Barriers and Facilitators to Self-management

in People With Back-related Leg Pain:

A Qualitative Secondary Analysis

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Background: Back related leg pain (BRLP) is a problematic subset of low back pain, leading to greater pain, loss of function and health related care costs. While evidence suggests self-management is effective, patient implementation can be sub-optimal. The purpose of this study is to identify barriers and facilitators to self-management for persons experiencing BRLP within the context of a controlled clinical trial and to map these to theory-informed intervention elements that can be addressed by front-line healthcare providers, informing the design and implementation of future theory-driven self-management interventions for this population.

Methods: This study was a qualitative secondary analysis of a 2-site, pragmatic, parallel group, randomized clinical trial (participants enrolled 2007-10) of spinal manipulative therapy (SMT) and home exercise and advice (HEA) compared to HEA alone for persons with subacute or chronic BRLP. We used deductive and inductive content analysis, to describe self-management facilitators and barriers among trial participants, map these to behavior change elements in the Behavior Change Wheel (BCW) Framework, and identify potentially modifiable, theory-intervention elements which may be addressed with guidance by healthcare providers. Baseline characteristics of participants were descriptively analyzed using SAS (University Edition).

Results: Of 40 participants, the majority identified as white (n = 24, 85%) and of non-Hispanic or Latino ethnicity (n = 38, 95%). Average participant age was 57 years old (range 29-80). Frequent facilitators included ease of exercises, knowing how to manage condition, atmosphere created by staff, therapeutic alliance, effectiveness of exercises or treatment, goal of reducing pain, and intentions of continuing exercises. Frequent barriers included time constraints, pain, and lacking confidence in treatment. Barriers were mapped to all 9 Intervention Functions, most common being modelling and education. Frequently identified Behavior Change Techniques included information, feedback, self-monitoring, graded tasks, restructuring, social support, goal setting, reviewing goals, and action planning.

Conclusion: This study identified barriers and facilitators to engaging in self-management for participants in a pragmatic, randomized clinical trial. A rigorous systematic intervention mapping process utilizing the BCW was used for describing what participants need and how their needs may be met. These findings may support the design of future self-management interventions for persons experiencing BRLP.

Keywords: Back pain; Behavior change; Self-management; Spinal manipulation.

From the FULL TEXT Article:

Introduction

People with chronic low back pain (LBP) experience a myriad of disruptions to multiple facets of their lives, including health, social activity, employment, and identity. LBP is a leading cause of disability [1–4], leading many people to weave together a patchwork of pharmacological, nonpharmacological, and self-management strategies to cope with their pain and symptoms. [5, 6] This is especially true for patients with back-related leg pain (BRLP), a more complicated variation of LBP with symptoms that can be more difficult to self-manage than back pain alone. [7–10] Persons experiencing BRLP pain face greater levels of disability, pain intensity, activity limitations, higher frequency of psychological risk factors, and poorer quality of life than those with uncomplicated LBP. [8, 9, 11–13]

Self-management can be defined as an “individual’s ability to manage symptoms, treatment, physical and psychosocial consequences and lifestyle changes inherent in living with a chronic condition”. [14] Clinical practice guidelines (CPGs) consistently recommend patient education, exercise, and self-management as first-line treatments for BRLP due to the impact of these strategies on patient outcomes. [15–19] For example, patients who engage in home exercise programs to manage chronic health conditions may experience a sense of empowerment and reduced dependence on healthcare professionals for treatment. [14, 20] Effective self-management however is hard and implementing new self-management strategies on a consistent basis requires behavior change [21, 22], not only on the part of the patient, but also among their clinicians. Healthcare professionals can play a key role in fostering effective BRLP self-management among patients through partnership, support, education, and supervision, and promoting self-efficacy. [20, 23–25]

However, health professionals’ practice conventions are often misaligned with guideline recommendations. For example, clinicians prescribe exercise to only half of their patients who might benefit [26] and rarely offer self-care education [27], rather continuing to advocate for rest over active care, and poorly advising patients on the psychological and social dimensions of their experience. [26] Even when health professionals do implement CPG recommendations, patient adherence to exercise and other self-management strategies is sub-optimal. [25, 28] These gaps between ideal and actual treatments necessitate further investigation into how patients and providers understand, recommend, or adopt self-management strategies for BRLP.

Self-management interventions, a type of behavioral change intervention, are those that promote the “active involvement of the patient in managing their condition”, and can help the individual learn about and implement health behaviors in their daily lives. [29] However, implementing such interventions can be tenuous. [29] Behavioral change models, for example, Michie and colleagues’ Behavior Change Wheel, highlight sustained behavioral change requires sufficient capability, opportunity, and motivation. [30] The absence of, or barriers within any of these three realms may prevent an individual from engaging in new health behaviors regularly and effectively [21] while facilitating them may support long-term adoption. [31–35]

A theory-informed approach to behavior change may allow patients and providers to move from identifying self-management barriers and facilitators to establishing a behavior change diagnosis with its accompanying interventions and expected outcomes. [30, 36] Not all behavior change frameworks are comprehensive, which may lend to heterogeneity among developing and implementing self-management interventions. [21, 36] The Michie and colleagues’ behavior change wheel (BCW) was developed from a systematic review of 19 frameworks of behavior change including nine intervention functions and seven policy categories resulting in a “behavior system” applicable to range of behavior change interventions. [21] Eilayyan et al., and Hurley et al. have undertaken studies to develop LBP self-management interventions utilizing the BCW. [31, 34, 37]

However, these studies focused on spinal back pain rather than BRLP, a more complicated and disabling variant of back pain. [8, 9, 11] To further expand the BCW knowledge base, our team undertook a theory-informed evaluation of BRLP self-management interventions. The purpose of our study was to identify barriers and facilitators to self-management for persons experiencing BRLP within the context of a controlled clinical trial and to map these to theory-informed intervention elements that can be addressed by front-line healthcare providers. Our goal was to provide research-based information to improve the design and implementation of future theory-informed self-management interventions for persons experiencing BRLP.

Methods

This study was a qualitative secondary analysis of a 2-site, pragmatic, parallel group, randomized clinical trial of spinal manipulative therapy (SMT) and home exercise and advice (HEA) compared to HEA alone for persons with subacute or chronic BRLP. [38, 39] Primary outcomes, the trial protocol, and a qualitative analysis examining what patients valued about SMT and HEA are published. [38–40] We used a multi-step analytic approach to describe self-management facilitators and barriers among trial participants, map these to behavior change elements in the BCW Framework, and identify potentially modifiable, theory-intervention elements which may be addressed with guidance by healthcare providers. [30, 36] The clinical trial was approved by the Institutional Review Boards at each research center and registered with clinicaltrials.gov (NCT00494065). Trial participants provided written informed consent. The current study was deemed exempt by the [University of Minnesota Institutional Review Board] (11/08/2021, STUDY00014393). We followed the Standards for Reporting Qualitative Research (SRQR) to prepare this report. [41]

Settings and participants

Participants were enrolled between 2007 and 2010 at the research clinics of Northwestern Health Sciences University (Bloomington, MN, USA) and Palmer College of Chiropractic (Davenport, IA, USA). Participants (N = 192) experiencing chronic BRLP were allocated to receive SMT + HEA (n = 96) or HEA alone (n = 96) for 12 weeks. [38, 39] This secondary analysis included a sample of the participants allocated to SMT + HEA, as this group received the intervention most representative of what chiropractors could deliver in practice.

Interventions

Trial interventions salient to this analysis included participant receipt of an adapted Back in Action book [42], which emphasized the biopsychosocial approach to management of back pain, and 4, 60-min individual sessions of HEA, delivered by chiropractors, exercise therapists and a personal trainer. HEA sessions reviewed information about BRLP causes, prognosis, self-care, and activity encouragement. Participants also received individualized instructions and supervised practice for positioning, stabilization exercises, and spine posture awareness during activities of daily living. Interactions with study clinicians (chiropractors) reinforced this training. [38, 39]

Transcript selection methods

At Week 12, 174 participants completed the self-reported outcome measures, followed by an optional, audio-recorded, semi-structured interview. Interviews were conducted in person by study coordinators and followed an interview schedule with open-ended questions related to satisfaction with care, changes in pain, and feelings toward the home exercise program and chiropractic treatment (Additional file 1). [38, 40] Of the 174 available, this analysis utilized 40 randomly selected, de-identified, transcripts from participants allocated to SMT + HEA who: (1) completed the study intervention and (2) provided an intelligible response of more than a yes or no answer to at least 1 relevant interview question. Random selection was conducted using a random number generator to minimize selection bias. The lead author (AZ) verified transcripts against these eligibility criteria with the first 40 transcripts meeting criteria used in the analysis. A second researcher (CS) verified eligibility determinations. Transcripts were uploaded to NVivo® v12 (QSR International Pty Ltd, Victoria, Australia) for analysis.

Secondary data analysis methods

Baseline characteristics were descriptively analyzed using SAS University Edition (SAS Institute, Cary, NC). Three coders (AZ, DT and DK) independently conducted the qualitative analysis using a deductive and inductive content analysis approach. [43, 44]

Coding process

Codebook development

The team coded for barriers and facilitators to BRLP self-management, using a codebook previously developed for a similar study [30], which was iteratively adapted for this analysis over 3 consensus meetings. The codebook was based on the BCW, Theoretical Domains Framework (TDF) and the Capability, Opportunity, Motivation Behaviour Model (COM-B) and included operational definitions and example statements for each domain (Additional file 2). The COM-B model provides a framework for representing 3 conditions needed for behavior change:

(1) Capability is a person’s physical and psychological capacity for engaging in the specified activity;

(2) Opportunity represents the social and contextual elements that make making engaging in the behavior possible; and

(3) Motivation consists of the beliefs and emotions/impulses directing behavior. [21]

The TDF consists of 12 domains synthesized from behavior change theory constructs and support the development of each COM-B element (Additional file 2). [21, 30] While the COM-B is a useful screening tool, the TDF allows assessing behavior and identifying needs at the individual level, establishing a behavioral diagnosis. [30]

Coding process

Our initial coding process utilized a deductive content analysis approach, coding and mapping directly to the pre-defined codebook. AZ coded all 40 transcripts, with DT coding every other transcript. Both AZ and DT were chiropractors engaged in graduate level research programs. DK, a faculty and research team member experienced in qualitative research and familiar with the TDF and COM-B model, co-coded 5 transcripts with DT before tapering to every 2nd, then every 3rd transcript. Consensus meetings occurred after coding the first 2 transcripts, then after every 10th transcript, for a total of 7 consensus meetings. Consensus meetings included reaching agreement on coding and when needed reviewing clarifying examples ensuring adherence to the codebook. Additional team members (CS and RE) were available to resolve coding discrepancies and confirm accuracy of findings.

After mapping barriers and facilitators to the TDF, it was noted each domain could benefit from further characterization. An additional round of coding was undertaken utilizing an inductive approach for further characterizing the types of barriers and facilitators within each TDF domain. Coding was done within NVivo® v12 (QSR International Pty Ltd, Victoria, Australia) for data organization purposes, no auto-coding was utilized. This also allowed for tracking and quantifying the frequency of each domain and theme. Representative quotes are reported for each theme.

We used the TDF to link BRLP self-management barriers and facilitators with intervention functions (IFs). Intervention functions are broad categories within the behavior change wheel (BCW) by which an intervention can change behavior. [30]

There are 9 IFs:

(1) education, adding knowledge or understanding;

(2) persuasion, facilitating positive or negative feelings or actions;

(3) incentivization, using an expectation or reward;

(4) coercion, using expectation of punishment or cost;

(5) training, imparting skills;

(6) restriction, using rules for reducing or increasing opportunity for engaging in the target behavior;

(7) environmental restructuring, changing physical or social context;

(8) modelling, providing an example; and

(9) enablement, facilitating means or removing barriers for increasing capability.

The intervention functions link from the COM-B and TDF providing a theory-informed way to move from behavior diagnosis to facilitating change. [30] Once IFs are linked, behavior change techniques (BCTs) can be identified. Behavior change techniques are “an active component of an intervention designed to change behavior” and can be linked to both the TDF and intervention functions. [30] Identifying BCTs occurred by 1 author applying the APEASE criteria while also accounting for most commonly utilized BCTs and applying clinical judgement for types of barriers and facilitators identified. [30, 36, 45] The APEASE criteria considers affordability, practicability, effectiveness and cost-effectiveness, acceptability, side effects/safety and equity of the proposed BCT. [30, 46]

Results

Baseline characteristics

Table 1

Baseline characteristics are presented in Table 1, and generally aligned with those reported elsewhere. [39, 40] Most participants identified as white (85%) and of non-Hispanic or Latino ethnicity (95%). On average, participants were 57 years of age (range 29–80) and had an average body mass index (BMI) of 28.1 (SD 5.4). Most participants engaged in light (32.5%) or moderate (50%) physical activity in their daily routines.

Capability

Table 2

Table 2 displays domains, operational definitions, and corresponding themes relating to physical and psychological capability. Physical capability refers to the participant’s physical ability or skill to perform self-management activities for BRLP. Physical ability or skill was mentioned by 19 participants (48%). A singular barrier to self-management, difficulty performing exercises, was mentioned by 4 participants (24%). Exercises feeling simple to perform was mentioned by 13 participants (76%) as facilitating self-management.

Psychological capability refers to a participant’s knowledge, cognitive and interpersonal skills, and memory, attention, and decision processes in self-management behaviors for BRLP. Twenty-four participants mentioned a knowledge barrier, such as not knowing how to manage their condition (13%), or at least 1 facilitator, including knowing how to manage their condition (49%), understanding their exercises (38%), and general knowledge gained during the study (33%). A barrier or facilitator pertaining to cognitive and interpersonal skills was mentioned by 6 participants (15%). Half of these participants cited recognizing and communicating a need as an enabling factor (n = 3; 50%). Barriers included not recognizing correctly performing exercises (n = 1; 17%) and having difficulty pacing exercises (n = 1; 17%). Six participants cited a barrier or facilitator relating to memory, attention, and decision processes. Two participants (33%) cited being aware of when to incorporate self-management strategies as an enabling factor. Difficulty making the decision to exercise was mentioned by two participants (n = 2; 33%).

Opportunity

Table 3

Table 3 displays domains, operational definitions, and corresponding themes relating to environmental context and resources, as well as social influences to enact self-management behaviors for BRLP. A facilitator or barrier related to environmental context and resources was cited by 38 participants (95%). Majority of participants cited the atmosphere created by staff as a facilitator for seeking treatment (n = 21; 53%). Others described the exercise schedule (n = 10; 26%) such as the progressive increase in difficulty, and portability of exercises allowing their use anywhere (n = 7; 25%). Lesser mentioned were affordability of treatment (n = 5; 13%), finding handouts helpful (n = 5; 13%), and flexibility of scheduling (n = 5; 13%). Environmental barriers were mentioned by 19 participants. Twelve participants cited time constraints as a barrier, often described as impacting performing exercises (32%). The driving distance to appointments (n = 3; 8%), the exercise schedule in terms of number of prescribed exercises (n = 2; 5%), lacking video or in-person visual demonstration (n = 2; 5%), and having space constraints for performing exercises (n = 2; 5%) were additional barriers.

Twenty-four participants (60%) mentioned a barrier or facilitator related to social influences, with each of the 24 (100%) citing a facilitator and 2 of the 24 participants (8%) citing a barrier. All facilitators were related to the influences of practitioners in the trial. The therapeutic alliance was cited as a facilitator by 22 of the 24 participants (92%) and was often described as practitioners as being caring, competent, professional, honest, and able to adapt. Barriers were less frequently mentioned in this domain with 1 participant (n = 1; 4%) citing family opinions, and 1 participant a break in the therapeutic alliance (n = 1; 4%).

Motivation

Table 4

Table 4 displays domains, operational definitions, and themes related to automatic and reflective motivation. Reinforcement was cited by 21 participants (53%) as either a facilitator or barrier. The effectiveness of exercises encouraging continuation of utilizing exercises was described by 12 participants (57%). Similarly, effectiveness of treatments was cited by 4 participants (19%) as a facilitator. Pain was described as both a facilitator and barrier to self-management. As facilitator, pain was described as prompting engaging in self-management strategies by 2 participants (10%). Pain posed a barrier for 5 participants (24%) with pain upon exercising discouraging engaging.

Goals as a facilitator or barrier was discussed by 37 participants (93%). Thirty-six participants (97%) cited a goal as a facilitator. Goals included reducing pain (n = 29; 78%), general improvement (n = 8; 22%), moving easier (n = 7; 19%), improving strength (n = 4; 11%), improving sleep (n = 3; 8%), increase ability for exercising (n = 3; 8%), improving health (n = 2; 5%), increasing activity levels (n = 2;5%), losing weight (n = 2; 5%), improving muscular restrictions/contractures (n = 1; 3%), less stiffness (n = 1; 3%), and maintaining current level of BRLP (n = 1; 3%). Barriers in this domain included not setting goals or expectations and were mentioned by 6 participants (16%).

Optimism was cited as a barrier or facilitator by 33 participants (84%). Having confidence in the efficacy of chiropractic treatments was discussed by 13 participants (40%), while 9 participants (27%) cited lacking confidence in the chiropractic treatments helping as a barrier. Confidence in efficacy of exercises were discussed by 7 participants (21%). Three participants (9%) discussed their own confidence in ability to self-manage as a facilitator.

Twenty-nine participants (73%) discussed a barrier or facilitator related to beliefs about consequences, with 24 participants (83%) citing a facilitator and 10 a barrier (34%). Beliefs about consequences enabling self-management included believing exercises will reduce pain (n = 11; 38%), exercising will result in general health progress (n = 9; 31%), and chiropractic treatment will result in general health progress (n = 4; 14%). Barriers included participants believing, because of their type of condition, that nothing will help their pain (n = 3; 10%). Others believed not having chiropractic care would have led to less or no improvement in their condition (n = 3; 10%), or that chiropractic treatment focused on the low back was less beneficial (n = 1; 3%).

Figure 1

Table 5

Intentions for self-management was mentioned by 16 participants (40%). No participants cited a barrier in this area. Intentions included continuing exercising (n = 13; 81%), being disciplined in completing exercises (n = 3; 19%), resuming exercising (n = 1; 6%), seeking additional treatment (n = 1; 6%), and continuing weight loss (n = 1; 6%).

Intervention functions and behavior change techniques Intervention functions found to be relevant to identified barriers are displayed in Figure 1. All 9 IFs described in the BCW were identified. The most common IFs identified were modelling and education.

Restriction, incentivization, and coercion were the least common intervention functions. No IFs linked to the TDF category ‘intentions’ were identified as no barriers existed in this domain. Behavior change techniques corresponding to each intervention function and considered appropriate by an author applying clinical judgment and the APEASE criteria are displayed in Table 5.

Discussion

This study identified barriers and facilitators for participants engaging in BRLP self-management activities within the context of a controlled clinical trial, and linked barriers to theory-informed behavior change intervention elements. A previous qualitative study utilizing interviews from the same treatment arm of the larger controlled clinical trial explored participant satisfaction with and perceptions of the SMT + HEA treatment arm. When participants discussed their satisfaction, they considered study factors such as interactions with providers and research staff, perceived treatment effects of both the chiropractic treatments and home exercise program, structure of the exercise program, and information received. [40] Similar factors were identified in the current study including the positive social influence of providers, environmental atmosphere created by staff, beliefs that engaging in chiropractic treatment or exercise will reduce pain or result in general health progress and finding exercise handouts and the schedule as facilitating engaging in self-management. The current study utilizes a different lens allowing for mapping of identified factors using an established theory-informed method that moves findings towards practical application.

Figure 2

This study utilized a theory-informed, established model for describing and intervention mapping addressing barriers and facilitators to self-managing BRLP. This process allowed establishing a behavioral diagnosis by identifying patient needs through barriers and facilitators, what is needed to meet their needs (IFs) and how this may be accomplished (BCTs) in a way facilitating behavioral change (Figure 2). [30] Our findings contribute implications for the role of providers engaging with persons experiencing BRLP.

Participants in our study were found to need education (“increasing knowledge or understanding”) and persuasion (“using communication to induce positive or negative feelings or stimulate action”). [30] Linked BCTs reveal this can be accomplished through providing information such as the nature of chronic pain and BRLP, as well as the consequences of self-managing. Education and persuasion can also be affected through boosting patient’s self-efficacy and personal views of capability through verbal persuasion. Utilizing these techniques requires providers engage in clear communication as part of a strong provider-patient partnership. [20, 23, 24, 47] While education is commonly recommended by guidelines [15–18], our findings suggest greater emphasis is needed spanning more than general education about health conditions.

This study found participants also needed incentivization (“creating an expectation of reward”) and coercion (“creating an expectation of punishment or cost”). [30] Linked BCTs demonstrate affecting incentivization and coercion may be achieved through providing feedback on behaviors and the outcomes of behavior. [30] This may include providing feedback on exercises, activities interfering with engaging with self-management, and behavior outcomes such as soreness or pain after exercising. While coercion is defined as “creating an expectation of punishment or cost” [30], in the current context it may be an avenue for providers being frank with patients regarding evidence-based information about long-term health costs of inactivity or unhealthy behaviors. Providers can also offer patients tools for facilitating self-monitoring of behaviors, including paper logs or web-based tools, or digital application. [48–50]

Participants were found to need training (“imparting skills”). [30] The linked BCTs revealed accomplishing this, can occur through demonstrating the desired behavior, such as how to perform the exercise in addition to providing instructions. For instance, this study found participants believed the printed handouts were helpful, but some still required video or in-person demonstration. For example, providers should allow time and space for allowing patients to practice behaviors in office, facilitating immediate feedback on the behavior. Following up and monitoring in subsequent visits with additional feedback on both the behavior and outcome can also be used, requiring practitioners to check in with patients on a regular basis. [51] One technique is to employ graded tasks (e.g. choosing appropriate exercises and increasing doses, difficulty, etc.) that can also be used for gradually developing physical skills and overcoming fear of movement or pain. [52] Breaking exercises into achievable components is a person-centered approach, meeting patients where they are with the potential for reducing anxiety, increasing adherence, and trust in providers0. [53–56]

Enablement (“increasing means/reducing barriers to increase capability or opportunity”) was also needed. [30] Associated BCTs show affecting enablement could be done through social support, and problem solving. Additionally, providers can enable their patients by working with them to establish both behavioral and outcome driven goals. Once goals are created, reviewing goals and creating a plan of action can be utilized for facilitating the meeting of goals. One well-recognized method of goal setting involves the use of the acronym SMART; creating goals that are specific, measurable, achievable, relevant and time-bound. [57, 58] Enabling patients also occurs through the provision and facilitation of social support. Social support may be in the form of family, friends, or from the provider by establishing a strong therapeutic alliance with the patient through communication and responding to patient needs. [59]

Strengths

This study has several strengths including the use of a comprehensive and established behavioral model to aid in identifying BRLP patients’ behavioral needs and matching them to provider based solutions that could be applied in practice. It is also the first study exploring BRLP self-management from a behavioral perspective. Utilizing behavior change diagnoses in addition to the clinical diagnosis, permits development and testing of theory-informed self-management interventions with elevated methodological rigor and intervention fidelity. Utilizing the BCW approach consolidates the different definitions of self-management, used in this research [29, 60] and may improve the small effect sizes typically reported from self-management trials which precludes guideline authors from making strong recommendations on strategies to improve self-management by patients experiencing BRLP. [19, 29]

Limitations

The context and constraints of this study pose several limitations. This study was conducted as a secondary analysis. As such, the interview schedule was not designed for our specific research purpose. Different barriers and additional facilitators may have been identified with a tailored interview schedule. The depth and breadth of answers within the interviews were, at times, limited. This may have affected how often barriers and facilitators mapping to more complex TDF domains were identified. As a secondary analysis this study contained a singular data sources (interviews), and relies on documentation of the original study for describing the original research context and participants impacting the trustworthiness component. However, our sampling strategy of selected transcripts was random, methods were congruent with well documented theory informed processes, and coding involved peer debriefing and verification within consensus meetings.

Participants were provided 12 weeks of care within the context of a clinical trial, enrolling participants between the years 2007–10, which included informational resources, spinal manipulative therapy, and guided home exercises. While providers did individualize instruction within the constraints of the study protocol which included practice and spine positioning awareness related to their activities of daily living, these interventions may not reflect clinical care received in community-based settings or within today’s current sociocultural context.

Conclusion

This study identified barriers and facilitators to engaging in self-management for participants in a pragmatic, randomized clinical trial. A rigorous systematic intervention mapping process utilizing a theory-informed behavior change approach, Michie et al.’s BCW was used for describing what participants need and how their needs may be met [21]; providing insight into the role back pain providers had in facilitating self-management. These findings may support the design of future self-management interventions for persons experiencing BRLP.

Supplementary Material

Additional File 1 Interview Schedule (13.3KB, docx)

Additional File 2 Codebook (16.8KB, docx)

Abbreviations

LBP = Low back pain

BRLP = Back-related leg pain

CPG = Clinical practice guideline

BCW = Behavior change wheel

SMT = Spinal manipulative therapy

HEA = Home exercise and advice

SRQR = Standards for Reporting Qualitative Research

TDF = Theoretical Domains Framework

COM-B = Capability, Opportunity, Motivation Behaviour Model

IF = Intervention function

APEASE = Affordability, practicability, effectiveness and cost-effectiveness, acceptability, side effects/safety and equity

BMI = Body mass index

SMART = Specific, measurable, achievable, relevant and time-bound

Author contributions

Concept development (provided idea for the research): AZ, RE

Design (planned the methods to generate the results): AZ, DT, DK, CS, RE

Supervision (provided oversight, responsible for organization and implementation, writing of the manuscript): RE, CS

Data collection/processing: AZ, DT, DK, CS, RE

Analysis/interpretation (responsible for statistical analysis, evaluation, and presentation of the results): AZ, DT, DK, CS, SS, RE

Literature search (performed the literature search): AZ

Writing (responsible for writing a substantive part of the manuscript): AZ, DT, DK, CS, SS, GB, RE

Critical review (revised manuscript for intellectual content, this does not relate to spelling and grammar checking): AZ, DT, DK, CS, SS, GB, RE.

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Ethics approval and consent to participate

The clinical trial from which these data were obtained was approved by the Institutional Review Boards at Northwestern Health Sciences University and Palmer College of Chiropractic and registered with clinicaltrials.gov (NCT00494065). Trial participants provided written informed consent. The current study was deemed exempt by the University of Minnesota Institutional Review Board (11/08/2021, STUDY00014393).

Competing interests

Competing interests The authors declare no competing interests.

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