based exercise among older adults with osteoarthritis who have discontinued participation in this exercise mode. *Australasian journal on ageing* 2016;**35**(1):12-7.
27. Hendry M, Williams NH, Markland D, et al. Why should we exercise when our knees hurt? A qualitative study of primary care patients with osteoarthritis of the knee. *Family practice* 2006;**23**(5):558-67.
28. Kaptein SA, Backman CL, Badley EM, et al. Choosing where to put your energy: a qualitative analysis of the role of physical activity in the lives of working adults with arthritis. *Arthritis care & research* 2013;**65**(7):1070-6.
29. Thorstensson CA, Roos EM, Petersson IF, et al. How do middle-aged patients conceive exercise as a form of treatment for knee osteoarthritis? *Disability and rehabilitation* 2006;**28**(1):51-9.