Est. 1841 | YORK ST JOHN UNIVERSITY

Gregersen, Mette H.M., Hartvigsen, Lisbeth, Andersen, Tonny Elmose, Hartvigsen, Jan, Hubeishy, Maja Husted, Ntoumanis, Nikos, Rolving, Nanna and Kongsted, Alice (2027) Motivational support for self-management of low back pain in health care: Co-design of a dialogue tool. Patient Education and Counseling, 154. p. 110363.

Downloaded from: https://ray.yorksj.ac.uk/id/eprint/16386/

The version presented here may differ from the published version or version of record. If you intend to cite from the work you are advised to consult the publisher's version: https://doi.org/10.1016/j.pec.2026.110363

Research at York St John (RaY) is an institutional repository. It supports the principles of open access by making the research outputs of the University available in digital form. Copyright of the items stored in RaY reside with the authors and/or other copyright owners. Users may access full text items free of charge, and may download a copy for private study or non-commercial research. For further reuse terms, see licence terms governing individual outputs. Institutional Repositories Policy Statement

RaY

Research at the University of York St John

For more information please contact RaY at ray@yorksj.ac.uk

Patient Education and Counseling 154 (2027) 110363

Contents lists available at ScienceDirect

Patient Education and Counseling

journal homepage: www.journals.elsevier.com/patient-education-and-counseling

Motivational support for self-management of low back pain in health care: Co-design of a dialogue tool☆

Mette H.M. Gregersen [a], Lisbeth Hartvigsen [b,c], Tonny Elmose Andersen [d], Jan Hartvigsen [a,e], Maja Husted Hubeishy [f], Nikos Ntoumanis [g,h,i], Nanna Rolving [f,j], Alice Kongsted [a,e,g,*], on behalf of the LBP dialogue tool user panel.

[a] Center for Muscle and Joint Health, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense M, Denmark
[b] The Practice Unit, Region of Southern Denmark, Vejle, Denmark
[c] Private chiropractic and physiotherapy clinic 'Hartvigsen & Hein', Odense, Denmark
[d] Department of Psychology, University of Southern Denmark, Odense M, Denmark
[e] Chiropractic Knowledge Hub, Odense M, Denmark
[f] Department of Physiotherapy and Occupational Therapy, Aarhus University Hospital, Aarhus, Denmark
[g] Danish Centre for Motivation and Behaviour Science, Department of Sports Science and Clinical Biomechanics, University of Southern Denmark, Odense, Denmark
[h] School of Sport, Exercise and Rehabilitation Sciences, University of Birmingham, United Kingdom
[i] School of Education, Language and Psychology, York St. John University, United Kingdom
[j] Department of Public Health, Aarhus University, Aarhus, Denmark

ARTICLE INFO

Keywords:
Low back pain
Self-management
Patient-centered care
Stakeholder participation

ABSTRACT

Objectives: Implementing motivational self-management support in low back pain care remains challenging due to barriers including health care professionals' limited confidence in addressing behavioural aspects of pain, people with low back pain's expectations, and time constraints. To promote person-centered low back pain care, this project engaged people with low back pain, health care professionals, and researchers in a co-design process to develop a dialogue tool aimed at supporting motivational conversations and facilitating self-management.

Methods: Guided by Design Thinking principles, we conducted a co-design process informed by Self-Determination Theory and structured around the 5A's model for behaviour change (Assess, Advise, Agree, Assist, Arrange). The process included fieldwork, workshops, prototype development, and iterative refinements. To inform refinements, acceptability, appropriateness, and feasibility of the dialogue tool were evaluated through surveys (n = 9 health care professionals) and in semi-structured interviews with health care professionals (n = 6) and people with low back pain (n = 4).

Results: The final product was an analog tool comprising 7 dialogue sheets and 5 information postcards aligned with the 5 A's components. Both health care professionals and people with low back pain found the prototype tool acceptable and feasible for structuring person-centered conversations about pain and self-management. The most frequently used elements were those to support a person-centered assessment of pain complexity (Assess) and to provide options for managing pain (Assist). Barriers included lack of experience and need for supplementary training in the use of the dialogue tool.

Conclusions: Using a co-design process, we developed an analog dialogue tool to facilitate a person-centered approach to support self-management of low back pain. Effects of the tool and strategies for implementation are still to be tested.

Practice implications: The dialogue tool may support person-centered motivational conversations about pain beliefs, factors affecting pain, and self-management strategies linked to meaningful goals and activities.

☆ The first, second and last author reflect specific roles in the project. The remaining authors are listed in alphabetical order that reflect equal contributions. Names and affiliations of the LBP dialogue tool user panel are reported under acknowledgements

* Correspondence to: University of Southern Denmark, Campusvej 55, 5230 Odense M, Denmark.
E-mail address: akongsted@health.sdu.dk (A. Kongsted).

https://doi.org/10.1016/j.pec.2026.110363
Received 18 May 2026; Received in revised form 24 August 2026; Accepted 23 October 2026
Available online 30 October 2026
0738-3991/© 2026 The Author(s). Published by Elsevier B.V. This is an open access article under the CC BY license (http://creativecommons.org/licenses/by/4.0/).

1. Background

Low back pain (LBP) remains the leading cause of disability worldwide [1]. There is growing evidence that a person-centered self-management supportive approach to LBP can improve individuals' outcomes [2–4]. In agreement with this evidence, the World Health Organisation's guidelines for the management of chronic LBP emphasised the importance of patient-centered care, advocating for the importance of considering personal and social determinants when selecting and tailoring interventions [5]. This is expressed across clinical guidelines recommending patient education, providing a self-management plan, and addressing fear avoidance [6].

These recommendations align with the needs expressed by people who seek care for LBP. They ask for individualised care that helps them understand pain, targets their worries and circumstances, and empowers them to manage and identify helpful treatments [7]. Still, adherence to clinical practice recommendations remains suboptimal [8,9]. This is partly due to barriers expressed by health care professionals (HCPs) such as doubts about the validity and applicability of clinical guidelines, a biomedical professional identity, people's treatment expectations, and time constraints faced by HCPs [9,10]. Overcoming these challenges and developing effective and sustainable care will require behaviour change among HCPs as well as patients [11,12].

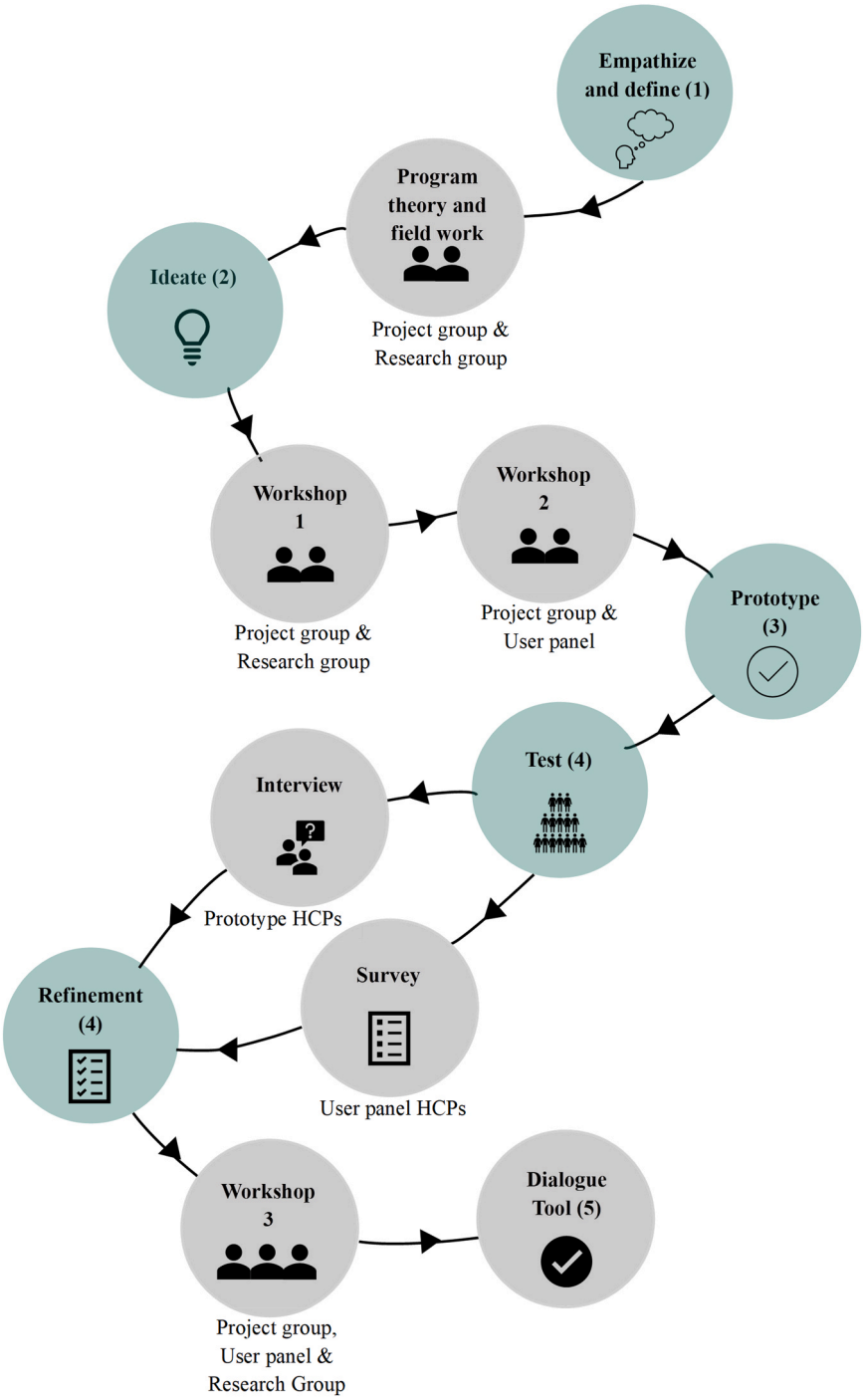


Fig. 1. Project journey of the co-design process including contributors to each step.

Helpful behaviour change for people with LBP involves re-engaging in physical and social activities. The strategies for achieving this must be driven by people's autonomous motivation. Therefore, HCPs need skills to support motivation and behaviour change as part of LBP care [13,14]. The 5 A's Behaviour Change Model (Assess, Advise, Agree, Assist, and Arrange) offers a practical framework for guiding such behaviour change counseling [15,16]. It is intended to structure communication between HCPs and patients, supporting collaborative goal setting, management planning, problem-solving, and follow-up. There is empirical evidence using the 5 A's model to guide the promotion of a healthy lifestyle as part of health care [17], and for counseling regarding physical activity [18]. Within cardiovascular disease prevention and risk management, the model has been endorsed for its ability to support patients' goal setting and ensure follow-up support by referring patients to evidence-based programs in primary care or community settings [19]. Within LBP care, counseling based on the 5 A's has shown promise to increase adherence to home-based rehabilitation [20]. To support a clinical encounter that enhances autonomous motivation for self-management among people with LBP, this project engaged people with LBP, HCPs, designers, and researchers in a co-design process to develop a 'dialogue tool' for use in clinical encounters.

2. Methods

2.1. Study framework

This co-design process was grounded in Design Thinking principles [21], an iterative process of five stages: 1) *empathise and define* with those affected by the problem to 2) *ideation*, where users contribute to generating potential solutions. Ideas that best address identified needs and are feasible within available resources are 3) developed into *prototypes* and 4) *tested* on a small scale. Insights from the tests inform refinement, potentially through multiple iterations, leading to an optimised and finalised intervention 5) ready to *implement* [22,23].

The development process from October 2024 to August 2025, including contributors to each step, is illustrated in Fig. 1.

2.2. Theory

The theoretical foundation of this work was Self-Determination Theory, which states that sustained behaviour change requires autonomous motivation (motivation driven by personal interest or personal values) and the support of three basic psychological needs: *autonomy, competence, and relatedness* [24]. The 5 A's model, which has previously been operationalised to promote these needs by mapping onto Self-Determination Theory, was chosen as the practical framework for the development process [17,25].

Although originally developed to guide behavioural counseling for tobacco cessation, the 5 A's model has been adapted for support of disease self-management with the five components defined as: *Assess* - explore peoples' beliefs, behaviours and knowledge about their condition and strategies to manage. *Advise* - provide behaviour change advice and tailored information relating symptoms to their behaviours and beliefs. *Agree* - use shared decision-making that includes collaborative goal setting and provides people with choice. *Assist* - identify barriers, develop strategies to overcome these, and identify relevant sources of support (e.g., referral to evidence-based programs). *Arrange* - make a plan to follow-up on the set goals and action plan to support sustained change [17,26].

2.3. Organisation

A collaboration between the Region of Southern Denmark and the University of Southern Denmark was initiated to design a dialogue tool. This was part of the implementation of the region's integrated care pathway for management of LBP which emphasises self-management support as a key component of LBP care [27].

The *project group* consisted of a spinal health consultant from the Region of Southern Denmark (LH), the research primary investigator (AK) and a research assistant (MHMG) from the University of Southern Denmark, and two designers (SP and MLA) from the Health Innovation Centre of Southern Denmark. The *Health Innovation Centre* facilitated the design process based on their expertise in user involvement processes and translating ideas into useful and feasible designs in healthcare system [28].

The *research group* included researchers with expertise in clinical musculoskeletal pain (AK, JH, MHH, NR), pain psychology (TEA), and behavioural science (NN).

A *user panel* comprising HCPs and people with personal experience of pain was recruited based on their interest and experience within the field of musculoskeletal pain and supported self-management. The panel included four chiropractors, three physiotherapists, three general practitioners, and two patient representatives with personal experience with chronic pain. Patient representatives were from The Association of People afflicted by Chronic Pain, Denmark (with the Danish abbreviation "FAKS"). Four of the HCPs were practice consultants employed at the Region of Southern Denmark responsible for implementing new evidence in primary care and facilitating collaboration between primary and secondary care.

Three chiropractors, two physiotherapists and one general practitioner from primary care clinics (*prototype test HCPs)* and four people consulting to them with LBP tested the prototype dialogue tool.

2.4. Intervention development

2.4.1. Empathise and define, and Ideate

2.4.1.1. Program Theory. The research group outlined a program theory stating that a successful intervention will empower people with LBP to take meaningful and helpful actions after visiting primary care, which will be reflected in reduced need for health care and increased engagement in activities that bring value to life (Fig. 2).

The mechanisms of action that were hypothesised to lead to reduced health care needs and increased engagement in activity are depicted in Fig. 2. These were based on previously identified effect mediators in LBP interventions [29–31] and mapped against the basic needs described in Self-Determination Theory. Finally, it was hypothesised which components of the 5 A's model would target each proposed mechanism, confirming that the model would cover the intention of the dialogue tool.

The content of the 5 A's components was linked to behaviour change techniques and communication styles within the Behavioural Change Intervention Ontology's (BCIO). Further, we linked our hypothesised mechanisms of action to those listed in the BCIO Mechanisms of Action ontology (Supplementary File A).

2.4.1.2. Field work. As the first step of empathising and defining, designers from the project group observed one consultation at a chiropractor and one at a physiotherapist clinic to experience an example of the context, challenges, and needs in practice.

2.4.1.3. Workshops. Specific needs and ideas for the type and content of tools to be developed were generated through two workshops using personas and realistic user journeys [32,33]. We held separate workshops with researchers and the user panel to avoid a skewed power balance that might deter users from engaging and sharing their perspectives freely.

In Workshop 1, the project and research group decided on personas representing different profiles of people with LBP. The personas were based on fieldwork and inspired by patient cases in a regional campaign about back pain [34]. User journeys were outlined that illustrated interactions between the personas and the health care system likely to occur after LBP care seeking.

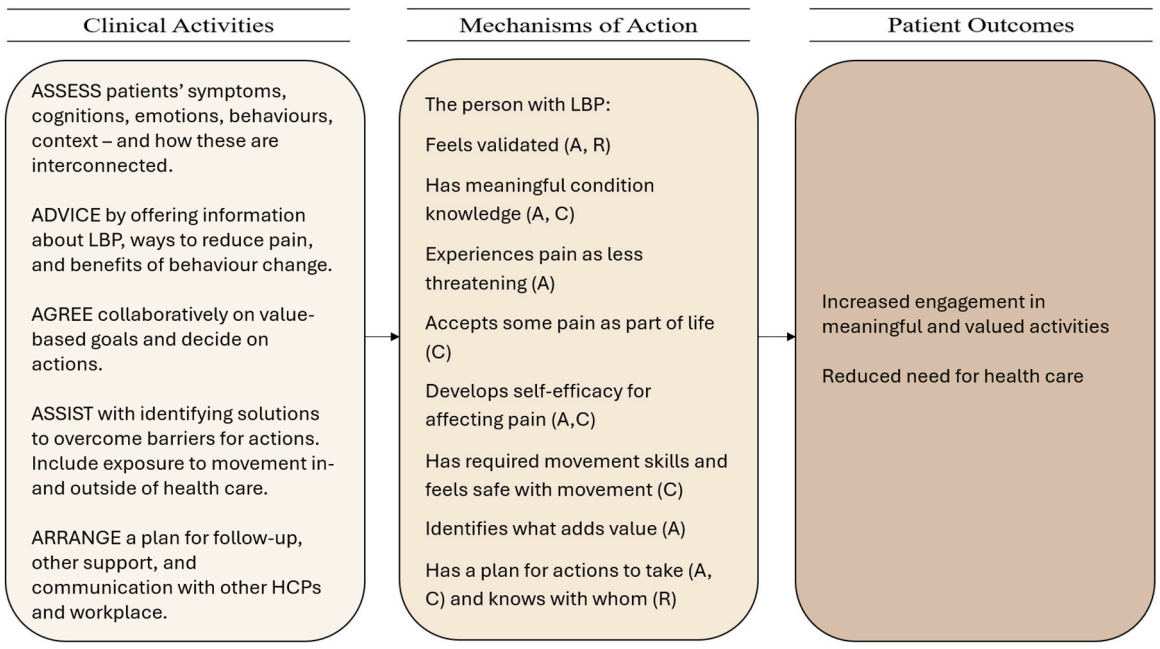


Fig. 2. Program theory hypothesizing how activities directed by the 5 A's model for behavior change lead to patient outcomes.

Workshop 2 involved the project group and the user panel. The user panel was divided into three groups, each group used one persona and a user journey to guide their discussions. The user panel identified interactions along journeys where challenges are often experienced and provided ideas for supporting a person-centered, behaviourally informed approach to care. Input was noted in template forms, capturing challenge (What is difficult at this point?), need (What are the needs of people with LBP and those of HCPs?), focus (How do we best support people with LBP at this point?), and aim (What do we want to achieve at this point?). As part of the process the panel provided suggestions for which dialogue tool content might be useful at each point. Finally, the user panel provided ideas on design and format.

2.4.2. Prototype

2.4.2.1. Merging Theory and User Input. First, all workshop input noted in the templates was categorised into themes describing problems to solve along the health care journey, potential solutions, and how HCPs might be supported in providing such solutions. Then, the research group identified relevant existing tools (e.g. tools for goal setting and metaphors for talking about LBP) and described how suggested solutions could be aligned with existing evidence. For example, it was suggested that factors affecting LBP should be explored collaboratively, rather than the HCP giving a generic explanation to the person with LBP. Finally, the designers used this material to sketch ideas for visuals and brief texts to fit the target group. These were then revised with input from the researchers in an iterative process resulting in a prototype tool.

The prototype consisted of dialogue sheets, information "postcards", and a manual explaining the intended use of each tool to HCPs. This was professionally printed on cardboard.

2.4.3. Test

The prototype was tested for two weeks by the *prototype test HCPs* and HCPs on the user panel.

We performed semi-structured interviews with the prototype test HCPs and people with LBP who had consulted them. The HCPs from the user panel completed a survey. Both interviews and surveys were informed by the Acceptability of Intervention Measure, Intervention Appropriateness Measure, and Feasibility of Intervention Measure [35,36], and the APEASE criteria (Appropriateness, Practicability, Effectiveness, Affordability (not considered), Side-effects, Equity) [37].

2.4.3.1. Interviews with prototype test HCPs and people consulting them. After the testing period, interviews were conducted with *prototype test HCPs* and people who had consented to be contacted for an interview about their consultation. The sample size was pragmatically determined by what was practical within time constraints and considered sufficient for a small-scale usability test. The interviews were individual semi-structured video interviews conducted by the research assistant (MHMG) and a designer, guided by an interview guide (Supplementary File B). The designer had prior experience with user interviews and conducted the first two interviews while the research assistant observed and then conducted the remaining interviews. The interviews covered HCPs' experiences with the dialogue tool, including acceptability, appropriateness and perceived feasibility across clinical situations and patient groups. Furthermore, they elaborated on the reasons for use or non-use of individual tools and on the impact of the dialogue tools on consultation flow, implementation potential, and areas for improvement. People consulting for LBP were asked questions related to acceptability, appropriateness and feasibility (Supplementary File B).

All interviews were audio-recorded and transcribed. The data were analysed by the two interviewers using a deductive descriptive qualitative approach [38] with the purpose of summarising user feedback on acceptability, appropriateness, feasibility, perceived effect, and unintended effects to inform refinement of the dialogue tool. One interviewer conducted the initial coding, which was subsequently reviewed by the second interviewer. The interviewers then collaboratively developed the final summary of the findings.

2.4.3.2. Survey for the user panel. HCPs on the user panel received a link to an online SurveyXact survey with 18 items asking to what degree the HCPs found the dialogue tool acceptable, appropriate, feasible and recommendable (Supplementary File C). Additionally, respondents were asked which part of the dialogue tool they had used and factors potentially influencing tool adoption, such as time, the patient, and competencies. They had the option to elaborate in open-ended questions

explaining whether and why any parts were particularly useful, why they did not use some elements, the need for additional elements, expected consequences, and if modification of wording was needed. Lastly, they were asked about the user manual and their self-efficacy for using the materials.

2.4.4. Refinement

2.4.4.1. Workshop 3. Workshop 3 included the project group, the user panel and the research group and aimed to revise each element of the prototype based on input from the test phase. The results from the test phase were first presented. Participants then worked in groups to provide detailed suggestions for amendments by writing their ideas on each of the printed tools.

All input from the workshop was summarised by AK, MHMG, and LH and used by the project group to finalise the dialogue tool.

3. Results

3.1. Personas and User Journeys

Three personas with different LBP histories and profiles were constructed, representing one male and two females aged 27–57 years, with different ethnicities and private circumstances.

The identified challenges and needs were primarily associated with early touchpoints in the patient journey. A repeatedly identified challenge in the workshop concerned the substantial variability in the information provided to people with LBP, both from multiple HCPs and from external sources such as social media. This inconsistency contributed to uncertainties about the causes of LBP and management options. To address this, consensus emerged across user panel groups that educational tools should standardise communication among HCPs, foster trust between HCPs and people with LBP, and facilitate an approach guided by people's goals rather than a biomedical diagnosis. Another important target highlighted by the panel was people's fearful thoughts and feelings of despair. Proposed strategies to mitigate these concerns emphasised active listening and fostering a shared understanding of pain, with the overarching goal of enhancing people's insights into factors affecting pain and sense of security.

Collectively, the ideation from workshop 2 generated specific suggestions for how a dialogue tool could address the identified challenges. The user panel proposed the development of a conversation card to support a person-centered assessment, including questions to better understand the individual's situation, concerns, and resources. They also suggested tools to facilitate collaborative goal setting and action planning.

3.2. Prototype

3.2.1. The dialogue tool

The prototype of the dialogue tool named 'My Back' consisted of 12 elements (Table 1). Some were dialogue sheets that combined illustrations with brief text to guide the conversation or questions and phrases as inspiration for HCPs. Others were 'postcard' formats with information for people to take home (Supplementary File D).

3.3. Test

3.3.1. Video interviews

Six prototype test HCPs (1 GP, 2 physiotherapists, 3 chiropractors) and four people consulting the HCPs were interviewed. Please refer to Supplementary File E for detailed results and interview quotes.

3.3.1.1. Acceptability. HCPs described the dialogue tool as a tangible prompt for renewed focus on self-management support and structured communication. All HCPs expressed intentions to continue using the dialogue tool after the test period. Both people with LBP and HCPs highlighted the visual appeal and official appearance. Some people with LBP noted that the visual layout made the information easier to understand and increased their confidence in the messages. Two HCPs found some of the tools to be too text heavy.

HCPs had somewhat different opinions on the print size of the tools and whether they preferred a pre-printed version sent by post or having access to printable versions. Also, one HCP would have liked the possibility of having a digital version of the dialogue tool. Three of four people with LBP mentioned the strength of having a printed version of the dialogue tool as a support for the conversation and to take home.

3.3.1.2. Appropriateness. HCPs found the dialogue tools relevant and aligned with their existing communication and reasoning practices. The visual and metaphorical elements fit naturally into their consultations and were perceived as flexible and applicable across both chronic and acute conditions, and even beyond LBP. Five HCPs appreciated the option to select elements when relevant to the individual person rather than following a fixed sequence. The dialogue tool was considered to potentially support an individualised dialogue, encouraging people with LBP to reflect on a broader range of factors influencing their pain and coping strategies. Similarly, people with LBP reported that the tool supported more comprehensive and reflective discussions during consultations.

3.3.1.3. Feasibility. The HCPs reported that the guide was well-structured and easy to understand, though comprehensive. They suggested that HCPs without prior training in communication or

Table 1
Elements of the dialogue tool linked with the 5 A's Model for Behaviour Change.

5 A Component	Tool(s)	Purpose*
ASSESS	Reflection sheet: No. 1: How pain affects me – for the person with LBP Dialogue cardboard: No. 2: How pain affects me – for the clinician	To facilitate person-centered assessment and support autonomy by uncovering the personal experience of LBP. To support competence by providing insights into links between cognitions, emotions, behaviors, and context. A take-home sheet is intended to help people reflect on their needs, barriers, and experiences between consultations.
ADVICE	Dialogue cardboards: No. 3: Activity level No. 4: Trajectories of back pain No. 6: Imaging Information postcards: No. 8: The cup metaphor No. 9: The balance metaphor No. 10: Hearing aid metaphor No. 11: Alarm system metaphor	To support autonomy and competence by helping people understand what affects pain, prognosis, coping strategies, and the limited usefulness of imaging.
AGREE	Dialogue cardboard: No. 5a: Goal setting	To support autonomy and relatedness by facilitating a dialogue about their valued goals.
ASSIST	Dialogue cardboard: No. 7: What I can do Information postcard: No. 12: People who can help me	To support autonomy and relatedness by helping people identify resources, treatment options, and options for social support.
ARRANGE	Dialogue cardboard: No. 5b: Action planning	To support competence and relatedness by facilitating a dialogue about options for pursuing goals, deciding on actions, and agreeing on a follow-up plan.

* According to the Self-Determination Theory, autonomy, competence, and relatedness are basic psychological needs and drivers of autonomous motivation (22).

biopsychosocial approaches might benefit from supplementary instruction or training. All elements were used by at least one HCP. To use all elements in the dialogue tool effectively, HCPs expressed that they needed to feel more competent through a larger experience with each element. Some also mentioned a need for extra time with the people with LBP to use the dialogue tool.

3.3.2. Survey

Eight HCPs (1 GP, 3 physiotherapists, 4 chiropractors) from the user panel along with the spinal health consultant from the project group, tested the tool and responded to the survey.

Overall, the HCPs reported high satisfaction, feasibility and relevance of the dialogue tool, and all reported intending to continue using it (Table 2).

The most used elements were *Trajectories of back pain*, *Activity level*, and *Imaging*, although all elements had been used by at least one HCP. Use of the dialogue tool was reported to depend on factors such as type of person, availability, habituation, and the HCP's skills and confidence. All survey responses are found in Supplementary File F.

In open text comments, the dialogue tool was described as clear and adaptable to individual people with LBP, though two HCPs suggested including more content on risk factors for chronicity and the influence of emotional and social factors. Most HCPs from the user panel felt confident using the dialogue tool, noting that further experience and practice would enhance confidence.

3.3.3. The dialogue tool

Only minor amendments were made to the prototype (Supplementary File D). The most significant change was for "People who can help me" which was altered from a dialogue cardboard to be an information postcard for use also outside of the consultation. In addition, the label "My Back" was removed from the dialogue tool because it was agreed that the tools would be relevant also for other musculoskeletal pain conditions.

Table 2
Survey responses from HCPs.

	Number of HCPs (n = 9)
Overall satisfaction with the dialogue tool	
Very dissatisfied	0
Dissatisfied	0
Neither satisfied nor dissatisfied	0
Satisfied	5
Very satisfied	4
Feasibility in clinical practice	
Very difficult to use	0
Difficult to use	0
Moderately usable	1
Easy to use	5
Very easy to use	3
Relevance of the dialogue tool	
Not at all relevant	0
Not relevant	0
Somewhat relevant	0
A little relevant	3
Very relevant	6
Recommendation to other HCPs	
Very low degree	0
Low degree	0
Moderate degree	1
High degree	5
Very high degree	3
Confidence in using the dialogue tool	
Very unconfident	0
A little unconfident	0
Neutral	2
Confident	4
Very confident	3
Future use of dialogue tool	
Yes	9
No	0

The final dialogue tool included 12 elements that are available from Supplementary File D. Six of these are sheets with illustrations to use during the consultation. For instance, an illustration to start the conversation about factors that may affect LBP, and a card with lines for writing individual goals. Four are postcard formats with metaphors explaining LBP as a multifactorial condition that patients can take home to revisit information discussed during the consultation. One postcard to take home lists resources for support within and outside of the health care system. Finally, one reflection sheet includes questions intended to help patients consider their condition, needs, and expectations between consultations. Examples are shown in Fig. 3.

The tools are to be used flexibly. Not all elements will be relevant to every patient, and they are not designed to be used in a fixed sequence. A user manual describes the intended use of each element for clinicians.

4. Discussion and Conclusion

4.1. Discussion

We developed a dialogue tool meant to enhance a person-centered, behavioural approach to support self-management for people seeking care for LBP. The aim was to facilitate a conversation that focuses on people's understanding of pain, values, and everyday activities. The tool prompts HCPs to explore people with LBP beliefs about pain, identify factors affecting pain and link self-management strategies to meaningful goals and activities. Rather than following a fixed sequence, the dialogue tool allows HCPs to select and adapt elements based on people with LBP needs.

The development process involved researchers, HCPs, people with lived experience of LBP, and designers collaborating to shape the tool's content and format. Using personas that represented realistic patient cases and their user journeys helped identify touchpoints that might have been overlooked with a researcher-driven approach alone. This collaboration resulted in close alignment between the program theory, informed by self-determination principles, and the needs identified by the user panel. By using the 5 A's model to underpin the dialogue tool, we operationalised self-determination mechanisms within clinical activities such as normalising pain experiences, collaborative goal setting, and planning that promotes individual choice.

Other resources exist that serve some of these purposes including patient education materials [7,39], and guidance on goal setting [40], promotion of physical activity [41], and person-centered assessment of LBP [42–44]. The Danish 'Thanks-for-asking Model' was incorporated directly into one of the new components. It was developed to support HCPs' assessment of thoughts, behaviours, and context in primary care consultations for LBP, but did not include patient-directed materials designed to enhance self-management [45]. Our tool integrates elements reflected in these existing resources into a coherent set of materials for both people with LBP and HCPs. It supports a process extending from assessment to care planning and follow-up and was designed to be feasible for non-specialist HCPs to implement in routine practice. To our knowledge, no existing theoretically informed musculoskeletal pain self-management tool combines these functions. Importantly, the new tool promotes self-management as a collaborative process, supporting partnerships between patients and HCPs. This responds to an identified need for patients and HCPs to engage more actively in self-management as partners rather than as recipients and providers of care [7,14,46].

Despite positive feedback on the content and visual appearance of the dialogue tool, HCPs pointed to the need for sufficient introduction or supplementary training to use it effectively to deliver self-management support. This aligns with evidence that HCPs often experience challenges delivering behaviour change interventions [16,45,47] and are challenged in adjusting their own behaviour [48]. We are in the process of developing an e-learning training course to help HCPs integrate self-management support systematically into clinical practice.

A key limitation of the development process was that the HCPs involved in the development process had substantial experience,

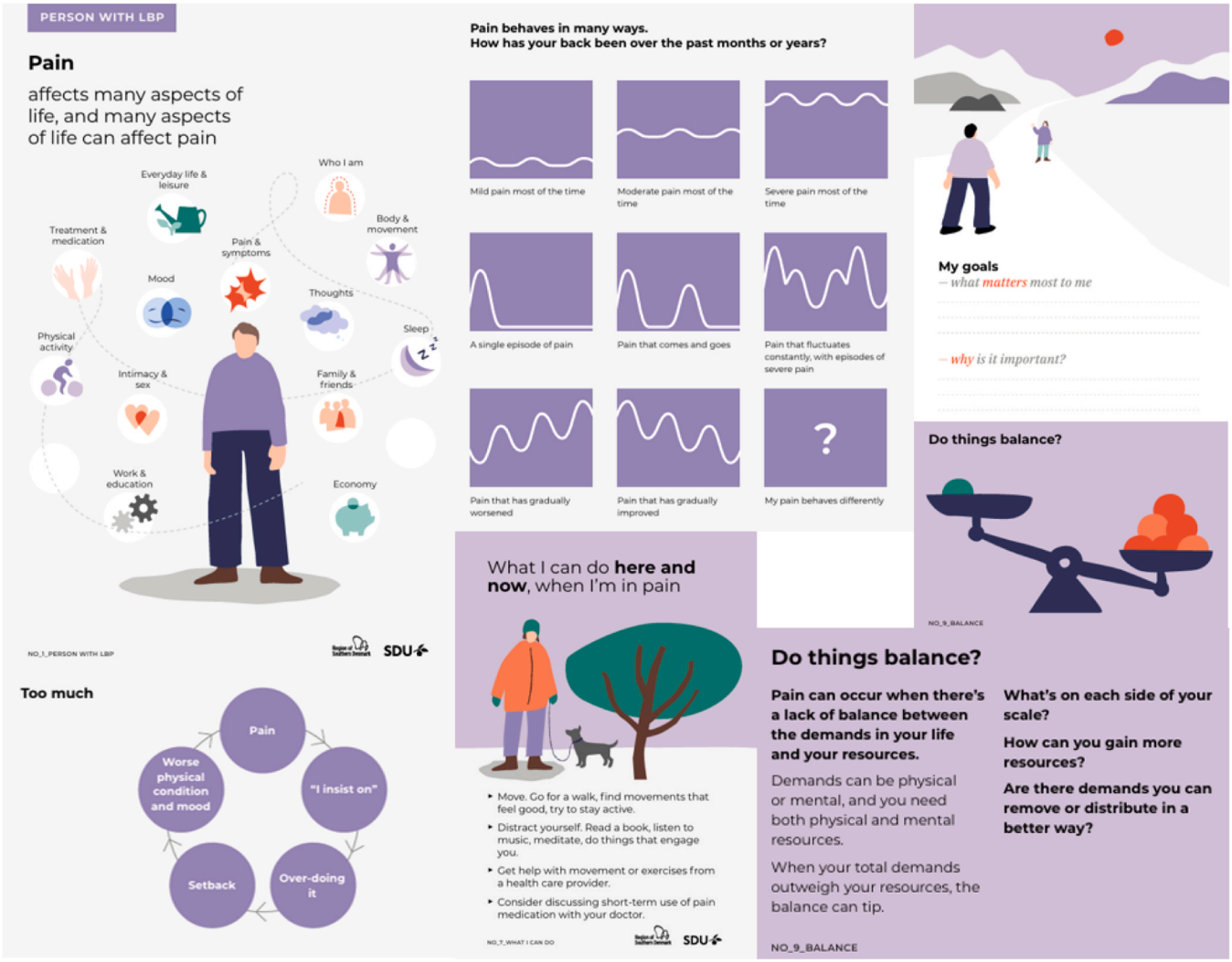


Fig. 3. Examples of elements in dialogue tool.

knowledge, and interest within LBP and were likely more receptive to a dialogue tool than HCPs in general. Only a small number of additional respondents took part in prototype testing, limiting our ability to draw conclusions about broader feasibility and acceptability. Therefore, the test should only be considered a preliminary usability test intended for obtaining rapid feedback. To understand usefulness across a wider range of clinical backgrounds and interests, the tool needs additional testing. We expect to update the dialogue tool when such testing provides findings that warrant revision. Future research should evaluate how the dialogue tool is implemented in clinical practice, as well as its impact on HCP behaviour, motivation of people with LBP, and their outcomes.

4.2. Conclusion

We co-designed a theory-informed dialogue tool intended to enhance person-centered conversations supporting self-management in LBP care. The tool was well received and perceived to support structured, person-centered dialogue. However, for it to be implemented and alter the clinical encounter, clinicians need training, organisational support, and positive incentives. Future research should investigate how this can best be achieved.

4.3. Practice implications

The dialogue tool is a freely available analog dialogue tool consisting of 12 dialogue elements that link to the 5A's model for behaviour change, designed as dialogue sheets, reflection tools, and information postcards. Although presented as a complete set of elements, clinicians are encouraged to select only tools that are considered relevant to each patient and consultation. We hope the dialogue tool will prompt exploring beliefs about pain, factors affecting pain, and linking self-management strategies to meaningful goals and activities.

Author contributions

AK, LH, NN, JH, MHH, NR, TEA conceptualised the project, MHMG, LH, TEA, JH, MHH, NN, NR, AK were part of the investigation process during workshops. AK and MHMG collected and interpreted data. MHMG drafted the manuscript. LH, TEA, JH, MHH, NN, NR, AK edited drafts of the manuscript and approved the final draft.

CRediT authorship contribution statement

Mette H.M. Gregersen: Writing – original draft, Investigation, Data curation. **Lisbeth Hartvigsen:** Writing – review & editing,

Investigation, Conceptualization. **Tonny Elmose Andersen:** Writing – review & editing, Investigation, Conceptualization. **Jan Hartvigsen:** Writing – review & editing, Investigation, Conceptualization. **Maja Husted Hubeishy:** Writing – review & editing, Investigation, Conceptualization. **Nikos Ntoumanis:** Writing – review & editing, Investigation, Conceptualization. **Nanna Rolving:** Writing – review & editing, Investigation, Conceptualization. **Alice Kongsted:** Writing – review & editing, Investigation, Data curation, Conceptualization.

Ethics declaration

Written informed consent to take part in the study and to publish the article has been obtained from all participants or their legal representatives. The privacy rights of participants have been observed.

This study was performed in compliance with relevant laws, regulatory frameworks and guidelines where the research took place. Ethics committee approval was not required under relevant laws and institutional guidelines. Health-science questionnaires and interview studies that do not involve human biological material do not require approval by the health ethics committees in Denmark (Committee Act § 14, 2).

Ethics

The HCPs involved in the field work provided informed consent prior to their involvement.

HCPs and people with LBP who took part in the testing of the prototype provided consent for the data to be used anonymously for research purposes. Health-science questionnaires and interview studies that do not involve human biological material do not require approval by the health ethics committees in Denmark (Committee Act § 14, 2).

Funding

This research did not receive any external funding from agencies in the public, commercial, or not-for-profit sectors. The development process, including salary for a research assistant at University of Southern Denmark, was financed by the Region of Southern Denmark.

Declaration of Competing Interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: Mette Holz Meinhardt Gregersen reports financial support and equipment, drugs, or supplies were provided by The Region of Southern Denmark. Alice Kongsted and Jan Hartvigsen are co-developers of GLA: D Back, a non-for-profit initiative hosted at University of Southern Denmark aimed at implementing evidence-based patient education and exercise therapy for back pain in clinical practice. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

The authors would like to thank Stine Poulsgaard, Mette Louise Andersen and Charlotte Rahr Mortensen from Health Innovation Centre of Southern Denmark for facilitating workshops and conducting the graphic design process of the dialogue tool.

Additionally, we would like to thank the participating HCPs and patients who contributed their time, experiences, and valuable feedback during the testing of the dialogue tool.

Specifically, we thank the user panel for participating in the workshops and contributing their knowledge and experience within the field. The LBP tool user panel members:

Henrik Kjældgaard[1], Inge Hvidkær[2], Jane Sidelmann[3], Lars Bye Møller[3], Lene Søndergaard[4,5], Marie Birk Thanning-Dahl[6], Mikael Busse[4], Morten Haugaard Pape[7], Rasmus Hansen[8], Signe Fuglkjær[9], Simon Nyvang Mariussen[4], Victor Ladegourdie[4].

1. General practitioner, Haderslev Medical Clinic, Haderslev, Denmark
2. Chiropractor, Chiropractors in Aarup, Aarup, Denmark
3. FAKS, The Association of People afflicted by Chronic Pain, Denmark
4. Practice consultant, Region of Southern Denmark, Denmark
5. General practitioner, Fænøsundlægerne, Middelfart, Denmark
6. Physiotherapist, Gudenådalens Fysioterapi, Bjerringbro, Denmark
7. Physiotherapist, Johnson Institute, Odense, Denmark
8. Chiropractor, Hansen & Hansen, Haderslev, Denmark
9. Chiropractor, Hartvigsen & Hein, Odense, Denmark

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2026.110363.

References

[1] Ferreira ML, de Luca K, Haile LM, Steinmetz JD, Culbreth GT, Cross M, et al. Global, regional, and national burden of low back pain, 1990–2020, its attributable risk factors, and projections to 2050: a systematic analysis of the Global Burden of Disease Study 2021. Lancet Rheumatol 2023 Jun 1;5(6):e316–29. https://doi.org/10.1016/S2665-9913(23)00098-X.

[2] Foster NE, Anema JR, Cherkin D, Chou R, Cohen SP, Gross DP, et al. Prevention and treatment of low back pain: evidence, challenges, and promising directions. Lancet Lond Engl 2018 Jun 9;391(10137):2368–83. https://doi.org/10.1016/S0140-6736(18)30489-6. PubMed PMID: 29573872.

[3] Kent P, Haines T, O'Sullivan P, Smith A, Campbell A, Schutze R, et al. Cognitive functional therapy with or without movement sensor biofeedback versus usual care for chronic, disabling low back pain (RESTORE): a randomised, controlled, three-arm, parallel group, phase 3, clinical trial. Lancet Lond Engl 2023 Jun 3;401(10391):1866–77. https://doi.org/10.1016/S0140-6736(23)00441-5. PubMed PMID: 37146623.

[4] Yang J, Lo WLA, Zheng F, Cheng X, Yu Q, Wang C. Evaluation of Cognitive Behavioral Therapy on Improving Pain, Fear Avoidance, and Self-Efficacy in Patients with Chronic Low Back Pain: A Systematic Review and Meta-Analysis. Pain Res Manag 2022;2022:4276175. https://doi.org/10.1155/2022/4276175. PubMed PMID: 35345623; PubMed Central PMCID: PMC8957446.

[5] World Health Organization. WHO guideline for non-surgical management of chronic primary low back pain in adults in primary and community care settings. Geneva. 2023.

[6] McKenzie BJ, Haas R, Ferreira GE, Gorelik A, Cyril S, Han JX, et al. Agreement between high-quality clinical practice guidelines in their treatment recommendations for low back pain: A systematic review. Spine J J North Am Spine Soc 2025;101130732. https://doi.org/10.1016/j.spinee.2025.07.015.

[7] Kongsted A, Larsen AC, Gregersen MHM, Andersen TE, Hoegh M, Kjaer P, et al. Patient education for chronic musculoskeletal pain: a scoping review of recommendations, effectiveness, and educational content. Chiropr Man Ther 2026 Jan 2. https://doi.org/10.1186/s12998-025-00614-y. PubMed PMID: 41484990.

[8] Lim YZ, Chou L, Au RT, Seneviwickrama KMD, Cicuttini FM, Briggs AM, et al. People with low back pain want clear, consistent and personalised information on prognosis, treatment options and self-management strategies: a systematic review. J Physiother 2019 Jul;65(3):124–35. https://doi.org/10.1016/j.jphys.2019.05.010. PubMed PMID: 31227280.

[9] Slade SC, Kent P, Patel S, Bucknall T, Buchbinder R. Barriers to Primary Care Clinician Adherence to Clinical Guidelines for the Management of Low Back Pain: A Systematic Review and Metasynthesis of Qualitative Studies. Clin J Pain 2016 Sep;32(9):800–16. https://doi.org/10.1097/AJP.0000000000000324. PubMed PMID: 26710217.

[10] Hubeishy MH, Rolving N, Poulsen AG, Jensen TS, Rossen CB. Barriers to the use of clinical practice guidelines: a qualitative study of Danish physiotherapists and chiropractors. Disabil Rehabil 2024 Jan;46(1):105–14. https://doi.org/10.1080/09638288.2022.2157501. PubMed PMID: 36537245.

[11] Hartvigsen J, Kamper SJ, French SD. Low-value care in musculoskeletal health care: Is there a way forward? Pain Pract J World Inst Pain 2022 Sep;22(2(2):65–70. https://doi.org/10.1111/papr.13142. PubMed PMID: 36109843; PubMed Central PMCID: PMC9545107.

[12] Shelton JD. The 6 domains of behavior change: the missing health system building block. Glob Health Sci Pract 2013 Aug 14;1(2):137–40. https://doi.org/10.9745/GHSP-D-13-00083. PubMed PMID: 25276524; PubMed Central PMCID: PMC4168572.

[13] Wood L, Foster NE, Dean SG, Booth V, Hayden JA, Booth A. Contexts, behavioural mechanisms and outcomes to optimise therapeutic exercise prescription for persistent low back pain: a realist review. Br J Sports Med 2024 Jan;(4). https://doi.org/10.1136/bjsports-2023-107598. PubMed PMID: 38176852.

[14] Linton SJ, O'Sullivan PB, Zetterberg HE, Vlaeyen JWS. The "future" pain clinician: Competencies needed to provide psychologically informed care. Scand J Pain 2024 Jan 1;24(1). https://doi.org/10.1515/sjpain-2024-0017.

[15] Glasgow RE, Goldstein MG, Ockene JK, Pronk NP. Translating what we have learned into practice: Principles and hypotheses for interventions addressing multiple behaviors in primary care. Am J Prev Med 2004 Aug 1;27(2):88–101. https://doi.org/10.1016/j.amepre.2004.04.019.

[16] Orleans Whitlock EP, Pender CT, Allan N. J. Evaluating primary care behavioral counseling interventions: an evidence-based approach. Am J Prev Med 2002 May; 22(4):267–84. https://doi.org/10.1016/s0749-3797(02)00415-4. PubMed PMID: 11988383.

[17] Kris-Etherton PM, Petersen KS, Després JP, Anderson CAM, Deedwania P, Furie KL, et al. Strategies for Promotion of a Healthy Lifestyle in Clinical Settings: Pillars of Ideal Cardiovascular Health: A Science Advisory From the American Heart Association. Circulation 2021 Dec 14;144(24):e495–514. https://doi.org/10.1161/CIR.0000000000001018. PubMed PMID: 34689589.

[18] Guerra PH, Sposito LAC, da Costa FF, Fermino RC, Papini CB, Rech CR. Effectiveness of the 5A Counseling Model-Based Interventions on Physical Activity Indicators in Adults: A Systematic Review. Behav Sci 2023 Jun;13(6):476. https://doi.org/10.3390/bs13060476.

[19] Laddu D, Ma J, Kaar J, Ozemek C, Durant RW, Campbell T, et al. Health Behavior Change Programs in Primary Care and Community Practices for Cardiovascular Disease Prevention and Risk Factor Management Among Midlife and Older Adults: A Scientific Statement From the American Heart Association. Circulation 2021 Dec 14;144(24):e533–49. https://doi.org/10.1161/CIR.0000000000001026.

[20] Lonsdale C, Hall AM, Murray A, Williams GC, McDonough SM, Ntoumanis N, et al. Communication Skills Training for Practitioners to Increase Patient Adherence to Home-Based Rehabilitation for Chronic Low Back Pain: Results of a Cluster Randomized Controlled Trial. 04/02 edn. 2017 Sep Arch Phys Med Rehabil 2017; 98(9):1732–1743.e7. https://doi.org/10.1016/j.apmr.2017.02.025.

[21] Gupta R. Princ Pract Des Think 2025. https://doi.org/10.13140/RG.2.2.11453.78566.

[22] Roberts JP, Fisher TR, Trowbridge MJ, Bent C. A design thinking framework for healthcare management and innovation. Healthc Amst Neth 2016 Mar;4(1):11–4. https://doi.org/10.1016/j.hjdsi.2015.12.002. PubMed PMID: 27001093.

[23] Altman M, Huang TTK, Breland JY. Design Thinking in Health Care. E117 Prev Chronic Dis 2018 Sep 27;15. https://doi.org/10.5888/pcd15.180128.

[24] Ntoumanis N., Moller A.C..(n.d.) Facilitating health behavior change: a self-determination theory perspective. In: Ryan R.M., Deci E.L., editors. The Oxford Handbook of Self-Determination Theory. 2nd edn. Oxford University Press.

[25] Murray A, Hall AM, Williams GC, McDonough SM, Ntoumanis N, Taylor IM, et al. Effect of a self-determination theory-based communication skills training program on physiotherapists' psychological support for their patients with chronic low back pain: a randomized controlled trial. Arch Phys Med Rehabil 2015 May;96(5): 809–16. https://doi.org/10.1016/j.apmr.2014.11.007. PubMed PMID: 25433220.

[26] Russell E, Glasgow, Whitlock EP. 5 A'S Behav Change Model Adapt Self-Manag Support Improv [Internet] [cited 2025 Nov 7. https://cffound.org/2020/wp-content/uploads/2025/03/24.-M-Behavior-Change-Model.pdf (Available from).

[27] Tværsektorielt forløbsprogram for borgere med lænderygbesvær – samarbejde og kommunikation [Internet]. Damhaven 12. 7100 Vejle: Region Syddanmark; 2023. Available from: https://regionsyddanmark.dk/media/mkfjkply/h%C3%B8ringsudkast_tv%C3%A6rsektorielt-forl%C3%B8bsprogram-for-borgere-med-l%C3%A6nderygbesv%C3%A6r-i-region-syddanmark.pdf.

[28] Health Innovation Centre of Southern Denmark [Internet]. [cited 2025 Jan 5]. Available from: https://syddansksundhedsinnovation.dk/en.

[29] Fordham B, Ji C, Hansen Z, Lall R, Lamb SE. Explaining How Cognitive Behavioral Approaches Work for Low Back Pain: Mediation Analysis of the Back Skills Training Trial. 08/24 edn. 2017 Sep 1 Spine Phila Pa 1976 2017;42(17): E1031–e1039. https://doi.org/10.1097/brs.0000000000002066.

[30] Alaiti RK, Castro J, Lee H, Caneiro JP, Vlaeyen JWS, Kamper SJ, et al. What Are the Mechanisms of Action of Cognitive-Behavioral, Mind-Body, and Exercise-based Interventions for Pain and Disability in People With Chronic Primary Musculoskeletal Pain?: A Systematic Review of Mediation Studies From Randomized Controlled Trials. Clin J Pain 2022 Jul 1;38(7):502–9. https://doi.org/10.1097/AJP.0000000000001047. PubMed PMID: 35686580.

[31] Bishop F, Al-Abbadey M, Roberts L, MacPherson H, Stuart B, Carnes D, et al. Direct and mediated effects of treatment context on low back pain outcome: a prospective cohort study. BMJ Open 2021 May 18;11(5):e044831. https://doi.org/10.1136/bmjopen-2020-044831. PubMed PMID: 34006548; PubMed Central PMCID: PMC8130743.

[32] Miaskiewicz T, Kozar KA. Personas and user-centered design: How can personas benefit product design processes? Des Stud 2011 Sep 1;32(5):417–30. https://doi.org/10.1016/j.destud.2011.03.003.

[33] Stickdorn M, Schneider J. This is Service Design Thinking: Basics, Tools, Cases. John Wiley & Sons; 2012. p. 389.

[34] Din ryg er stærkere end du tror [Internet]. [cited 2025 Jul 21]. Available from: https://regionsyddanmark.dk/om-region-syddanmark/presse-og-nyheder/magasinet-sund-i-syd/tema-om-ryggen.

[35] Weiner BJ, Lewis CC, Stanick C, Powell BJ, Dorsey CN, Clary AS, et al. Psychometric assessment of three newly developed implementation outcome measures. Implement Sci IS 2017 Aug 29;12(1):108. https://doi.org/10.1186/s13012-017-0635-3. PubMed PMID: 28851459; PubMed Central PMCID: PMC5576104.

[36] Rasmussen HM, Dalsgaard JL, Hoffmann E, Moos C, Bauer EH, Hansen KK, et al. Danish translation and cultural adaptation of three implementation outcomes of healthcare innovations-acceptability, appropriateness, and feasibility. Implement Sci Commun 2025 Dec 24;7(1):14. https://doi.org/10.1186/s43058-025-00848-0. PubMed PMID: 41437128; PubMed Central PMCID: PMC12849133.

[37] Michie S., Atkins L., Gainforth H.L.. Changing Behaviour to Improve Clinical Practice and Policy. In: Dias P, Gonçalves A, Azevedo A, Lobo F, editors. In: Dias, P and Gonçalves, A and Azevedo, A and Lobo, F, (eds.) NOVOS DESAFIOS, NOVAS COMPETÊNCIAS: CONTRIBUTOS ATUAIS DA PSICOLOGIA. (pp. 41-60). Axioma - Publicações da Faculdade de Filosofia: Braga, Portugal. (2016) [Internet]. Braga, Portugal: Axioma - Publicações da Faculdade de Filosofia; 2016 [cited 2025 Oct 9]. p. 41–60. Available from: https://discovery.ucl.ac.uk/id/eprint/1536305/.

[38] Neergaard MA, Olesen F, Andersen RS, Sondergaard J. Qualitative description - the poor cousin of health research? BMC Med Res Methodol 2009 Jul 16;9:52. https://doi.org/10.1186/1471-2288-9-52. PubMed PMID: 19607668; PubMed Central PMCID: PMC2717117.

[39] Debonne C, Houdart A, Cachinho C, Ouvrier-Neyret A, Gérard T, Vaillant V, et al. Accessible Patient Education Materials for Low Back Pain Rarely Meet People's Information Needs: A Scoping Review. Musculoskelet Care 2025 Jun;23(2): e70130. https://doi.org/10.1002/msc.70130. PubMed PMID: 40444958; PubMed Central PMCID: PMC12124170.

[40] Bard-Pondarré R, Villepinte C, Roumenoff F, Lebrault H, Bonnyaud C, Pradeau C, et al. Goal Attainment Scaling in rehabilitation: An educational review providing a comprehensive didactical tool box for implementing Goal Attainment Scaling. J Rehabil Med 2023 Jun 14;55:jrm6498. https://doi.org/10.2340/jrm.v55.6498. PubMed PMID: 37317629; PubMed Central PMCID: PMC10301855.

[41] Midtgaard J, Skou ST, Bricca A. Communicating With Patients About Physical Activity. JAMA 2026 Aug 6. https://doi.org/10.1001/jama.2026.6083.

[42] mctf [Internet]. [cited 2026 Mar 10]. Musculoskeletal Clinical Translation Framework | Home. Available from: https://www.musculoskeletalframework.net.

[43] Academy E.P.C. Evoolve Pain Care Academy [Internet]. [cited 2026 Mar 10]. Clinician Resources. Available from: https://evoolvepaincare.academy/clinician-resources.

[44] International Classification of Functioning, Disability and Health (ICF) [Internet]. [cited 2026 Feb 22]. Available from: https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health.

[45] Hubeishy MH, Rossen CB, Dannapfel P, Thomas K, Jensen TS, Maribo T, et al. Developing a low back pain guideline implementation programme in collaboration with physiotherapists and chiropractors using the Behaviour Change Wheel: a theory-driven design study. Implement Sci Commun 2024 Apr 3;5(1):33. https://doi.org/10.1186/s43058-024-00568-x. PubMed PMID: 38570830; PubMed Central PMCID: PMC10993475.

[46] Slater H, Jordan JE, O'Sullivan PB, Schütze R, Goucke R, Chua J, et al. Listen to me, learn from me': a priority setting partnership for shaping interdisciplinary pain training to strengthen chronic pain care. 04/07 edn. 2022 Apr 6. Located at: 35384928 Pain 2022. https://doi.org/10.1097/j.pain.0000000000002647.

[47] Holopainen R, Simpson P, Piirainen A, Karppinen J, Schütze R, Smith A, et al. Physiotherapists' perceptions of learning and implementing a biopsychosocial intervention to treat musculoskeletal pain conditions: a systematic review and metasynthesis of qualitative studies. Pain 2020 Jun;161(6):1150–68. https://doi.org/10.1097/j.pain.0000000000001809. PubMed PMID: 31977935.

[48] Hubeishy MH, Trøstrup J, Joensen M, Thomas K, Dannapfel P, Rossen CB, et al. Can a tailored implementation programme enhance the adoption of guideline-adherent behaviour in physiotherapists and chiropractors managing patients with low back pain? An implementation study. Implement Sci Commun 2025 Dec 6;7 (1):7. https://doi.org/10.1186/s43058-025-00820-y. PubMed PMID: 41350913; PubMed Central PMCID: PMC12797829.