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Using the Behaviour Change Wheel to Develop Interventions to Promote the Adoption of Regular Exercise Practice in Patients at Risk of Low Back Pain Recurrence: The MyBack Training Programme and The MyBack Intervention Programme

Dissertação de Mestrado em Fisioterapia
Relatório de Projeto de Investigação

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Relatório do Projeto de Investigação apresentado para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Fisioterapia, área de especialização em Fisioterapia em Condições Músculo-Esqueléticas, realizada sob a orientação científica do Professor Doutor Eduardo Brazete Cruz e coorientação da Professora Susana Tinoco Duarte.

Declaro que este Relatório de Projeto de Investigação é o resultado da minha investigação pessoal e independente. O seu conteúdo é original e todas as fontes consultadas estão devidamente mencionadas no texto, nas notas e na bibliografia.

O candidato,

____

(Luís Alexandre Meneses Moniz)

Setúbal, 29 de novembro de 2022

Declaro que este Relatório de Projeto de Investigação se encontra em condições de ser apresentado a provas públicas.

O Orientador,

____

(Eduardo Brazete Cruz)

Setúbal, 29 de novembro de 2022

“Hard things will happen to us,

We will recover,

We will learn from it,

We will grow more resilient because of it,

And as long we are fortunate enough to be breathing,

We will breathe in,

Breathe through,

Breathe deep,

And breathe out.”

(T.S., 2022)

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RESUMO

Utilização do Behaviour Change Wheel para Desenvolver Intervenções Focadas na Promoção da Adoção da Prática Regular de Exercício para Utentes em Risco de Recorrência de Lombalgia: Programa de Formação MyBack e Programa de Intervenção MyBack

Alexandre Moniz, Susana Tinoco Duarte e Eduardo Brazete Cruz

Introdução: Embora o curso de um episódio de lombalgia seja favorável, as recorrências são frequentes. O exercício é sugerido como uma das estratégias mais efetivas para reduzir o risco de recorrência, no entanto os utentes não praticam exercício regularmente. Evidência recente destaca a necessidade de desenvolver intervenções informadas pela mudança comportamental, de forma a facilitar a adoção da prática regular de exercício pelos utentes, bem como a sua promoção pelos fisioterapeutas. Assim, este estudo tem por objetivo desenvolver duas intervenções informadas pela mudança comportamental para promover a adoção da prática regular de exercício em utentes em risco de recorrência de lombalgia. Especificamente, serão exploradas barreiras e facilitadores à promoção e adoção deste comportamento pelos fisioterapeutas e utentes, respetivamente. Adicionalmente, as fases do *Behaviour Change Wheel* (BCW) irão informar o desenvolvimento das intervenções.

Metodologia: Foram realizados quatro grupos focais (dois com 14 fisioterapeutas; dois com 11 utentes), baseados num guião de entrevista semiestruturado e informado pelo BCW, incluindo o modelo Capacidade, Oportunidade, Motivação – Comportamento (COM-B) e o *Theoretical Domains Framework* (TDF). Os grupos focais foram realizados através de videoconferência, gravados em formato áudio e vídeo e posteriormente transcritos *verbatim*. Foi realizada uma análise de conteúdo dedutiva, independentemente por dois investigadores. Os resultados de uma revisão da literatura sobre a prática regular de exercício foram também incorporados na análise. Após a codificação dos determinantes, o BCW permitiu a identificação de opções de intervenção, conteúdo e opções de implementação, para informar o desenvolvimento das intervenções. Estas foram desenvolvidas e refinadas através de um processo sistemático, iterativo e dinâmico, informado pela evidência, teoria e feedback de *stakeholders*. Todo o processo foi suportado por investigadores com expertise nas áreas da mudança comportamental, desenvolvimento de intervenções complexas, prescrição de exercício e metodologias qualitativas.

Resultados: A análise revelou 13 barreiras (quatro componentes COM-B; sete domínios TDF) e 23 facilitadores (cinco COM-B; 13 TDF) à implementação de uma intervenção de exercício informada pela mudança comportamental, a nível dos fisioterapeutas. Esta informação permitiu a identificação de sete funções de intervenção e 27 técnicas de mudança comportamental (TMCs), que resultou no desenvolvimento do Programa de Formação MyBack. Relativamente ao comportamento alvo dos utentes, adoção da prática regular de exercício, a revisão de literatura e grupos focais revelaram 18 barreiras (cinco COM-B; nove TDF) e 19 facilitadores (cinco COM-B; 13 TDF). Estes determinantes permitiram a seleção de sete funções de intervenção e 30 TMCs, resultando no desenvolvimento do Programa de Intervenção MyBack.

Conclusões: Este estudo identificou barreiras e facilitadores à promoção e adoção da prática regular de exercício pelos fisioterapeutas e utentes, respetivamente. Através da metodologia do BCW, estes determinantes informaram o desenvolvimento do Programa de Formação MyBack para os fisioterapeutas e do Programa de Intervenção MyBack para os utentes.

Palavras-chave: Mudança comportamental, exercício, ciências da implementação, lombalgia, investigação qualitativa

ABSTRACT

Using the Behaviour Change Wheel to Develop Interventions to Promote the Adoption of Regular Exercise Practice in Patients at Risk of Low Back Pain Recurrence: The MyBack Training Programme and The MyBack Intervention Programme

Alexandre Moniz, Susana Tinoco Duarte and Eduardo Brazete Cruz

Introduction: Although the course of a low back pain (LBP) episode is favourable, recurrences are frequent. Exercise interventions are suggested as the most effective strategies to reduce the risk of recurrence, but patients do not exercise regularly. Evidence highlights the need to develop behaviour change-informed interventions to facilitate patients' adoption of regular exercise practice, as well as physiotherapists' promotion of this behaviour. Therefore, this study aimed to develop two behaviour change-informed interventions to promote the adoption of regular exercise practice in patients at risk of LBP recurrence. Specifically, barriers and facilitators to the promotion and adoption of this behaviour, from the physiotherapists' and patients' perspectives were respectively explored. Additionally, the Behaviour Change Wheel (BCW) stages will help inform the development of the interventions.

Methodology: Four focus groups (two with 14 physiotherapists; two with 11 patients) were conducted. The focus groups were based on a semi-structured interview guide informed by the BCW, including the Capability, Opportunity, Motivation – Behaviour (COM-B) model and the Theoretical Domains Framework (TDF). All focus groups were held through videoconference, audio and video recorded and transcribed *verbatim*. A deductive content analysis was performed by two independent researchers. The findings of a literature review regarding the patients' target behaviour were also incorporated into the analysis. After the codification of the barriers and facilitators, the BCW allowed the identification of intervention options, content and implementation options, to inform the development of the interventions. The interventions were developed and refined through a systematic, iterative and dynamic process, informed by theory, evidence and stakeholder feedback. The whole process was supported by researchers with expertise in the areas of behavioural change, development of complex interventions, exercise prescription and qualitative methodologies.

Results: The analysis revealed 13 barriers (four COM-B components; seven TDF domains) and 23 facilitators (five COM-B; 13 TDF) to physiotherapists' implementation of a behaviour change-informed exercise intervention. This information allowed the identification of seven intervention functions and 27 behaviour change techniques (BCTs), which resulted in the development of the MyBack Training Programme. Regarding the patients' target behaviour of adopting regular exercise practice, the literature review and focus groups revealed a total of 18 barriers (five COM-B; nine TDF) and 19 facilitators (five COM-B; 13 TDF). Through the next steps, seven intervention functions and 30 BCTs were selected, which resulted in the development of the MyBack Intervention Programme.

Conclusions: This study identified barriers and facilitators to the promotion and adoption of regular exercise practice by physiotherapists and patients, respectively. Guided by the BCW methodology, these determinants informed the development of the MyBack Training Programme for physiotherapists and the MyBack Intervention Programme for patients.

Keywords: Behaviour change, exercise, implementation science, low back pain, qualitative research

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LIST OF ABBREVIATIONS

ACES – *Agrupamentos de Centros de Saúde*

APEASE – Affordability, Practicability, Effectiveness and cost-effectiveness, Acceptability, Side-effects/safety, and Equity

BCW – Behaviour Change Wheel

BCT – Behaviour Change Techniques

BCTTv1 – Behaviour Change Technique Taxonomy v1

CI – Confidence Interval

CrI – Credibility Interval

COM-B – Capability, Opportunity, Motivation – Behaviour

COREQ – Consolidated Criteria for Reporting Qualitative Research

FG – Focus Groups

HR – Hazard Ratio

LBP – Low Back Pain

MD – Mean Difference

MRC – Medical Research Council

MoD – Modes of Delivery

NHS – National Health System

OR – Odds Ratio

RCT – Randomised Controlled Trial

RHA – Regional Health Administration

RHAA – Regional Health Administration of Alentejo

RHALTV – Regional Health Administration of Lisbon and Tagus Valley

RR – Risk Ratio

SD – Standard Deviation

SOLAS – Self-management of Osteoarthritis and Low back pain through Activity and Skills

TDF – Theoretical Domains Framework

TMC – *Técnicas de mudança comportamental*

UI – Uncertainty Interval

YLD – Years Lived with Disability

1. INTRODUCTION

Low Back Pain (LBP) is usually defined as pain, muscle tension or stiffness located below the costal margin and above the inferior gluteal folds, with or without referred pain into one or both lower limbs, that lasts for at least one day (Hoy et al., 2014; Vlaeyen et al., 2018). LBP is very common, affecting people of all countries and all ages, with almost everyone experiencing an episode during their lifetime (Hartvigsen et al., 2018; Vlaeyen et al., 2018). It is characterized by several biological, psychological and social dimensions with a high functional, societal and economic impact (Hartvigsen et al., 2018).

LBP is the leading cause of years lived with disability (YLDs) worldwide, and in the year 2019 it was responsible for approximately 568.4 million (95% Uncertainty Interval (UI) 505.0 to 640.6 million) prevalent cases, 223.5 million (95% UI 197.7 to 253.0 million) incident cases and 63.7 million (95% UI 45.0 to 85.2) YLDs (Chen et al., 2022).

In Portugal, results from the EpiReumaPT national survey, an epidemiological population-based study, showed that 26.4% (95% Confidence Interval (CI) 23.3% to 29.5%) of the adult population was affected by LBP, making it the most prevalent rheumatic and musculoskeletal condition among the portuguese population (Branco et al., 2016). LBP was also more frequent in women (29.6%; 95% CI 25.8% to 33.5%) than in men (22.8%; 95% CI 17.9% to 27.8%) and was significantly associated with worse health-related quality of life ($\beta = -0.07$; 95% CI –0.10 to –0.04; $p < 0.001$), worse disability ($\beta = 0.09$; 95% CI 0.04 to 0.13; $p < 0.001$), the presence of anxiety (Odds ratio (OR) = 1.9; 95% CI 1.2 to 2.9; $p = 0.005$) and depressive symptoms (OR = 1.6; 95% CI 1.1 to 2.4; $p = 0.014$) (Branco et al., 2016).

The course of an LBP episode is typically favourable, with most people experiencing significant improvements in pain and disability after six weeks, and full recovery at 12 weeks (da C Menezes Costa et al., 2012). However, LBP recurrences are frequent, and some people even develop persistent and disabling pain (Hartvigsen et al., 2018). LBP recurrences have been defined, by Stanton et al. (2011) through a modified Delphi approach study, as "LBP which has occurred at least two times over the past year with each episode of LBP lasting at least 24 hours, with a pain intensity of > 2 on an 11-point Numeric Rating Scale (> 20mm on a 100mm Visual Analog Scale), and with at least a 30-day pain-free period between episodes" (Stanton et al., 2011). These LBP recurrences may be longer in duration and

associated with greater disability and medical costs (Wasiak et al., 2006), being acknowledged as major contributors to the burden of LBP on healthcare systems worldwide (Hartvigsen et al., 2018).

A systematic review by da Silva et al. (2017) sought to investigate the risk of, and predictors for, recurrence in people who recovered from an LBP episode. It reported that existing studies did not allow for a robust estimate of the risk of or prognostic factors for recurrence. This was due to the small number of existing studies, heterogeneity and generally poor methodological quality. Of the included studies, only one (Stanton et al., 2008) had an adequately short inception period (< six weeks) and reported a 1-year recurrence proportion of 24% (95% CI 20% to 28%), based on a one-year recall period. However, when LBP recurrence was defined as recall of recurrence at one year or pain at the three- or 12-month follow-up, this proportion increased to 33%. Regarding prognostic factors, only a history of previous episodes seemed to be predictive of an LBP recurrence (OR = 1.8; 95% CI 1.0 to 3.2) (da Silva et al., 2017).

Machado et al. (2017) conducted an inception cohort study nested in a case-crossover study, to determine the incidence of recurrence in patients who recovered from an acute LBP episode and identify predictors of recurrence. Of the 469 participants who recovered from the LBP episode within six weeks, 33% had an LBP recurrence based on a 12-month recall period, and 18% had an LBP recurrence in which care-seeking was sought. This study also found that having had three or more previous episodes of LBP increased the odds of recurrence (OR = 3.18; 95% CI 2.11 to 4.78; $p < 0.001$). This association remained statistically significant when the outcome was care-seeking due to an LBP recurrence (OR = 2.87; 95% CI 1.73 to 4.78; $p < 0.001$). No other studied variables (duration of episode, pain intensity, depression, and physical activity) were associated with recurrences (Machado et al., 2017).

More recently, a prospective inception cohort from da Silva et al. (2019) found that within 12 months of recovery after an LBP episode, 69% (95% CI 62% to 74%) of participants had an LBP recurrence. Of those, 40% (95% CI 33% to 46%) had an LBP recurrence that limited activity and 41% (95% CI 34% to 46%) resorted to health care. This study also investigated prognostic factors for LBP recurrence. From the studied variables, only frequent exposure to awkward postures (Hazard Ratio (HR) = 1.81; 95% CI 1.22 to 2.68), time spent sitting >

five hours (HR = 1.50; 95% CI 1.08 to 2.09), and the number of previous episodes between three and 10 (HR = 1.94; 95% CI 1.28 to 2.94) were associated with LBP recurrences within 12 months, with an increased risk of 81%, 50% and 63%, respectively. Furthermore, occasional exposure to awkward postures was not found to increase the risk (HR = 1.20; 95% CI 0.83 to 1.73), while those reporting more than 10 previous episodes had a 94% greater risk (HR = 1.50; 95% CI 1.28 to 2.94) of having recurrences (da Silva et al., 2019).

These results highlight LBP recurrences as a major public health issue, showing that after recovery, more than two-thirds of people are likely to have an LBP recurrence within a year. It suggests exposure to awkward postures, longer time spent sitting and having more than two previous LBP episodes as the main prognostic factors associated with LBP recurrences (da Silva et al., 2019).

While the majority of effectiveness studies are focused on the immediate management of LBP (Canada TOP, 2017; Hayden et al., 2021; National Institute for Health and Care Excellence, 2020; Oliveira et al., 2018; Owen et al., 2020; Qaseem et al., 2017), evidence about effective strategies to prevent LBP recurrences is scarce (Buchbinder et al., 2018; Foster et al., 2018).

A Cochrane systematic review of randomised controlled trials (RCTs) found moderate-quality evidence that post-treatment exercise programmes can prevent LBP recurrences, reporting a reduction of 50% (Rate Ratio = 0.50; 95% CI 0.34 to 0.73) in the rate of recurrences at one year (two RCTs, n = 130), when compared with no intervention (Choi et al., 2010). Furthermore, there was also moderate-quality evidence from two RCTs (n=154) that post-treatment exercise could reduce the number of recurrences (Mean difference (MD) = –0.35; 95% CI –0.60 to –0.10) and very low-quality evidence that it could also reduce the number of days on sick leave (MD = –4.37; 95% CI –7.74 to –0.99) (Choi et al., 2010).

Supporting these findings, a systematic review with Bayesian network meta-analysis, that aimed to investigate the most effective prevention strategies for LBP, found exercise alone (OR = 0.59; 95% Credibility Interval[a] (CrI) 0.36 to 0.92) and exercise combined with education (OR = 0.59; 95% CrI 0.41 to 0.82) to be the most effective preventive measures

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[a] In Bayesian statistics, the 95% Credible Interval (CrI) is used.

for LBP (Huang et al., 2020). In this study, exercise was also found to prevent LBP-related work absenteeism (OR = 0.04; 95% CrI 0.00 to 0.34) (Huang et al., 2020).

Likewise, Steffens et al. (2016) carried out a systematic review with meta-analysis investigating the effectiveness of interventions for the prevention of future LBP episodes. They found low-quality evidence that in the short-term (≤ 1 year), exercise alone could reduce 35% the risk of an LBP episode (Risk Ratio (RR) = 0.65; 95% CI 0.50 to 0.86) and very-low quality evidence that in the long-term (≥ 1 year) it reduced 78% the risk for sick leave (RR = 0.22; 95% CI 0.06 to 0.76). When studying exercise in combination with education, they found moderate-quality evidence of a 45% risk reduction (RR = 0.55; 95% CI 0.41 to 0.74) for a new recurrence in the short-time (Steffens et al., 2016). The study also indicates very low-quality evidence that in the long-term the effect size for exercise disappears (RR = 1.04; 95% CI 0.73 to 1.49), and low-quality evidence that it decreases for exercise combined with education (RR = 0.73; 95% CI 0.55 to 0.96). However, given the low number of included trials, these findings should be cautiously interpreted, and may even suggest that long-term adoption of exercise may be important for it to continue providing a protective effect (Steffens et al., 2016).

Despite these findings and the widely acknowledged importance of exercise and physical activity behaviours, research indicates that about 50-70% of people with LBP do not adopt exercise in the long-term (Beinart et al., 2013) and around 27.5% of adults globally do not meet the recommended levels of physical activity (Guthold et al., 2018). There is a wide range of factors that influence exercise adoption (Slade et al., 2014), and throughout the literature, several barriers and facilitators have been identified to influence patients' adoption of regular exercise practice. However, to our knowledge, there is no available research that investigates determinants influencing exercise adoption in adults that recovered from an LBP episode. Given this gap, the following findings are focused on barriers and facilitators to exercise practice identified in other populations, specifically healthy individuals and people with musculoskeletal conditions, such as LBP and osteoarthritis.

A systematic review by Spiteri et al. (2019), which studied barriers and facilitators to exercise in middle-aged and older adults, found that participants identified themselves as lacking the necessary skills to carry out exercise, lacked knowledge on exercise and were not aware of its benefits. Other barriers reported in this study were lack of time management

skills because of other competing activities, self-sacrifice to accommodate the needs and wants of others, and the presence of queries or fear about safety to carry out exercise practice (Spiteri et al., 2019). Conversely, having accurate knowledge on exercise and its benefits was identified as a facilitator (Spiteri et al., 2019).

Kanavaki et al. (2017) conducted a systematic review of qualitative evidence on barriers and facilitators to physical activity in patients with knee or hip osteoarthritis. The study found that patients viewed physical activity as being ineffective or even harmful, demonstrating the belief that it might even contribute to condition deterioration (Kanavaki et al., 2017). Additionally, having negative beliefs about the condition and not prioritizing physical activity in the face of demands of other life roles and busy schedules, especially family-related, were also relevant barriers (Kanavaki et al., 2017).

Low levels of self-efficacy, which refers to individuals' lack of confidence in their ability to complete a given task (Areerak et al., 2021; Essery et al., 2017; Miles et al., 2011), lack of motivation to persevere with a behaviour in the absence of external drivers (Essery et al., 2017), and distress experienced from ongoing pain, stress, fatigue, and depression that negatively influenced self-management ability (Devan et al., 2018; Kanavaki et al., 2017) have also been pointed out as important barriers to exercise adoption.

Important enablers such as feeling empowered by being with similar others in a group setting, which contributed to a sense of normality and decreased isolation, understanding the biopsychosocial nature and mechanisms underpinning the condition, accepting pain as part of *self* and acknowledging that it is possible to live life despite pain, and self-discovery or the ability to distinguish *self* (i.e., body, thoughts and feelings) from pain and consequently develop self-efficacy are some of the enablers outlined in the literature (Devan et al., 2018).

These findings highlight the existence of several barriers and facilitators that can act at different levels and have a significant impact on the development and maintenance of exercise practice behaviours. To overcome these barriers and optimize the facilitators, evidence suggests that the development of multifaceted interventions that incorporate behaviour change strategies and target specific determinants may be beneficial in increasing long-term exercise adoption (Jordan et al., 2010; Keogh et al., 2015; Nicolson et al., 2017). Therefore, there seems to be a need to develop behaviour change-informed interventions to

facilitate regular adoption of exercise, prevent LBP recurrences and reduce unnecessary care-seeking and associated costs in people at risk of LBP recurrence.

At the same time, to facilitate the desired behaviour change at the patient level and promote the regular adoption of exercise, a change in physiotherapists' behaviours and practice is also required, since they will determine the quality of care received by the patients (French et al., 2012). This raises the need not only to develop effective and evidence-based interventions at the patient level aimed at promoting exercise adoption and LBP recurrences prevention but also, to ensure that physiotherapists receive proper training and increase their competency in effectively delivering the interventions as intended (Borrelli, 2011; Lehane et al., 2019).

For this to happen, it is also important to explore what may hamper or enable physiotherapists' implementation of these interventions, since the effectiveness and sustainability of health interventions can be influenced by a wide range of factors, which can act at a macro- (e.g., functionality and scope of health systems, health policies, infrastructure and resource allocation), meso- (e.g., clinical workforce volume and competencies, health professionals' education) and micro-level (e.g., patients' knowledge and skills to participate in their care), and requires a comprehensive understanding of the specific setting and stakeholders involved (Briggs et al., 2016). Furthermore, previous qualitative findings suggest the existence of several factors influencing healthcare professionals' implementation of interventions focused on the promotion of physical activity-related behaviours, such as health professionals' knowledge, attitudes, beliefs about capabilities, involvement of important stakeholders in the development and refinement of interventions, training to deliver the interventions, among others (Huijg et al., 2015).

Studies have shown that change is more likely to be successful if interventions are specifically designed to address pre-identified behavioural determinants (Baker et al., 2010, 2015). Understanding the determinants for change and developing implementation strategies that target them can directly impact the acquisition of new practices and influence the desired behaviour change towards those practice (Lewis et al., 2018), which can be facilitated by the use of theory (Dziedzic et al., 2016). In this sense, the interest in the use of theories, models and frameworks to inform the development and implementation of complex interventions, and understand what may determine their success has been escalating (Nilsen, 2015).

Given the increasing evidence that interventions based on theories from the behavioural sciences may be more effective in evoking behaviour change than those that are not (Glanz & Bishop, 2010; Michie et al., 2018; Michie & Abraham, 2004; Sheeran et al., 2017), two relevant theoretical frameworks were used to inform the development of interventions to facilitate patients' adoption of regular exercise practice and support physiotherapists' implementation. The updated UK Medical Research Council (MRC) guidance on the development and evaluation of complex interventions, which allows for the design, implementation and evaluation of complex behavioural interventions, has currently shifted focus to understanding whether and how an intervention will be acceptable, implementable, cost-effective, scalable, and transferable to different contexts (Skivington et al., 2021). The framework is divided into four phases (development or identification of the intervention; feasibility; evaluation; and implementation), each one composed of common core elements (context, programme theory, stakeholder engagement, identification of key uncertainties, intervention refinement and economic considerations), that must be continuously considered (Skivington et al., 2021).

Despite its utility in generally informing the development, evaluation and implementation of complex interventions, and outlining the importance of combining evidence and theory, the MRC framework does not provide specific guidance on how to best do it (French et al., 2012). Additionally, the existence of several theoretical frameworks and a lack of clarity on how to select and apply the most appropriate may also hinder the selection of one theory over another (Michie et al., 2011). The Behaviour Change Wheel (BCW) was developed to tackle this issue, as it recognizes the existence of many theoretical frameworks, and that none is sufficiently comprehensive and conceptually coherent to understand the nature of behaviours and fully characterize behaviour change interventions (Michie et al., 2011).

The BCW is a synthesis of 19 frameworks of behaviour change, that allows the systematic development and evaluation of behaviour change interventions, grounded in theory and evidence (Michie et al., 2014). It also allows the identification of relevant determinants of behaviour and possible mechanisms of change, the development of strategies to design successful interventions, and helps to understand the success or failure of interventions and implementation strategies (French et al., 2012; Michie & Prestwich, 2010; Painter et al., 2008).

At the core of the BCW, sits the *Capability*, *Opportunity*, *Motivation – Behaviour* (COM-B) model, which defends that behaviour is influenced by all of these components, which are essential for it to occur (Michie et al., 2011). Each COM-B component can be divided into two types. *Capability* can be divided into "*Psychological Capability*" and "*Physical Capability*", *Opportunity* into "*Physical Opportunity*" or "*Social Opportunity*", and *Motivation* can be "*Reflective Motivation*" or "*Automatic Motivation*" (Michie et al., 2011). Additionally, the Theoretical Domains Framework (TDF) can also be used as a way of reinforcing the analysis made by the COM-B and provides a deeper understanding of the factors influencing the behaviours and how to target them (Atkins et al., 2017). The TDF consists of 14 domains (*Knowledge*; *Skills*; *Memory, attention and decision processes*; *Behavioural regulation*; *Environmental context and resources*; *Social influences*; *Social/professional role and identity*; *Beliefs about capabilities*; *Optimism*; *Beliefs about consequences*; *Reinforcement*; *Intentions*; *Goals*; *Reinforcement*; *Emotion*) (Cane et al., 2012), which can be directly linked to the COM-B components (Michie et al., 2014).

Surrounding the core of the BCW stands nine intervention functions (*Education*; *Persuasion*; *Incentivization*; *Coercion*; *Training*; *Enablement*; *Modelling*; *Environmental restructuring*; *Restriction*), defined as "the broad categories of means by which an intervention can change behaviour", that can be applied to an intervention to address the behavioural diagnosis previously made (Michie et al., 2014). The BCW also helps to identify the appropriate behaviour change techniques (BCTs), defined as "an active component of an intervention designed to change behaviour", through the behaviour change technique taxonomy v1 (BCTTv1) (Michie et al., 2013), as well as the potential modes of delivery (MoDs). MoDs are an essential aspect of behaviour change interventions, as it guides the way the content is delivered to the target population and can have an important influence on the outcomes and effects of an intervention (Marques et al., 2020).

This study aims to develop two behaviour change-informed interventions to promote the adoption of regular exercise practice in patients at risk of LBP recurrence and to support physiotherapists' promotion of this behaviour. Specifically, this study will explore physiotherapists' and patients' perspectives on the potential barriers and facilitators to the promotion and adoption of regular exercise practice, respectively. Additionally, the stages of the BCW will help inform the development of two interventions to facilitate the promotion and adoption of regular exercise practice by physiotherapists and patients, respectively.

2. METHODOLOGY

2.1. Study Design

The MRC guidance recommendations for the development and evaluation of complex interventions (Skivington et al., 2021) and the BCW (Michie et al., 2014) were used to inform the development of interventions for the promotion and adoption of regular exercise practice in patients at risk of LBP recurrence.

The BCW, including the COM-B model and the TDF, was used to guide the interview schedule and analysis of the barriers and facilitators to physiotherapists' and patients' target behaviours. Focus groups were conducted with physiotherapists from four groups of different primary healthcare centres, and patients with LBP history and that previously participated in the SPLIT[b] programme, an interdisciplinary stratified model of care for the management of LBP (Caeiro et al., 2019). These focus groups aimed to explore barriers and facilitators to physiotherapists' target behaviour of implementing a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice and to patients' target behaviour of adopting regular exercise practice. The barriers and facilitators to patients' adoption of regular exercise practice, identified in the literature review, were also incorporated into this analysis. The Consolidated Criteria for Reporting Qualitative Research (COREQ) was used to guide the study design and the subsequent data analysis (Tong et al., 2007).

After the identification of the barriers and facilitators, which corresponds to the BCW step of identifying what needs to change, the next step was to develop two tailored interventions aimed at targeting them, through the identification of intervention options, content and implementation options, as outlined by the BCW.

The interventions were developed and refined through a systematic, iterative and dynamic process, informed by theory, evidence and stakeholder feedback, namely physiotherapists and patients with LBP history. The whole process was supported by researchers with

[b] The SPLIT programme is an interdisciplinary stratified model of care for the management of LBP in primary healthcare (Caeiro et al., 2019). Using the translated and culturally adapted version of the Keele STarT Back Tool, patients are stratified into three subgroups based on their risk (low, medium, high) of developing persistent disabling pain, and then matched to the corresponding physiotherapy treatments.

expertise in the areas of behavioural change, development of complex interventions, exercise prescription and qualitative methodologies.

2.2. Ethics

In line with the declaration of Helsinki, all participants were sent a written invitation letter and a study information sheet (**Appendix 1**) containing details about the study's aims and procedures, as well as potential advantages and disadvantages/risks and actions taken to ensure complete confidentiality. It was also emphasised that participation was completely voluntary and that the study could be abandoned at any moment, without any consequences. Participants were also informed that all data would be preserved in a safe place only accessible by the research team and destroyed after a period of five years. Those who agreed to participate were sent a link giving access to an informed consent form **(Appendix 2)**, which included instructions so that participants could keep a copy for themselves.

Ethical approval was granted by the Specialized Ethics Committee for Research from the School of Health, Polytechnic Institute of Setúbal (CEEI-ESS) (Reference 77/AFP/2021) (**Appendix 3**).

2.3. Setting

The Portuguese National Health Service (NHS) is a universal tax-financed system, with the Ministry of Health being responsible for the coordination of health care provision and financing (de Almeida Simoes et al., 2017). At a regional level, the NHS is supervised by regional health administrations (RHAs), responsible for the management of groups of primary healthcare centres (de Almeida Simoes et al., 2017).

The interventions will be implemented in four of these groups of primary healthcare centres, that belong to two RHAs. Three of these groups of primary healthcare centres (ACES Arrábida, ACES Arco Ribeirinho and ACES Almada Seixal), belong to the Regional Health Administration of Lisbon and Tagus Valley (RHALTV). The other group of primary healthcare centres (ACES Alentejo Central) belongs to the Regional Health Administration of Alentejo (RHAA).

The ACES Arrábida provides health services to a population of 243.683 individuals, within three municipalities. The ACES Arco Ribeirinho, provides health services to a population of 210.884 individuals, living in four municipalities, while the ACES Almada Seixal, to a population of 366.165 individuals, from two municipalities (SNS, 2022). Finally, the ACES Alentejo Central provides health services to around 167.980 individuals from twelve municipalities (SNS, 2022).

2.4. Participants

Physiotherapists from the groups of primary healthcare centres previously described were purposively selected for participation in the study. Physiotherapists' inclusion criteria were: 1) working in one of the participating ACES; and 2) having participated and completed the SPLIT training programme. The adopted sampling strategy ensured the inclusion of physiotherapists from the various participating ACES, with a variety of viewpoints and heterogeneity in terms of professional background and clinical experience, allowing the identification of barriers and facilitators from the different contexts.

For patient recruitment, physiotherapists who implemented the SPLIT programme were asked to identify patients who participated in the SPLIT programme, this being the only inclusion criterion for patients' participation in the study. Patients were purposively recruited in order to ensure representation of the different risk levels of developing persistent and disabling LBP (low, medium or high risk), age, gender and academic qualifications.

Purposive sampling was the chosen and employed sampling strategy for this study, and is often employed in qualitative research since it allows the selection of individuals that provide relevant information to the research team (Johnson & Waterfield, 2004).

2.5. Interview guide

A semi-structured interview guide (**Appendix 4**) was developed, exploring potential barriers and facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention and patients' adoption of regular exercise practice. The interview guide's questions were informed by the COM-B model and the 14 TDF domains, using

existing guidance from Atkins et al. (2017) and from "The Behaviour Change Wheel – A Guide to Designing Interventions" (Michie et al., 2014).

2.6. Data collection

All participants were asked to fill out a sociodemographic and clinical questionnaire (**Appendix 5** and **6**) to collect the sample characteristics. For the physiotherapists, sociodemographic information such as gender, age, academic qualifications, years of experience, years working in primary care and the group of primary healthcare centres where they work was collected. For the patients, sociodemographic and clinical information was collected, including gender, age, marital status, academic qualification, level of risk of developing persistent disabling LBP at SPLIT baseline, number of LBP episodes in the last year, duration of LBP episode, current professional status and sick leave due to an LBP episode.

Two focus groups with physiotherapists (with a total of 14 physiotherapists) and two focus groups with patients (with a total of 11 patients) were conducted. Focus groups are semi-structured discussions with groups of people that aim to explore a specific set of issues, and it is built on the notion that participants are encouraged to explore and clarify individual and shared perspectives through group interactions (Tong et al., 2007). To ensure the quality and validity of the qualitative results, focus groups are usually composed of six to eight participants (Finch & Lewis, 2014). Both physiotherapists' focus groups were composed of seven participants, while the patients' focus groups were only composed of five and six participants since some of the invited patients were not able to attend.

All focus groups were moderated by a researcher (CC) with experience in conducting qualitative studies and facilitating focus groups and co-moderated by two other researchers (AM and SD), who received training in qualitative research. The focus groups were held through videoconference, lasted approximately 90 minutes, and were audio and video recorded. The structure of the focus groups followed the recommendations by Finch & Lewis (2014): 1) scene setting and ground rules; 2) individual introduction; 3) opening topic; 4) discussion; 5) ending discussion.

At the start of each focus group, the goals and the main evidence-based components of an intervention aimed to prevent LBP recurrences were briefly introduced by the moderator.

The presentation included the following topics: 1) The importance of adopting regular exercise practice for the prevention of LBP recurrences; 2) The need to structure (duration, number of sessions, and mode of application) and tailor the exercise programme to the patients' individual physical fitness needs (i.e., aerobic capacity, trunk and lower limb muscle resistance, motor control and flexibility); 3) the need to use BCTs to facilitate the adoption of regular exercise practice; and 4) use of motivational interviewing principles to guide the whole intervention.

2.7. Data management and analysis

Prior to the analysis of the focus groups, recordings were transcribed verbatim and anonymised with a pseudonym for each participant, by two researchers (AM and SD). A third researcher (CC) then checked the transcripts for accuracy.

The deductive content analysis was independently performed by two researchers (AM and SD), while a third researcher (CC) was approached to settle disagreements. The deductive content analysis was performed using a coding matrix based on the TDF domains and the COM-B components **(Appendix 7)** and was guided by the study's aims of identifying barriers and facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice, and barriers and facilitators to patients' adoption of regular exercise practice.

Additionally, the barriers and facilitators to patients' adoption of regular exercise practice identified in the literature review were incorporated into this analysis. Two researchers (AM and SD) independently mapped these barriers and facilitators to the respective COM-B components and TDF domains. Disagreements concerning this classification were resolved through discussion and consensus. When consensus could not be achieved, a third researcher (CC) was approached.

2.8. Data trustworthiness

To ensure the quality and trustworthiness of the qualitative data, the credibility, transferability, dependability and confirmability criteria were considered (Korstjens & Moser, 2018).

Regarding the credibility criteria, the strategies of triangulation and member checking were used (Amin et al., 2020; Korstjens & Moser, 2018). All data was analysed independently by more than one researcher, who then compared results and discussed existing divergences until consensus (triangulation) was reached. Emerging barriers and facilitators were also shared with participants for feedback, allowing them to analyse the findings and provide further information or clarification if so intended (member checking) (Amin et al., 2020; Korstjens & Moser, 2018).

Transferability means providing a "thick description" of the participants and the whole research procedures, allowing outsiders to judge if the study findings are transferable to their own settings and contexts (Korstjens & Moser, 2018). In this study, transferability was ensured by describing the context and setting in which the research was conducted, the participant sample, sample size, sample strategy, demographic characteristics and all aspects related to data collection.

The audit trail strategy was used to guarantee the dependability and confirmability criteria (Korstjens & Moser, 2018). Dependability refers to the aspect of consistency and means that the research follows the accepted standards for a particular study design, while confirmability relates to neutrality and ensures that the findings are based on the data and not on the researchers' subjective interpretations (Korstjens & Moser, 2018). The audit trail was ensured through the description and documentation of all data collection and data analysis processes.

2.9. Development of the interventions: Identification of intervention options and identification of content and implementation options

From the barriers and facilitators previously identified from the literature review and focus groups, the procedures for the identification of intervention options and the identification of content and implementation options were then carried out. This process was independently performed by two researchers (AM and SD), and divergences were resolved through discussion and consensus. Following this, all decisions related to these steps were presented to the remaining members of the research team, who used the APEASE criteria (affordability, practicability, effectiveness and cost-effectiveness, acceptability, side-effects/safety, and equity) to ensure that decisions were appropriate for the context in which

the implementation of the behaviour change-informed interventions will occur. After the deductive content analysis of the literature review and focus groups, a "behavioural diagnosis" of what needs to happen for physiotherapists' implementation of a behaviour change-informed exercise intervention and patients' adoption of regular exercise practice was achieved. This behavioural diagnosis, established through the COM-B and TDF analysis, was then linked to the intervention functions. Definitions for each COM-B component, TDF domain and intervention function are presented in **Appendix 8**.

After selecting the appropriate intervention functions, the identification of the intervention content (i.e., BCTs) and implementation options (i.e., MoDs) was conducted. As recommended by the BCW guidance, the BCTTv1 (Michie et al., 2013) was used to select the BCTs that best serve the intervention functions previously identified. The BCW guidance developed a matrix, through expert consensus, that links specific BCTs to intervention functions (Cane et al., 2015; Michie et al., 2014). This matrix was used to identify the most appropriate BCTs to use in the context of the intervention, and that would best target the barriers and facilitators to physiotherapists' implementation of a behaviour change-informed intervention and patients' adoption of regular exercise practice. Additionally, to guide the selection of the most effective BCTs, the newly available Theory and Technique tool (http://theoryandtechniquetool.humanbehaviourchange.org/) was also used. This tool was developed by triangulation of data (Johnston et al., 2021) from two studies (Carey et al., 2019; Connell et al., 2019), and provides a link between each BCT and its Mechanism of Action (COM-B component and TDF domain). Lastly, the potential modes of delivering the BCTs and intervention contents to physiotherapists and patients were identified. A MoD ontology (Marques et al., 2020) was used, to inform the selection of the most appropriate MoDs to deliver the content of the intervention.

3. RESULTS

3.1. Exploring physiotherapists' barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice and development of The MyBack Training Programme

This section outlines physiotherapists' sociodemographic characteristics and all qualitative findings related to physiotherapists' barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence. The final part of this section addresses the results of the BCW used to develop a behavioural change intervention targeting physiotherapists.

3.1.1. Physiotherapists' sample demographics

In total, 14 physiotherapists participated in the focus groups. Participants had a mean age of 44.36 years old (± 10.75), were mostly of the female gender (n = 12, 86%), 10 (71%) had a graduate degree and four (29%) had a master's degree. All physiotherapists' sociodemographic characteristics are described in **Table 1.**

Table 1. *Sociodemographic characteristics of participating physiotherapists*

Variable	Category	Frequency
Gender	Female	12 (86%)
	Male	2 (14%)
Age	Mean ± Standard deviation (SD)	44.36 years old ± 10.75
	Minimum	30 years
	Maximum	59 years
Academic Qualification	Graduate degree	10 (71%)
	Master's degree	4 (29%)
Years of Experience	Mean ± SD	21.79 years ± 10.58
	Minimum	8 years
	Maximum	38 years
Years working in primary healthcare	Mean ± SD	8 years ± 11.71
	Minimum	1 year
	Maximum	26 years
ACES	ACES Alentejo Central	3 (21%)
	ACES Almada-Seixal	3 (21%)
	ACES Arco Ribeirinho	5 (37%)
	ACES Arrábida	3 (21%)

3.1.2. Barriers to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice

The deductive content analysis revealed 13 barriers to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence (**Table 2**). These barriers were linked to four COM-B components (i.e., *Psychological Capability*; *Social Opportunity*; *Physical Opportunity*; and *Reflective Motivation*) and seven TDF domains (i.e., *Knowledge*; *Skills*; *Social influences*; *Environmental context and resources*; *Social/professional role and identity*; *Beliefs about capabilities*; and *Optimism*).

Table 2. *Synthesis of the barriers to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice identified from the focus groups*

COM-B components	TDF domains	Barriers
Psychological Capability	Knowledge	Lack of knowledge on the risk factors for and management of LBP recurrences, and BCTs
	Skills	Lack of skills for the implementation of the intervention
Social Opportunity	Social influences	Lack of peer interaction and discussions
Physical Opportunity	Environmental context and resources	Lack of time to implement and schedule incompatibilities between patients' and primary healthcare's schedules
		Existence of other priorities from their contexts (COVID-19 pandemic and vaccination)
		Lack of management support, that does not consider the intervention a priority
		Lack of human and material resources
		Current focus on treatment rather than prevention
		Low number/lack of patient referrals
		Unable to implement the SPLIT programme
Reflective Motivation	Social/professional role and identity	Practice according to a paternalistic model of care that does not promote patient autonomy
	Beliefs about capabilities	Lack of confidence for the implementation of the intervention
	Optimism	Pessimism about the implementation of the intervention

Within the COM-B component of *Psychological Capability*, two barriers related to the TDF domains of *Knowledge* and *Skills* were identified. Participants demonstrated a general lack of knowledge about the potential risk factors and management recommendations for LBP recurrences and about BCTs.

"Now, recommendations for the prevention of new episodes, I find it more difficult to… I don't want to be here shooting recommendations into the air. I think you need to think a little bit about that." (Physiotherapist Leonor, FG1, 19, 618)

Physiotherapists were also unanimous about their lack of skills to implement the behaviour change-informed exercise intervention, and the need for training in its several components.

"(...) to me, what I feel is most lacking is, without a doubt, the issues of behaviour change (...) being something that I never applied in my clinical practice, it's without a doubt, what I need more help with." (Physiotherapist João, FG2, 21, 968)

Within the scope of the COM-B component *Social Opportunity*, the analysis revealed one barrier at the level of the TDF domain *Social influences*. This barrier was related to physiotherapists' inability to discuss and interact with their peers, given the fact that many of them work alone, and are therefore isolated from other colleagues.

"(…) we work a lot alone. We end up not being able to share in loco with anyone, nor to clear a doubt that arises at that moment, the best strategy (...)" (Physiotherapist Sónia, FG2, 22, 1007)

The most commonly identified COM-B component and TDF domain was *Physical Opportunity* and *Environmental context and resources*, respectively. In total, seven barriers were identified. Participants identified incompatibilities between patients' and primary healthcare's schedules, as well as a lack of time in their contexts which may hinder their ability to effectively implement the intervention. This lack of time was mainly justified by the existence of other competing activities, little time to treat patients and the high number of referrals to the SPLIT programme.

"Because, in one healthcare unit, I have a high number of referrals for the SPLIT programme and the availability in terms of time… it's a bit short to start another intervention, still having other patients on waitlist. It's just more in that sense of time." (Physiotherapist Maria, FG2, 10, 441)

The existence of other priorities from their contexts and management, specifically the current national and international panorama created by the COVID-19 pandemic was also highlighted as a barrier.

> *"(...) things haven't been easy and now with the vaccination problem, first it was the pandemic, now it's the vaccination. They're excuses, so to speak, for the ACES not implementing the programme [SPLIT] there." (Physiotherapist Matilde, FG1, 2, 64)*

Additionally, some participants felt that the management of their primary healthcare centres did not consider physiotherapy issues to be a primary concern and did not consider this type of interventions a priority.

> *"Because as we know, healthcare, primary healthcare is focused a lot on the nursing part, right? And that's it, they're at the front, their things are the first to be resolved, and then comes physiotherapy." (Physiotherapist Matilde, FG1, 3, 79)*

Participants stated that their healthcare centres placed increased focus of human resources on the treatment of acute conditions, rather than prevention. Prevention interventions did not seem to be a priority.

> *"We should do more prevention than just... than just treatment and what happens, perhaps, in most patients that we end up following are, effectively, treatment. Of course, we do prevention (...) but primarily it's not... it's not the philosophy." (Physiotherapist Maria, FG2, 17, 789)*

Physiotherapists reported other context-related barriers such as the low number or even lack of patient referrals and the inability to implement the SPLIT programme. A lack of human (low number of physiotherapists currently working in primary healthcare) and material resources in some primary healthcare centres was also outlined as a possible barrier to the implementation of the intervention.

> *"And even material resources, it's all very... there are none, there are none. There are practically none. For example, to work in a group, for example, in one unit where I am, there isn't... there's only one ball. So, no... you can't make certain group activities." (Physiotherapist Carolina, FG2, 20, 918)*

In the COM-B component of *Reflective Motivation*, three barriers were identified. Power differences between physiotherapists and patients were outlined, as it was considered that physiotherapists practice mainly according to a paternalistic model, that does not promote patient autonomy. This barrier was linked to the TDF domain of *Social/professional role and identity*.

> *"(...) but in general, we still have a lot of control over the patient (...) We often say to the patient, or we tell each other, that the patients don't do anything for themselves, but maybe many of us don't do anything so that the patient understands this. They go there for us to treat them, but we all know that's not how it's supposed to be." (Physiotherapist Mariana, FG2, 15, 662)*

A barrier related to the TDF domain *Beliefs about capabilities* was identified. Some participants reported lack of confidence for the implementation of a behaviour change-informed exercise intervention, associated with doubts about their capabilities to implement and their ability to respond to the rising needs, not having been able to implement the SPLIT programme in their healthcare centres, and not having the necessary skills to effectively implement the intervention.

> *"My confidence level, of confidence in the implementation is low at the moment, I would give it a four*[c] *(...) in terms of confidence, I don't feel very confident, and I believe that training would help a lot, of course." (Physiotherapist Madalena, FG1, 8, 243)*

Finally, one barrier within the scope of the TDF domain *Optimism* was identified. Pessimism regarding the implementation was demonstrated, justified by low expectations that the implementation of the intervention will happen, given the fact that the SPLIT programme still has not been implemented.

> *"(...) so, I really want to implement. My wish is to implement, without a doubt, but since the other one hasn't been implemented yet, the SPLIT, I'm a little...*

[c] Level of confidence for the implementation of new behaviour change-informed interventions to promote the adoption of regular exercise practice, on an 11-point Likert scale (in which 0 means "not confident" and 10 means "totally confident").

well with some… I'm not very, I don't have a lot of expectations (…)" (Clara, FG1, 8, 265)

3.1.3. Facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice

Regarding the facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence, 23 were identified (**Table 3**). These were linked to five COM-B components (i.e., *Psychological Capability*; *Social Opportunity*; *Physical Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and 13 TDF domains (i.e., *Knowledge*; *Skills; Memory, attention and decision processes*; *Behavioural regulation*; *Social influences*; *Environmental context and resources*; S*ocial/professional role and identity*; *Beliefs about capabilities*; *Beliefs about consequences*; *Optimism*; *Intentions*; *Reinforcement*; and *Emotion*).

Table 3. *Synthesis of the facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice identified from the focus groups*

COM-B components	TDF domains	Facilitators
Psychological Capability	Knowledge	Having knowledge on the recommendations for the management of LBP recurrences
	Skills	Acquisition of skills through participation in the implementation of the intervention
	Memory, attention and decision processes	The interventions is aligned with current practice
		Positive past experiences related to participation in exercise interventions
	Behavioural regulation	Ability to organize and manage work activities according to the needs and availabilities
Social Opportunity	Social influences	Therapeutic relationships previously established
		Relationship with and involvement of the multidisciplinary team
		Professional relationships and collaboration between physiotherapists
Physical Opportunity	Environmental context and resources	Context provides the necessary time to implement the intervention
		Having management support, that consider the intervention a priority
		The intervention's principles are aligned with primary healthcare's principles
		High number of referrals
		Need for few resources
		High incidence of LBP recurrences, which justified the need for the intervention*
Reflective Motivation	Social/professional role and identity	Benefits for the physiotherapists and for the profession
		The intervention aligns with physiotherapists' professional identity and role in primary healthcare
	Beliefs about capabilities	High confidence levels for the implementation of the intervention
	Optimism	Optimism about the implementation of the intervention
	Beliefs about consequences	Beliefs about the potential patient benefits and improvement of quality of care
	Intentions	Willingness to change
Automatic Motivation	Reinforcement	Joint development of the interventions with higher education institutions
		Continuity of care
	Emotion	Positive emotions about the implementation of the intervention

* Non-modifiable facilitator

In the COM-B component *Psychological Capability*, five facilitators were identified within the scope of the TDF domains of *Knowledge*, *Skills*, *Memory, attention and decision processes*, and *Behavioural regulation*. Conversely to the lack of knowledge previously reported, having some degree of knowledge about the recommendations for the management

of an LBP recurrence was identified as a facilitator. The implementation of the intervention was also associated with participation in a training programme, which was expected to promote the acquisition and development of skills that would allow physiotherapists to improve the healthcare provided and add value to their practices.

> *"(...) this project will fill those big gaps that we have in primary care, and give us new knowledge, right? The project itself, technical and scientifical knowledge to be applied in our practices and actually have this reliable demonstration of our intervention." (Physiotherapist Raquel, FG1, 15, 503)*

Some participants perceived that this kind of interventions were, in a way, similar to their current practice. They mentioned having already implemented similar interventions focused on the promotion of physical activity behaviours, but not in a structured and measurable way

> *"(...) I confess that I already end up doing a little bit of this, but not in a measurable way. So, that's what maybe we'll start doing. It's doing something that is measured and that we can apply." (Physiotherapist Maria, FG2, 9, 405)*

Additionally, physiotherapists reported overall positive previous experiences with exercise interventions that took place within their primary healthcare centres, and which included exercise and even behaviour change components. These experiences were considered to be an advantage for the implementation of the intervention.

> *"I think that the learning we acquired through SPLIT can also help us for these new programmes (...)" (Physiotherapist Leonor, FG1, 5, 154)*

Another important aspect was physiotherapists' ability to organise and manage their work activities according to the rising needs and availabilities, allowing them to introduce a new intervention into their schedules.

> *"(...) I may have to prioritize, this one, next week I identify two people with priority. So, I'll start with those, and maybe the others I can wait and call at the next opportunity." (Physiotherapist Leonor, FG1, 6, 170)*

Regarding the COM-B component of *Social Opportunity* and the TDF domain of *Social influences*, the analysis revealed three facilitators. Therapeutic relationships previously established in the SPLIT programme were seen as an enabling factor for patient adherence to this type of interventions.

"(...) I think there will be a lot of patient adherence, because they already know us from SPLIT (...) They already trust us and often the patients already know us... no, I think that adherence will be easier." (Physiotherapist Leonor, FG1, 6, 201)

Furthermore, participants considered positive relationships and interdisciplinary work between healthcare professionals, as well as their involvement with this type of interventions as essential aspects, potentially having a positive effect on the way physiotherapy is regarded and perceived.

"(...) I know that a project of this nature will create even more trust from the other professionals in us, trust that we are capable, that we are... that we are part of the problem solving, right? Of the problems, right? (...)" (Physiotherapist Leonor, FG1, 17, 567)

Just as the relationships established with patients and other healthcare professionals, professional relationships and collaboration between physiotherapists were also outlined as key factors. The inclusion of and cooperation between physiotherapists from different primary healthcare centres in the development of the intervention was deemed to contribute to possibly having a more structured practice and a stronger profession.

"(...) as long as we're not... isolated, each one doing different things (...) that's it, we're going to be another piece that's there. I think we need this structure and being more together and having more strength together (...)" (Physiotherapist Leonor, FG1, 17, 571)

For the COM-B component *Physical Opportunity* and the TDF domain *Environmental context and resources*, six facilitators were identified. Some participants reported that their contexts provided the necessary time to implement a new intervention. Their contexts allowed them to freely manage their schedules, but they were conscient that this may not be a reality for many of the other colleagues.

"... at least, we... have... we manage our schedule. The... so, we manage... (...) so, in terms of time, it depends on the number of referrals and then if we have other requests, but it's not a constraint, nor is something too difficult." (Physiotherapist Inês, FG2, 21, 949)

Additionally, it was considered relevant to develop and implement this kind of intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence, as it would target a health condition with high impact and would complement the service provided by the SPLIT programme.

> *"(...) I think the intervention is very relevant and important and we miss... that, right? We who treat people in SPLIT, we feel the need to have something more to offer people." (Physiotherapist João, FG2, 6, 243)*

Having service management support was also considered a critical factor for the implementation of the intervention. Some participants outlined having support from the management of their healthcare centres, that considered this type of interventions a priority.

> *"I'd like, I'd just like to say that here in my ACES this programme has a high priority, an eight or ten[d], at the management level (...)" (Physiotherapist Sónia, FG2, 18, 834)*

Other identified facilitators were the perception that this type of intervention is aligned with primary healthcare's principles and having a high number of referrals of patients with LBP, which constitute possible future participants for the new intervention. Additionally, even though the lack of material resources was identified as a barrier, it was also pointed out that the implementation of this kind of interventions would not require a high number of resources, thus the need for few resources was considered a facilitator to the implementation.

> *"... in terms of resources (...) it's not something that involves having a lot of things. So, having us, the person, and a place where to put the person, to do the exercises, is enough." (Physiotherapist Inês, FG2, 20, 937)*

Within the COM-B component of *Reflective Motivation*, six facilitators were also identified. Two barriers were linked to the TDF domain *Social/professional role and identity*. Participants indicated possible emerging benefits from the implementation of a behaviour

[d] Level of confidence for the implementation of new behaviour change-informed interventions to promote the adoption of regular exercise practice, on an 11-point Likert scale (in which 0 means "not confident" and 10 means "totally confident").

change-informed exercise intervention, such as expectations of professional recognition, differentiation and a chance for professional development.

> *"Our work is very under-recognized in primary care, and we must grab on to something that makes us different from the others and united to each other. I think that's very important. (...)" (Physiotherapist Matilde, FG1, 15, 485)*

They also considered the intervention's principles to be aligned with their professional identity and with their role as healthcare professionals in primary healthcare.

> *"If I think that the programme is very interesting and seems to me to meet the lines of... and the principles that I think that should be and belong to what we are as physiotherapists in primary health care? Of course, I have no doubts about that." (Physiotherapist Luana, FG1, 4, 132)*

A facilitator related to perceived high levels of confidence for the implementation was linked to the TDF domain *Beliefs about capabilities*. While some participants demonstrated a perceived lack of confidence to implement the intervention, others reported high confidence levels. These confidence levels were dependent on their motivation levels to implement, the acquisition of knowledge and skills through participation in a training programme, and the ability to promote patient adherence to the programme.

> *"(...) on the assumption that we will have training, right? So, my confidence level is based on that assumption. I think my confidence level is 10[e]." (Physiotherapist Leonor, FG1, 7, 230)*

One facilitator was found within the TDF domain of *Optimism*. In contrast with what was reported in the barriers, some participants were optimistic about the potential implementation of a new behaviour change-informed exercise intervention, the possible improvements to their practices, the possible benefits at the patient level and hopes of a "paradigm shift" in physiotherapy practice.

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[e] Level of confidence for the implementation of new behaviour change-informed interventions to promote the adoption of regular exercise practice, on an 11-point Likert scale (in which 0 means "not confident" and 10 means "totally confident").

"Each patient treats himself, either going to treatment or with the things they do at home, and... I think these interventions also help us... we keep saying this so many times to the patient, it may be that it also gets into our own heads." (Physiotherapist Mariana, FG2, 15, 667)

Most physiotherapists anticipated and demonstrated beliefs about the potential benefits of the intervention for the patients and the improvement of quality of care, and this was linked to the TDF domain *Beliefs about consequences*. Physiotherapists consensually identified patient benefits in the development of self-regulation capability, increased patient confidence and autonomy to manage their musculoskeletal health, prevent LBP recurrences, and reduce unnecessary healthcare consumption. Simultaneously, the acquisition of skills to manage a possible recurrence was also identified as an important aspect.

"(...) a great benefit of this project may be this issue of patients themselves gaining more confidence in their skills and abilities, right? (...) because that's the only way they may not come back here to… resort so much to healthcare services, right? (...)" (Physiotherapist Leonor, FG1, 13, 407)

Additionally, gaining exercise practice habits, reducing medication intake, increasing work productivity and improving quality of life were also pointed out by physiotherapists as potential patient benefits of this kind of interventions.

"If they have less low back pain, they will be able to spend more time at work, have fewer sick leaves, they will have a better quality of life (...)" (Physiotherapist João, FG2, 12, 553)

A facilitator within the scope of the TDF domain of *Intentions* was also identified. Participants considered the intervention a priority and expressed willingness to change their practice.

"(...) I think that I really consider it to be a top priority for me, to give continuity, and find a way in my schedule to fit this type of project, because I have seen the benefits and I still feel the benefits that it was to implement the SPLIT project..." (Physiotherapist Leonor, FG1, 17, 564)

Lastly, three facilitators were found for the COM-B component *Automatic Motivation*. One facilitator was tied with the TDF domain *Emotion* and referred to the demonstration of

positive emotions about the future implementation of the intervention. The other two facilitators were linked with the *Reinforcement* domain. The development of these interventions through a partnership with a research team, tied to several higher education institutions, was also considered to be an important aspect, giving validity and legitimacy to the intervention and physiotherapy practice, and increasing the visibility of the results achieved.

> *"Yes, first because we have a university supporting the program (...) Credible, in several places at the same time, with well-studied, well-structured data... I think that there is very little of this in physiotherapy and we really needed it." (Physiotherapist Mariana, FG2, 15, 657)*

The perception that this type of interventions will allow for a continuity of care, reinforcing what had been previously done in the SPLIT programme and providing the opportunity to continue following patients after they are discharged was also highlighted as an important enabler.

> *"I think that it's very relevant to implement this intervention, because it's also the reinforcement of what has been done before (...)" (Physiotherapist Carolina, FG2, 3, 138)*

3.1.4. Development of a behaviour change-informed intervention to facilitate physiotherapists' promotion of the adoption of regular exercise practice: The MyBack Training Programme

3.1.4.1. Identification of intervention options

The findings of the physiotherapists' focus groups allowed the identification of what needs to be targeted to ensure physiotherapists' implementation of a behaviour change-informed exercise intervention to promote patients' adoption of regular exercise practice. The next step, as recommended by the BCW, was to identify the intervention functions that are likely to bring about the desired change in physiotherapists' behaviours. Given the COM-B components and TDF domains previously identified, the BCW guidance indicated that all nine intervention functions could be relevant to the intervention. Seven intervention functions were selected as the most suitable to address the behavioural diagnosis established

from the focus groups: *Education*; *Persuasion*; *Incentivization*; *Training; Environmental restructuring*; *Modelling*; and *Enablement*.

As an example, a section of the links between the COM-B, TDF, identified physiotherapists' barriers, and selected intervention functions are shown in **Table 4**. In **Appendix 9**, the full mapping of barriers and facilitators to the intervention functions is presented.

Table 4. *Example of the mapped physiotherapists' barriers (and respective COM-B components and TDF domains) to intervention functions*

			Intervention Functions								
COM-B	TDF	Barriers	Education	Persuasion	Incentivisation	Coercion	Training	Restriction	E. Restructuring	Modelling	Enablement
Psychological Capability	Knowledge	Lack of knowledge on the risk factors for and management of LBP recurrences, and BCTs	×								
Social Opportunity	Social influences	Lack of peer interaction and discussions							×	×	×
Reflective Motivation	Optimism	Pessimism about the implementation of the intervention	×	×							×

3.1.4.2. Identification of content and implementation options

The use of the methodology previously described, allowed for the identification of 27 BCTs to be included in the MyBack Training Programme: *1.1. Goal-setting (behaviour)*; *1.2. Problem-solving*; *1.4. Action planning*; *1.7. Review outcome goal(s)*; *2.1. Monitoring of behaviour by others without feedback*; *2.2. Feedback on behaviour*; *2.3. Self-monitoring of behaviour*; *3.1. Social support (unspecified)*; *3.2. Social support (practical)*; *4.1. Instruction on how to perform the behaviour*; *5.1. Information about health consequences*; *5.3. Information about social and environmental consequences*; *5.6. Information about emotional consequences*; *6.1. Demonstration of the behaviour*; *6.3. Information about others' approval*; *7.1. Prompts/cues*; *8.1. Behavioural practice/rehearsal*; *8.7. Graded tasks*; *9.1. Credible source*; *10.3. Non-specific reward*; *10.4. Social reward*; *11.2. Reduce negative*

emotions; *11.3. Conserving mental resources*; *12.1. Restructuring the physical environment*; *12.2. Restructuring the social environment*; *15.1. Verbal persuasion about capability*; *15.3. Focus on past success*.

Having selected the BCTs, the following step was to specify the intervention content that the BCTs will help deliver, as well as the MoDs. The use of the MoD Ontology previously mentioned allowed the identification of several MoDs to help deliver the BCTs and intervention content to physiotherapists throughout the implementation of the MyBack Training Programme. **Table 5** shows an example of the mapping between the COM-B components, TDF domains, intervention functions, BCTs, intervention content and MoDs, while the full mapping of barriers and facilitators is available in **Appendix 10**.

This whole process allowed the theory-based development of the MyBack Training Programme, which aims to support and enhance the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence. The MyBack Training Programme will be delivered through the identified intervention functions, BCTs and MoDs, and will include a 3-day training programme with face-to-face and online components, a 6-month mentorship programme, and several resources which will facilitate and support implementation.

Table 5. *Example of the mapping of physiotherapists' barriers, COM-B components, TDF domains and intervention functions to selected BCTs, intervention content and modes of delivery*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery[f]
Psychological Capability	Knowledge	Education	5.1. Information about health consequences 5.3. Information about social and environmental consequences	• Effects of exercise on the prevention of LBP recurrences • Consequences of not practising exercise • Exercise SOS signs • Determinants for the adoption of regular exercise practice • FITT-VP principles for exercise prescription on healthy adults/recovered from LBP • Behavioural diagnosis and BCTs • Evidence on use of BCTs for adoption of regular exercise practice • Information on implementation of the MyBack Intervention Programme: programme presentation, eligibility criteria, baseline assessment and group allocation • Motivational interview principles and processes • Behavioural change theories – COM-B model and TDF domains	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
Social Opportunity	Social influences	Environmental restructuring Modelling Enablement	3.1. Social support (unspecified) 3.2. Social support (practical) 6.1. Demonstration of the behaviour 12.2. Restructuring the social environment	• Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme • Share experienced difficulties in carrying out physical fitness tests, exercise prescription and use of motivational interview and BCTs • Promotion of specific moments for discussion and peer sharing	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Reflective Motivation	Optimism	Education Persuasion Enablement	1.7. Review outcome goal(s) 5.3. Information about social and environmental consequences 15.1. Verbal persuasion about capability	• Discussion and review of goals related to the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Presentation of the MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)

[f] Each code (e.g., BCIO:011003) represents a different MoD, and originate from the MoD Ontology used in this study (Marques et al., 2020).

3.2. Exploring patients' barriers and facilitators to the adoption of regular exercise practice and development of The MyBack Intervention Programme

This section presents the participating patients' sociodemographic and clinical characteristics and all barriers and facilitators to the adoption of regular exercise practice identified in the literature review and focus groups. Then, following the BCW, the results of all steps used to develop a behavioural change intervention targeting patients are presented.

3.2.1. Patients' sample demographics

The patients' focus groups included 11 participants, with a mean age of 43.55 years old (± 11.97), with most being of the female gender (n = 7, 63.63%) and having college education (n = 4, 36.36%). All sociodemographic and clinical characteristics are presented in **Table 6**.

Table 6. *Sociodemographic and clinical characteristics of participating patients*

Variable	Category	Frequency
Gender	Female	7 (63.64%)
	Male	4 (36.36%)
Age	Mean ± SD	43.55 years old ± 11.97
	Minimum	30 years
	Maximum	59 years
Marital status	Single	3 (27.27%)
	Married	3 (27.27%)
	Civil Union	3 (27.27%)
	Divorced	2 (18.18%)
Academic Qualification	Primary education or lower	2 (18.18%)
	Basic education (9th year)	2 (18.18%)
	High school or equivalent (12th year)	3 (27.27%)
	College education	4 (36.36%)
Risk subgroup at SPLIT baseline	Low risk	3 (27.27%)
	Medium risk	5 (45.45%)
	High risk	3 (27.27%)
Number of LBP episodes in the last year	Mean ± SD	1.36 episodes ± 1.12
	Minimum	0 episodes
	Maximum	4 episodes
Duration of the last LBP episode	Mean ± SD	38.91 days ± 51.18
	Minimum	0 days
	Maximum	180 days
Current professional status	Currently employed	9 (81.82%)
	Domestic worker	1 (9.09%)
	Unable to work (not due to LBP)	1 (9.09%)
Sick leave due to an LBP episode	Yes	0 (0%)
	No	11 (100%)

3.2.2. Barriers to patients' adoption of regular exercise practice

This section covers the barriers to adopting regular exercise practice at the patients' level, resulting from both the literature review and focus groups. In total, the analysis revealed 18 barriers linked to five COM-B components (i.e., *Physical Capability*; *Psychological Capability*; *Physical Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and nine TDF domains (i.e., *Skills*; *Knowledge*; *Memory, attention and decision processes*; *Behavioural regulation*; *Environmental context and resources*; *Beliefs about capabilities*; *Beliefs about consequences*; *Reinforcement*; and *Emotion*). All barriers identified, linked to the respective COM-B components and TDF domains, are presented in **Table 7.**

Table 7. *Synthesis of the barriers to patients' adoption of regular exercise practice identified from the literature review and focus groups*

COM-B component	TDF domain	Barriers
Physical Capability	Skills	Lack of skills to practice exercise*
Psychological Capability	Knowledge	Lack of knowledge on how to manage an LBP recurrence**
		Lack of knowledge on exercise and not being aware of its benefits*
	Memory, attention and decision processes	Not having exercise habits**
	Behavioural regulation	Lack/presence of symptoms**
		Daily tiredness sensation**
		Having other priorities and demands in daily life#
		Lack of behavioural regulation strategies (i.e., time-management skills, inability to self-regulate)#
		Self-sacrifice to accommodate others*
Physical Opportunity	Environmental context and resources	Negative influence of work context and type of professional activity in the promotion of sedentary behaviours**
Reflective Motivation	Beliefs about capabilities	Lack of self-efficacy to practice exercise autonomously#
		Lack of self-efficacy to manage a potential LBP recurrence autonomously**
	Beliefs about consequences	Fear-avoidance beliefs about exercise#
		Negative beliefs about condition*
Automatic Motivation	Reinforcement	Motivation to practice exercise dependent on external drivers#
	Emotion	Negative emotions related to health condition**
		Fear of having an LBP recurrence**
		Anxiety/ stress/ fear of pain*

* Barrier only identified in the literature review
** Barrier only identified in the focus groups
\# Barrier identified both in the focus groups and literature review

3.2.2.1. Literature review results

Eleven barriers to patients' adoption of regular exercise practice were found in the literature review. These barriers were classified into four COM-B components (i.e., *Physical Capability*; *Psychological Capability*; *Reflective Motivation*; and *Automatic Motivation*) and seven TDF domains (i.e., *Skills*; *Knowledge*; *Behavioural regulation*; *Beliefs about capabilities*; *Beliefs about consequences*; *Reinforcement*; and *Emotion*).

In total, six barriers were classified in the COM-B component of Psychological *Capability*. One barrier was linked to the TDF domain of *Skills* and was related to patients identifying themselves as lacking the necessary skills to carry out exercise (Spiteri et al., 2019). Another barrier was identified within the TDF domain *Knowledge*, which was lacking knowledge on exercise and not being aware of its benefits (Spiteri et al., 2019). The other four barriers were tied to the TDF domain of *Behavioural Regulation*. The literature showed that in the face of demands of other life roles and busy schedules, especially family-related, patients would not prioritize exercise practice (Kanavaki et al., 2017). Lack of time management skills because of a lot of things to do and self-sacrifice to accommodate others were also identified (Kanavaki et al., 2017; Spiteri et al., 2019).

Three other barriers were identified within the COM-B component of *Reflective Motivation*. One of these barriers, related to patients' low levels of self-efficacy in their abilities to complete a given task (Areerak et al., 2021; Essery et al., 2017; Kanavaki et al., 2017; Miles et al., 2011; Spiteri et al., 2019), was classified with the TDF domain of *Beliefs about capabilities*. The other two barriers identified were the presence of queries or fear about safety to carry out exercise practice and having negative beliefs about the health condition (Kanavaki et al., 2017; Spiteri et al., 2019). These barriers were classified with the TDF domain *Beliefs about consequences*. Lastly, two barriers were identified within the COM-B component *Automatic Motivation*. One barrier was linked with the TDF domain of *Reinforcement* and was related to the lack of motivation to persevere with a behaviour in the absence of external drivers (Essery et al., 2017). The other barrier, the presence of feelings of distress from ongoing pain, stress, fatigue, anxiety, and depression was classified within the TDF domain of *Emotion* (Devan et al., 2018; Kanavaki et al., 2017).

3.2.2.2. Focus groups results

From the focus groups, the analysis revealed 13 barriers to the target behaviour of patients' adoption of regular exercise practice, six of whom had already been identified in the literature review. These barriers were linked to four COM-B components (i.e., *Psychological Capability*; *Physical Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and eight TDF domains (*Knowledge*; *Memory, attention and decision processes*; *Behavioural regulation*; *Environmental context and resources*; *Beliefs about capabilities*; *Beliefs about consequences*; *Reinforcement*; and *Emotion*).

Six barriers were linked with the COM-B component *Psychological Capability*. One of these barriers was tied with the TDF domain *Knowledge* and defined as lack of knowledge. Specifically, some participants reported not knowing how to act in case of an LBP recurrence and would have to contact their respective doctors or physiotherapists or resort to passive coping strategies.

> *"... if it [LBP episode] happens to me again, I won't know what to do, because, in the meantime, as I'm going to keep doing the exercises I learned, specific for low back pain, I think I'll really have to go to the doctor because I won't know what to do." (Patient Anabela, FG3, 12, 551)*

Another barrier was also identified within the domain of *Memory, attention and decision processes*, and was related to currently not having exercise habits. The remaining four barriers were tied to the TDF domain of *Behavioural regulation*. Participants reported several aspects that prevented them from engaging with exercise habits, such as it being impacted by the lack or presence of symptoms, daily tiredness sensation, having other priorities and demands in their daily lives and a lack of behavioural regulation strategies (i.e., time management skills, inability to self-regulate).

> *"But this is the truth, I'm terrible at practising these things [exercise] by myself, I have to be in a place and people have to tell me to do it, because otherwise, I won't do it." (Patient Jéssica, FG4, 3, 124)*

> *"(...) I would like to go on some walks too, but no, until now I still haven't been able to find that hour (...)" (Patient Celeste, FG3, 2, 69)*

At the level of the COM-B component *Physical Opportunity* and the TDF domain *Environmental context and resources,* only one barrier was identified. This barrier was related to the negative influence that the work context and specific types of professional activities can have in promoting sedentary behaviours.

> *"(…) but the truth is that after this remote work thing, because I stayed at home, it's been two years since I started working from home, and this has made me more sedentary (…)" (Patient Vitória, FG4, 4, 152)*

For the COM-B component *Reflective Motivation*, three barriers were found. Low levels of self-efficacy were identified, with some participants reporting a lack of confidence in their abilities to practice exercise and manage a potential LBP recurrence autonomously. These barriers were linked with the TDF domain *Beliefs about capabilities*.

> *"I think that if I have the same episode, and it's just my way of comparison, I will be incapacitated, I won't be able to do much." (Patient Cristiano, FG4, 15, 683)*

> *"... my episodes were always a bit violent. The most acute ones, right? And I always had to be on medication, so I honestly don't know... without, without medical intervention, I don't know if... if it will be possible to recover." (Patient Jéssica, FG4, 15, 669)*

The other barrier was identified at the level of the TDF domain *Beliefs about consequences* and was defined as fear-avoidance beliefs about exercise. Some participants presented beliefs that exercise practice could worsen their health condition and potentially trigger a new episode of LBP.

> *"... one of my main fears was doing exercise in a way that was wrong and that would do more harm than good, while I was still exercising." (Patient Joel, FG4, 5, 192)*

Lastly, three barriers were identified within the COM-B component *Automatic Motivation*. One of these barriers was linked to the TDF domain *Reinforcement* and was related to the overall lack of motivation to practice exercise autonomously, without the influence of external drivers.

"... I'm really bad at doing things. If it's imposed on me, if I'm there... at that time and it's imposed on me, I'll do it." (Patient Jéssica, FG4, 18, 825)

The last two barriers were tied with the TDF domain *Emotion*. These barriers were defined as patients' negative emotions regarding their health condition, specifically for not achieving the expected results and fear of suffering an LBP recurrence in their daily lives.

"(...) I felt a little bit sad because I didn't... I didn't have those improvements that were expected (...)" (Patient Jéssica, FG4, 13, 595)

"(...) it's always what I'm always aware of. As soon as I feel a bit of pain, I'll take my foot off the accelerator and let's slow down because, you know, I have that fear. This fear. It may even be nothing (...) but yes, I pay a lot of attention." (Patient Cristiano, FG4, 16, 724)

3.2.3. Facilitators to patients' adoption of regular exercise practice

The facilitators to patients' adoption of regular exercise practice are presented in this section. The combined results of the literature review and focus groups revealed 19 facilitators classified within five COM-B components (i.e. *Psychological Capability*; *Social Opportunity*; *Physical Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and 13 TDF domains (*Knowledge*; *Memory, attention and decision processes*; *Behavioural regulation*; *Social influences*; *Environmental context and resources*; *Social/professional role and identity*; *Beliefs about capabilities*; *Optimism*; *Beliefs about consequences*; *Intentions*; *Goals*; *Reinforcement*; and *Emotion*). All of the patients' facilitators to the adoption of exercise practice can be found in **Table 8**, with links to the COM-B components and TDF domains.

Table 8. *Synthesis of the facilitators to patients' adoption of regular exercise practice identified from the literature review and focus groups*

COM-B components	TDF domains	Facilitators
Psychological Capability	Knowledge	Having knowledge on exercise and LBP recurrences[#]
		Understanding the biopsychosocial nature and mechanisms underpinning condition[*]
	Memory, attention and decision processes	Past experiences related with LBP episodes[**]
		Having regular exercise habits[**]
	Behavioural regulation	Being able to manage and prioritize musculoskeletal health in daily life[**]
		Recognition of own limits and self-monitoring of symptoms[**]
		Being able to manage exercise practice according to daily availabilities[**]
Social Opportunity	Social influences	Practicing exercise with other people/Being with similar others[#]
Physical Opportunity	Environmental context and resources	General availability for being at home (e.g., sick leave, retired, etc.)[**]
		Having a place and material resources to practice exercise[**]
Reflective Motivation	Social/professional role and identity	Accepting pain as part of *self*[*]
	Beliefs about capabilities	Self-confidence to practice exercise[**]
	Optimism	Optimism that the expected benefits and results will be achieved[**]
	Beliefs about consequences	Anticipating and believing in the benefits of exercise[**]
	Intentions	Wanting to practice exercise and prioritizing it[**]
	Goals	Having well defined health-related goals[**]
Automatic Motivation	Reinforcement	Safety to practice exercise with physiotherapists' support[**]
	Emotion	The ability to distinguish self (i.e., body, thoughts and feelings) from pain[*]
		Positive emotions related with exercise practice[**]

[*] Facilitator only identified in the literature review
[**] Facilitator only identified in the focus groups
[#] Facilitator identified both in the literature review and focus groups

3.2.3.1. Literature review results

Regarding the facilitators, the literature review revealed five facilitators to patients' adoption of regular exercise practice, which were classified into four COM-B components (i.e., *Psychological Capability*; *Social Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and four TDF domains (i.e., *Knowledge*; *Social influences*; *Social/professional role and identity*; Emotion).

For the COM-B component *Psychological Capability* and TDF domain *Knowledge*, the literature review revealed two facilitators. One was understanding the biopsychosocial

nature and mechanisms underpinning the condition (Devan et al., 2018), while the other was having accurate knowledge on exercise and its benefits (Spiteri et al., 2019). One barrier was classified within the COM-B component *Social Opportunity* and the TDF domain *Social influences*, and was related to being with similar others in a group setting was empowering, since patients felt a sense of normality and decreased isolation (Devan et al., 2018).

Accepting pain as part of *self* and acknowledging that it is possible to live life despite pain (Devan et al., 2018) was classified within the COM-B component of *Reflective Motivation* and the TDF domain of *Social/professional role and identity*. Lastly, self-discovery or the ability to distinguish *self* (i.e., body, thoughts and feelings) from pain (Devan et al., 2018) was classified with the COM-B component of *Automatic Motivation* and the TDF domain *Emotion*.

3.2.3.2. Focus groups results

Through the content analysis of the focus groups transcripts, 16 facilitators to patients' adoption of regular exercise practice were found, two of which had already been identified in the literature review. The analysis allowed the mapping of these facilitators to five COM-B components (i.e., *Psychological Capability*; *Social Opportunity*; *Physical Opportunity*; *Reflective Motivation*; and *Automatic Motivation*) and 12 TDF domains (*Knowledge*; *Memory, attention and decision processes*; *Behavioural regulation*; *Social influences*; *Environmental context and resources*; *Beliefs about capabilities*; *Optimism*; *Beliefs about consequences*; *Intentions*; *Goals*; *Reinforcement*; and *Emotion*).

Six facilitators were mapped to the COM-B component *Psychological Capability*. One facilitator, having knowledge about exercise and LBP recurrences, was linked with the TDF domain *Knowledge*. This facilitator was specifically related to having knowledge about the importance and benefits of exercise, strategies to prevent LBP recurrences and knowing how to act in case of a recurrence.

> *"But as I told you, I continue to put into practice everything I learned with... in physiotherapy, as prevention essentially." (Patient Cristiano, FG4, 15, 686)*

"Me too, if I have an episode, I also think that I would put into practice what I've learned, which I think was very beneficial for me (…)" (Patient Graça, FG4, 15, 694)

Regarding the TDF domain *Memory, attention and decision processes*, two facilitators were identified. Past experiences related to LBP episodes, such as the use of strategies previously learned for practising exercise in the presence of symptoms and the memory of the levels of disability associated with previous episodes, were deemed to contribute substantially to the adoption of the target behaviour.

"(…) I would make notes of the exercises I had to do, and I still keep those notes. And they're pretty handy notes to remind me (…) And that was, it was something that was really helpful (…) I could remember exactly what I had to do to make sure I wasn't doing any exercise in the wrong way." (Patient Joel, FG4, 2, 91)

Additionally, one other facilitator within this domain was revealed. Conversely to what was identified in the barriers, having regular exercise habits was considered to be a facilitator.

"(…) I continue doing it [exercise] alone at home, with the indications given by my physiotherapist, I continue to do it at home, daily (…)" (Patient Conceição, FG3, 5, 193)

"In the meantime, I've always continued to do the exercises, I run, five times a week. I've always kept practising." (Patient Fátima, FG3, 2, 58)

Three facilitators, related to patients' ability to regulate their behaviour and introduce exercise practice into their lives, were mapped to the TDF domain of *Behavioural regulation*. Participants reported important aspects, such as being able to manage and prioritise musculoskeletal health in their daily lives. Additionally, recognising their own limits when practising exercise and self-monitoring of symptoms, and having strategies to manage exercise practice according to their daily availabilities were important enablers within this domain.

"(…) because it's easier, I have some days when I don't have time to go for a walk. When, when I see that I have time, I'll take a walk. When I see that I don't have time, because of this or that, I'll do the exercises (…) and it has worked." (Patient Graça, FG4, 2, 72)

The COM-B component *Social Opportunity* and the TDF domain *Social influences* were linked to one facilitator, defined as practising exercise with other people. The opportunity to share information and knowledge about exercise with others was an important aspect identified by this facilitator, however, different perspectives were present. Some participants considered practising exercise in a group as a motivating factor, while others reported that their motivation to practice exercise was not influenced by other people.

> *"I do it [exercise] alone during the week. I only have company during the weekend. I also really like to do it alone and it's not because I'm alone that I'll stop doing my walks." (Patient Anabela, FG3, 12, 535)*

At the level of the COM-B component of *Physical Opportunity* and the TDF domain *Environmental context and resources*, the analysis revealed two facilitators. Some participants reported being available to practice exercise for being at home, on sick leave or retired. The most common facilitator within this domain was having a specific place and access to the necessary material resources to practice exercise.

> *"I also think I'm able to do it [exercise]. I have space, I also have a comfortable place where I can do it." (Patient Jéssica, FG4, 8, 365)*

> *"In my case (...) I go to the gym right at seven in the morning and I do it [exercise] there. From seven until nine, more or less, because of my professional life. And so that's where I do it…" (Patient Cristiano, FG4, 8, 341)*

Within the COM-B component *Reflective Motivation*, five facilitators, each one linked to a different TDF domain, were identified. Self-confidence to practice exercise, associated with an intrinsic motivation to practice exercise and confidence in the potential results of exercise due to positive past experiences, was linked to the TDF domain *Beliefs about capabilities*.

> *"(...) given the improvements I had with SPLIT (...) I would say eight, nine[g], because I know that from that previous programme, there were great improvements (...)" (Patient Cristiano, FG4, 13, 573)*

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[g] Level of confidence for the adoption of regular exercise practice, on an 11-point Likert scale (in which 0 means "not confident" and 10 means "totally confident").

Some participants also reported optimism that the expected benefits and results from practising exercise will be achieved, and this was tied with the TDF domain *Optimism*. From the patients' point of view, the potential benefits of regular exercise practice (e.g., its role in the prevention of LBP, habit creation, physical and psychological benefits) was considered to be a key enabler and was linked to the TDF domain *Beliefs about consequences*.

> *"The main benefit would be not being in the sixty-nine per cent who go back to having a low back pain episode within the first year. That would be the main benefit..." (Patient Joel, FG4, 12, 517)*

> *"(...) to me exercise is an important asset... essentially, at a physical level, muscle strengthening is without a doubt a plus (...) and it ends up being like an escape on a mental, psychological level, from our daily stresses (...)" (Patient Pedro, FG3, 11, 475)*

One facilitator was found in the TDF domain *Goals* and was defined as having well-defined health-related goals, such as preventing LBP recurrences. Not wanting to feel again the pain and disability previously experienced seemed to offer patients a motivating and very concrete goal, towards which they intend to direct their efforts.

> *"At this moment, I'm very motivated. For someone who has had several recurrences of low back pain, I don't want to have it again." (Patient Fátima, FG3, 4, 152)*

Another was found within the domain of *Intentions*, which was related to participants wanting to practice exercise, as well as considering it a priority in their daily lives.

> *"I think this is a matter of priorities. So, if my priority... since I was invited to the intervention, for me it becomes a priority (...) It will make so I don't have low back pain (...)" (Patient Fátima, FG3, 14, 645)*

The last two facilitators were found at the level of the COM-B component *Automatic Motivation*. Safety to practice exercise was associated with having physiotherapists' support, which was also considered a reinforcing factor. This facilitator was linked with the TDF domain *Reinforcement*. The last facilitator, linked to the TDF domain *Emotion*, was the demonstration of positive emotions related to exercise practice.

"...how do I feel when I've finished exercising? (...) I feel good, I feel good, that's why I do it. Because I like it, I like that sense of accomplishment when… when I reach the goal I set for each exercise session I do." (Patient Fátima, FG3, 11, 483)

3.2.4. Development of a behaviour change-informed intervention to facilitate patients' adoption of regular exercise practice: The MyBack Intervention Programme

3.2.4.1. Identification of intervention options

As in the physiotherapists' analysis, all potentially relevant intervention functions to best target the patients' behaviour of adopting regular exercise practice were identified. From the nine intervention functions, seven were selected as the most suitable to address the behavioural diagnosis established from the patients' focus groups and the literature review: *Education*; *Persuasion*; *Incentivization*; *Training; Environmental restructuring*; *Modelling*; and *Enablement*. Once again, an example of the mapping between the COM-B model, TDF, patient barriers, and intervention functions is provided in **Table 9**. Additionally, the full mapping of the remaining barriers and facilitators is presented in **Appendix 11**.

Table 9. *Example of the mapped patients' barriers (and respective COM-B components and TDF domains) to intervention functions*

COM-B	TDF	Barriers	Intervention Functions								
			Education	Persuasion	Incentivisation	Coercion	Training	Restriction	E. Restructuring	Modelling	Enablement
Physical Capability	Skills	Lack of skills to practice exercise					×				
Psychological Capability	Behavioural regulation	Having other priorities and demands in daily life	×				×				×
Automatic Motivation	Emotion	Fear of having an LBP recurrence		×	×					×	×

3.2.4.2. Identification of content and implementation options

After selecting the intervention functions, the next step allowed for the selection of 30 BCTs to be used with patients in order to facilitate their adoption of regular exercise practice: *1.1. Goal-setting (behaviour)*; *1.2. Problem-solving*; *1.3. Goal-setting (outcome)*; *1.4. Action planning*; *1.5. Review behaviour goal(s)*; *1.7. Review outcome goal(s)*; *2.1. Monitoring of behaviour by others without feedback*; *2.2. Feedback on behaviour*; *2.3. Self-monitoring of behaviour*; *3.1. Social support (unspecified)*; *3.2. Social support (practical)*; *4.1. Instruction on how to perform the behaviour*; *5.1. Information about health consequences*; *5.3. Information about social and environmental consequences*; *5.6. Information about emotional consequences*; *6.1. Demonstration of the behaviour*; *6.3. Information about others' approval*; *7.1. Prompts/cues*; *8.1. Behavioural practice/rehearsal*; *8.7. Graded tasks*; *9.1. Credible source*; *10.3. Non-specific reward*; *10.4. Social reward*; *11.2. Reduce negative emotions*; *11.3. Conserving mental resources*; *12.1. Restructuring the physical environment*; *12.2. Restructuring the social environment*; *12.5. Adding objects to the environment*; *15.1. Verbal persuasion about capability*; *15.3. Focus on past success*.

Once again, after selecting the BCTs, the next step was to identify the content for the MyBack Intervention Programme, as well as the MoDs. In this step, the intervention content that the BCTs will help deliver to the patients to facilitate the adoption of regular exercise practice were specified and their MoDs identified. **Table 10** represents an example of the mapping between the COM-B components, TDF domains, intervention functions, BCTs, intervention content and MoDs identified. The full mapping is available in **Appendix 12**.

Through the BCW process, it was possible to develop a theory-based behaviour-change-informed exercise intervention to promote the adoption of regular exercise practice for patients at risk of LBP recurrence, the MyBack Intervention Programme (**Appendix 13**). The intervention functions, BCTs and MoDs helped develop a programme that will include several components, including supporting materials that will ensure that the intervention is tailored to individuals' specific barriers and facilitators and that will support patients' implementation of the target behaviour of adopting regular exercise practice.

Table 10. *Example of the mapping of patients' barriers, COM-B components, TDF domains and intervention functions to selected BCTs, intervention content and modes of delivery*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery
Physical Capability	Skills	Training	2.2. Feedback on behaviour 4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 8.1. Behavioural practice/rehearsal 8.7. Graded tasks	• Selection of exercises suitable for the different types of training • Progression criteria for the different exercise training types • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of general health status • Monitoring and register of exercise levels • Exercise adaptation in case of symptoms (e.g., pacing) • Strategies to deal with LBP recurrence • How to perform the exercises properly and safely • Feedback on patients' exercise skills • Feedback on patients' monitoring skills • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Rehearsal/practice of exercise and monitoring skills (BCIO:011048) • Private access to a platform with videos of the exercises (BCIO:011010)
Psychological Capability	Behavioural regulation	Education Training Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 1.4. Action planning 2.3. Self-monitoring of behaviour 11.2. Reduce negative emotions 11.3. Conserving mental resources	• Definition of SMART goals • Development of an action plan and monitoring goal achievement • Criteria for seeking versus not seeking healthcare • Planning for the future, after finishing the programme • Use exercise postcards and MyBack website • Register of exercise levels • Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Personal barriers and facilitators for the adoption and training of self-management strategies	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010)
Automatic Motivation	Emotion	Persuasion Incentivization Modelling Enablement	2.2. Feedback on behaviour 3.1. Social support (unspecified) 5.6. Information about emotional consequences 6.1. Demonstration of the behaviour 10.4. Social reward 11.2. Reduce negative emotions	• Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice • Congratulate patients for achieving the established goals • Fear of movement and LBP recurrences • Consequences of counterproductive thoughts and behaviours • Pain information (pain ≠ injury) • Multifactorial origin of pain	• (Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)

4. DISCUSSION

The purpose of this study was to develop behaviour change-informed interventions to promote the adoption of regular exercise practice in patients at risk of LBP recurrence and to support physiotherapists' promotion of this behaviour. Therefore, this study specifically explored physiotherapists' barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice, as well as patients' perceived barriers and facilitators to the adoption of this behaviour. Additionally, the stages of the BCW, through the identification of intervention options, content and implementation options, allowed the development of two behaviour change-informed interventions: 1) The MyBack Training Programme, aimed at supporting physiotherapists' promotion of regular exercise practice; and 2) The MyBack Intervention Programme, a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence.

4.1. Physiotherapists' barriers and facilitators and development of the MyBack Training Programme

There are a plethora of barriers influencing the implementation of evidence-based practices. For instance, the high volume of research evidence currently available and continuously produced, lack of time and skills to properly appraise and understand evidence are some of the most commonly reported barriers by health professionals (Grimshaw et al., 2012). While targeting these issues is important, it may not be sufficient since many barriers, such as structural barriers (e.g., financial disincentives), organizational barriers (e.g., lack of resources and facilities), peer-related barriers (e.g., usual practice not being aligned with the desired practice), professional barriers (e.g., knowledge, skills and attitudes) and barriers related to the interactions between patients and healthcare professionals (e.g., communication and information processing issues), can act at different levels of the healthcare systems and not just at an individual level (Grimshaw et al., 2012).

The COM-B model and the TDF provided a detailed understanding of the barriers and facilitators that may impact the future implementation of the MyBack Intervention Programme by physiotherapists, which then allowed the development of the MyBack Training Programme that will target these specific determinants. The analysis revealed that

for the desired behaviour to occur, five COM-B components and 13 TDF domains needed to be considered. In total, 13 barriers and 23 facilitators to physiotherapists' implementation of the MyBack Intervention Programme were identified. Some of the results of this study are in line with previously identified barriers and facilitators in the literature, related to implementation science or implementation of other interventions in primary healthcare.

Within the COM-B component *Psychological Capability* and the TDF domains of *Knowledge* and *Skills*, lack of knowledge and lack of skills for the implementation of the MyBack Intervention Programme were respectively identified. Conversely, having knowledge and acquiring skills through participation in the implementation of the intervention were considered to be facilitators. A mixed-methods study by Ris et al. (2021) that explored clinicians' perceptions on the implementation of the GLA:D Back programme, a structured group-based patient education and exercise programme for LBP, also reported personal gains such as the enhancement of skills, knowledge and participation in research projects as implementation facilitators.

Regarding the COM-B component *Physical Opportunity* and TDF domain *Environmental context and resources*, several barriers and facilitators were identified. The existence of other priorities from the contexts and not having management support were considered by some participants as important barriers to the future implementation of the MyBack Intervention Programme. Conversely, other participants identified having the necessary support within their contexts from management, who considered the intervention and its implementation a priority. Some participants either identified lack of time or having time to implement the MyBack Intervention Programme as a potential barrier or facilitator, respectively. Resource availability, human or material, was also an issue raised by participants, with some mentioning not having the necessary resources and facilities, and others reporting the contrary. These opposing barriers and facilitators identified by the physiotherapists highlight the existence of several contextual differences between primary healthcare centres. For instance, the divergences regarding management support may be explained by physiotherapists' previous experience in implementing the SPLIT programme, where some had management support, while others did not. This may also indicate the need to adapt the MyBack Training Programme to the different contexts.

These previous results are in line with what has been previously identified in the literature. A systematic review of reviews by Lau et al. (2016) that aimed to identify the causes of the evidence-to-practice gap for complex interventions in primary healthcare, identified that stakeholders' lack of acceptance of and willingness to actively support and/or participate, resistance or presence of competing priorities, or lack of interest was an important barrier to implementation. However, buy-in by the different stakeholders and having them aligned with the implementation plan was found to promote implementation (Lau et al., 2016). Additionally, the availability of resources, including time and appropriate staff was also identified as a barrier or facilitator, while insufficient equipment for implementation was reported as a barrier (Lau et al., 2016). The use of resources, specifically time, was also reported as a barrier to implementation by Ris et al. (2021), while another systematic review by Scurlock-Evans et al. (2014) that sought to identify barriers and facilitators to physiotherapists' implementation of evidence-based practice, found that lack of time and workload pressure were the most commonly reported barriers. In another study by Caeiro et al. (2019), which sought to explore potential barriers and facilitators to the implementation of the SPLIT programme, the lack of adequate facilities to implement and conduct group physiotherapy sessions was also highlighted as an important barrier to implementation in primary healthcare. Still, within this domain, physiotherapists also identified that the alignment of the intervention's principles with primary healthcare's principles might also facilitate its implementation. This has also been reported in the Caeiro et al. (2019) study, which identified that the coherence between SPLIT and the aims and mission of primary healthcare was seen to enable implementation.

Within the COM-B component *Social Opportunity* and the TDF domain *Social influences*, participants identified lack of opportunity to interact and discuss with their peers as a potential barrier, whereas the establishment of relationships with patients, other physiotherapists or the remaining members of the multidisciplinary team were considered to enable implementation. In their study, Caeiro et al. (2019) also reported interdisciplinary work as a potentially key enabling factor. These factors were also identified within the systematic review by Lau et al. (2016), where the presence of a positive and trusting inter-professional relationship through active communication and opportunity to discuss issues and challenges, relationships between healthcare professionals and between healthcare professionals and patients were identified to positively influence implementation (Lau et al.,

2016). Additionally, that study also identified the involvement and support from peers, colleagues and superiors, active engagement of clinical and non-clinical staff and continuous communication as facilitating factors (Lau et al., 2016).

Participants also mentioned factors classified within the COM-B component *Reflective Motivation* and the TDF domain *Social/professional role and identity*. As a barrier, it was identified that most physiotherapists still practice according to a paternalistic model of care that does not promote patient autonomy. This is in line with previous findings by Cruz et al. (2012), which suggest that portuguese physiotherapists seem to favour a reasoning and practice approach more consistent with a traditional biomedical model of care and a practice that is mostly clinician-centred. As potential facilitators, participants identified possible benefits at the physiotherapists' level and development of the profession and the alignment of the intervention with their professional identity and role in primary healthcare. Ris et al. (2021) also found that the desire to implement evidence-based practice and alignment of the programme with clinicians' own attitudes and beliefs to be an important factor.

Levels of self-efficacy for the implementation of the MyBack Intervention Programme, classified with the TDF domain of *Beliefs about consequences*, was also an important aspect raised by physiotherapists, with some being confident, while others were not. This factor was also identified to hamper implementation by Lau et al. (2016), while in the study by Ris et al. (2021) clinicians' beliefs in their skills and capability to implement the programme was found to facilitate implementation of the GLA:D programme.

Ris et al. (2021) also reported other facilitators, such as positive feelings and emotions related to the capability to implement the programme and to patients' experienced benefits from the programme. In the present study, these aspects were also identified, with participants demonstrating positive emotions towards the implementation of the intervention (COM-B *Automatic Motivation*; TDF *Emotions*) and beliefs about the possible patient benefits and the improvement of the quality of care provided (COM-B *Reflective Motivation*; TDF *Beliefs about consequences*). This last factor was also reported by Caeiro et al. (2019) regarding the implementation of SPLIT, where participants demonstrated motivation to improve the healthcare provided to patients.

Similarly to the present study, the Self-management of Osteoarthritis and Low back pain through Activity and Skills (SOLAS) intervention also sought to explore, through the use of

the TDF, potential barriers and facilitators to be addressed to support physiotherapists' implementation of the intervention, in Ireland's primary healthcare (Hurley et al., 2016). The study identified factors within 13 TDF domains, mainly related to the physiotherapists who will implement the intervention and the target participants. Most barriers were identified within the domain of *Environmental context and resources* (e.g., availability of suitable facilities and equipment to deliver the intervention as designed; increased workload due to the time involved in setting up and running the intervention), *Beliefs about capabilities* to deliver the intervention as intended (e.g., dealing with a mixed group of patients with different physical capabilities), and *Beliefs about its consequences* (e.g., causing flare-ups due to patients' inability to properly select exercises) (Hurley et al., 2016). Facilitators were identified within the domains of *Knowledge* and *Skills* (e.g., experience in managing the target participants; experience in conducting group sessions for several persistent conditions), *Optimism* (e.g., on the self-management approach and on supporting patients' autonomy to self-manage), *Environmental context and resources* (e.g., having access to appropriate facilities), among others (Hurley et al., 2016).

After identifying all barriers and facilitators to physiotherapists' implementation of a behaviour change-informed exercise intervention, and following the BCW process, it was possible to systematically develop the MyBack Training Programme for physiotherapists.

The MyBack Training Programme will be tailored to support physiotherapists' implementation of the MyBack Intervention Programme and will target the specifically identified determinants. For instance, for the *Knowledge* barrier of lack of knowledge on the risk factors for and management of LBP recurrences, physiotherapists will, for example, receive education on the effects of exercise for the prevention of recurrences, the determinants that mediate the adoption of regular exercise practice, evidence on the use of BCTs, among other components. For the *Social influences* barrier of lack of peer interaction and discussions, the MyBack Training Programme will include specific moments for group discussions and peer sharing. To target the *Beliefs about capabilities* barrier of lack of confidence for the implementation of the intervention, several strategies will be used to target this, including but not only, demonstration on how to perform the physical fitness tests and demonstration on how to structure a tailored exercise plan, based on the results of the physical fitness assessment.

The identified facilitators will also be targeted, as a way of reinforcing them. For instance, the facilitator ability to organize and manage work activities according to the needs and availabilities, identified within the TDF domain *Behavioural regulation*, will be optimized through the establishment of goals for the implementation of the MyBack Intervention Programme, anticipation and discussion of expected barriers and facilitators and ways to overcome or optimize them, and the development of an action plan and monitorization of goals for recruitment and implementation. For the *Emotion* facilitator of positive emotions towards the implementation of the intervention, strategies such as giving feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs, feedback on the achievement of established goals and action plan, and reinforcement of their role as agents of change will be used.

These are only some examples of how this study helped to develop specific strategies to overcome or optimize, respectively, the barriers and facilitators to physiotherapists' implementation of the MyBack Intervention Programme, a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice in patients at risk of LBP recurrence.

4.2. Patients' barriers and facilitators and development of the MyBack Intervention Programme

Regarding the analysis of the patients' target behaviour, it is important to note that, given the lack of research conducted on barriers and facilitators of patients who recovered from an LBP recurrence regarding the adoption of exercise practice, the conducted literature review focused on other populations, specifically healthy individuals, people with low back pain and osteoarthritis, and the results were extrapolated to the population of interest. This allowed the identification of common barriers and facilitators to exercise practice reported in the literature, that may be of interest to consider and target within the MyBack Intervention Programme.

One of the barriers to patients' target behaviour identified in the literature, tied to the COM-B component *Physical Capability* and the TDF domain *Skills*, was patients reporting not having the necessary skills to adopt and practice exercise (Spiteri et al., 2019). This barrier was not identified in the patients' focus groups, which may be explained by the fact that the

MyBack Intervention Programme was presented as an individually tailored exercise intervention, in which the exercise plan will be tailored to each individual's physical skills, according to the results of the different physical fitness tests. Regarding the COM-B component of *Psychological Capability* and the TDF domain *Knowledge*, lack of knowledge or having knowledge on exercise and its potential benefits were found in the literature (Spiteri et al., 2019), as well as in the patients' focus groups as a barrier or facilitator, respectively.

Levels of self-efficacy was also a recurrent barrier or facilitator reported throughout most participating patients in the focus groups and was classified with the COM-B component *Reflective Motivation* and the TDF domain *Beliefs about capabilities*. On the one hand, some participants reported lack of self-efficacy to practice exercise or manage a potential LBP recurrence autonomously. On the other hand, other participants reported high levels of self-efficacy, related to self-confidence for exercise practice. A systematic review by Essery et al. (2017) found similar results, outlining self-efficacy as a strong predictor to home-based rehabilitation adherence. More recently, the findings of another systematic review by Areerak et al. (2021) also found self-efficacy to be a factor associated with exercise adherence, and that the improvement of self-efficacy levels may be an important management target. Furthermore, self-efficacy has been suggested as an important predictor and mediator of patients' outcomes (Miles et al., 2011).

Several other barriers and/or facilitators were also concurrently identified in the literature review and focus groups. Lacking time management skills (Spiteri et al., 2019) and not considering exercise a priority (Kanavaki et al., 2017) (COM-B *Psychological Capability*; TDF *Behavioural Regulation*), the presence of fear-avoidance beliefs in practising exercise (Spiteri et al., 2019) (COM-B *Reflective Motivation*; TDF *Beliefs about consequences*), and not practising exercise without external influences (Essery et al., 2017), such as having physiotherapists' supervision (COM-B *Automatic Motivation*; TDF *Reinforcement*) were reported barriers both in the literature and in the focus groups. The opportunity provided by the social environment, specifically being able to be around people with similar experiences and practising exercise with others was also a common facilitator identified within the present study and in the literature (Devan et al., 2018).

The SOLAS study also sought to identify patients' views on the intervention, conceptualizing them within the TDF domains (Hurley et al., 2016). They found factors related to the domains of *Social influences* (e.g., patients' positive attitudes towards the social interaction experienced in group physiotherapy sessions), *Beliefs about consequences* (e.g., the anticipation of positive outcomes in pain, function and ability to cope with their health condition), and *Environmental context and resources* (e.g., patients reported preferring a longer programme as a way to support the ability to self-manage their condition (Hurley et al., 2016).

With the identification of specific barriers and facilitators to patients' adoption of regular exercise practice, it was possible to engage with the BCW stages of identifying the intervention functions, BCTs and MoDs. This process informed the theory-based development of the MyBack intervention programme, which will take into account the specific determinants to the adoption of the target behaviour and employ specific strategies, ensuring that the intervention is individually tailored to each patient's characteristics.

To clarify, some examples are provided. To target the *Memory, attention and decision processes* barrier of patients not having exercise habits, strategies such as using exercise postcards and having access to demonstrative videos on how to perform the exercises, exercise adaptations in case of symptoms, selection, use and interpretation of different exercise monitoring methods will be used. For the *Environmental context and resources* barrier of the negative influence of the work context and type of professional activity in the promotion of sedentary behaviours, patients will be supported in identifying specific strategies that may help them increase their daily exercise levels. The fear-avoidance beliefs associated with exercise, classified with the TDF domain of *Beliefs about consequences*, may be targeted through providing information on the benefits of exercise practice in preventing LBP recurrences, on the importance of adopting self-management strategies and healthy behaviours, or demonstration that exercise practice is safe through watching testimonies of people who have recovered from an LBP episode and have been able to introduce exercise into their lives.

In the same way, the identified facilitators will also be optimized through the use of similar strategies. For example, to target the *Social influences* facilitator of being with similar others and practicing exercise with other people, the MyBack Intervention Programme will include

discussions on how to restructure the social environment in a way that promotes exercise practice, and patients will be given the opportunity to participate in group sessions. The facilitator optimism that the expected benefits and results of the programme will be achieved, classified within the *Optimism* domain, will be optimized through the discussion and review of the goals established, the reinforcement of patients' capabilities on the adoption of self-management strategies and exercise, and provision of information on exercise importance and benefits on the prevention of recurrences, among other strategies.

Once again, these are only some examples of how the findings regarding the barriers and facilitators to patients' adoption of regular exercise practice were used to inform the development of the MyBack Intervention Programme.

4.3. Development of the behaviour change-informed interventions: the BCW guidance

In summary, the use of the BCW, including the COM-B model and the TDF, first allowed to identify specific barriers and facilitators and focus on what needed to happen for the target behaviours of physiotherapists' implementation of the MyBack Intervention Programme and patients' adoption of regular exercise practice to occur. The COM-B model of behaviour allowed the conceptualization of the findings of this study within participants' capability, opportunity and motivation, while the TDF then allowed for a more comprehensive and specific understanding of the different barriers and facilitators. The BCW then offered a clear path to select the most appropriate intervention components and inform the development of the MyBack Training Programme and the MyBack Intervention Programme, to overcome these barriers and optimize the facilitators. To our knowledge, this is the first study to use behaviour change theory to inform, optimize and support physiotherapists' implementation of a tailored exercise programme informed by behaviour change, aimed at preventing LBP recurrences. Other studies have used behaviour change theory, including the TDF, to develop interventions focused on the management of LBP or even to develop training programmes to facilitate implementation (French et al., 2012, 2013; Keogh et al., 2018), however, none were focused on the prevention of LBP recurrences.

The BCW has been used in the development and evaluation of several interventions, including modifying physical activity behaviours (Munir et al., 2018; Ojo et al., 2019), however, it has never been applied to understand the behaviours or to enhance the

development of interventions aimed at promoting the adoption of exercise practice in patients at risk of LBP recurrence. Some studies have been conducted on exercise and education programmes for the prevention of recurrences in people who have recovered from an LBP episode (de Campos et al., 2020; Ferreira et al., 2021; Pocovi et al., 2020; Stevens et al., 2018), however, none have reported the use of a theoretical framework to develop the interventions.

4.4. Strengths and limitations of the study

Several strengths of this study can be highlighted. First, the use of the BCW, including the COM-B model and the TDF, allowed the identification and comprehension of the specific barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice and use that knowledge to inform the development of the MyBack Training Programme and the MyBack Intervention Programme.

Second, this study addresses a clear evidence-practice gap and contributes to the evidence about LBP recurrence prevention. Furthermore, the BCW offered a systematic, theory- and evidence-based approach to develop both interventions, adjusted to the specific contexts in which they will be implemented, and that may help ensure their future adoption, effectiveness and sustainability, among other important implementation outcomes. In this sense, the use of the BCW contributes to the behavioural science literature.

Some limitations of the study need to be considered. Social desirability bias, the desire to conform to social acceptability, may have been present and may have influenced participants' responses during the focus groups. Additionally, regarding the patients' focus groups, given the small number of included participants, there is no guarantee that the findings on the barriers and facilitators to the adoption of regular exercise practice represent all possible points of view. This may limit the transferability of the MyBack Intervention Programme to other contexts. Furthermore, all possible barriers and facilitators to the implementation of the MyBack Intervention Programme may not have been identified, since the perspectives of other important stakeholders, such as ACES management and coordinators were not explored.

5. CONCLUSIONS

This study aimed to develop behaviour change-informed interventions to promote the adoption of regular exercise practice in patients at risk of LBP recurrence and to support physiotherapists' promotion of this behaviour. Therefore, in a first instance, physiotherapists' barriers and facilitators to the implementation of a behaviour change-informed exercise intervention to promote the adoption of regular exercise practice and patients' perceived barriers and facilitators to the adoption of this behaviour were explored. Additionally, through the use of the BCW, it was possible to identify intervention options and identify content and implementation options, in order to inform the theory-based development of two interventions to target the identified determinants.

The findings of this study highlight a wide range of barriers and facilitators. At the physiotherapists' level, 13 barriers (4 COM-B components and 7 TDF domains) and 23 facilitators (5 COM-B components and 13 TDF domains) to the implementation of a behaviour change-informed exercise intervention were identified. At the patients' level, the literature review and focus groups revealed 18 barriers (5 COM-B components and 9 TDF domains) and 19 facilitators (5 COM-B components and 13 TDF domains) to the adoption of regular exercise practice.

Using this knowledge, the BCW then offered a systematic and comprehensive approach that resulted in the development of two programmes: 1) The MyBack Training Programme, aimed at targeting physiotherapists' perceived barriers and facilitators (which includes seven intervention functions and 27 BCTs); and 2) The MyBack Intervention Programme, aimed at the barriers and facilitators to the adoption of regular exercise practice (which includes seven intervention functions and 30 BCTs).

This study represents the initial stages of the MyBack project, which will aim to conduct a hybrid type 1, randomized, pragmatic, parallel, controlled and multicenter study to evaluate the effectiveness and implementation of the MyBack Intervention Programme in primary healthcare, for the secondary prevention of LBP.

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7. APPENDICES

7.1. Appendix 1. Participant information sheet

CONVITE E FOLHA DE INFORMAÇÃO AO PARTICIPANTE

Projeto MyBack - Aceitabilidade, viabilidade, barreiras e facilitadores da implementação de um programa personalizado para promoção da autogestão na prevenção de recorrências e incapacidade persistente em utentes que recuperaram de um episódio de lombalgia

Somos uma equipa de investigadores constituída por Fisioterapeutas, Médicos Reumatologistas, Psicólogos e Epidemiologistas, empenhada em contribuir para a implementação de cuidados de saúde baseados na melhor evidência científica para os utentes com lombalgia que recorrem aos cuidados de saúde primários. O MyBack é um projeto de investigação e melhoria da qualidade dos cuidados prestados que visa promover a autogestão da lombalgia em utentes em risco de recorrência de lombalgia, capacitando-os para gerir, a longo prazo, os seus sintomas, prevenir a incapacidade funcional e ocupacional e reduzir a necessidade de recorrer a serviços de saúde devido a recorrências desta condição.

O Projeto MyBack é financiado pela Fundação para a Ciência e Tecnologia (Ref. PTDC/SAU-SER/7406/2020) e resulta de uma parceria entre a Escola Superior de Saúde do Instituto Politécnico de Saúde, a NOVA Medical School/ Faculdade de Ciências Médicas e a Escola Nacional de Saúde Pública da Universidade Nova de Lisboa. Será implementado em diferentes Agrupamentos de Centros de Saúde (ACES) da Administração Regional de Saúde de Lisboa e Vale do Tejo (ARSLVT).

O estudo para o qual a(o) gostaríamos de convidar a participar é realizado no âmbito do Projeto MyBack. Antes de tomar qualquer decisão, é importante que compreenda as razões que justificam a realização do estudo, bem como o nível de envolvimento que lhe é solicitado.

Neste documento serão apresentadas todas as informações relativas aos procedimentos do estudo, com o objetivo de a(o) auxiliar a decidir se pretende, ou não, participar. Com o intuito de facilitar a leitura, a informação é apresentada no formato pergunta/resposta.

Se algum aspeto não for claro ou se desejar obter mais informação por favor não hesite em colocar as suas questões. Utilize o tempo que necessitar para decidir se pretende, ou não, participar neste estudo.

Qual é o propósito do estudo?

Pretende-se investigar a aceitabilidade, viabilidade, barreiras e facilitadores da implementação de um programa personalizado para promoção da autogestão na prevenção de recorrências e incapacidade persistente em utentes que recuperaram de um episódio de lombalgia nos ACES da ARSLVT. Será conduzido um estudo qualitativo, onde se incluem grupos focais, também conhecidos como entrevistas de grupo.

Por que fui convidada(o)?

Foi convidada(o) a participar neste estudo por estar, enquanto utente com lombalgia, em tratamento num dos ACES participantes ou enquanto fisioterapeuta que interveio em utentes com lombalgia.

Tenho mesmo que participar?

A sua participação é totalmente voluntária. Iremos descrever o estudo ao longo deste documento informativo. Caso aceite participar, solicitaremos o seu consentimento informado. É livre de não participar, sem que tenha que o justificar.

Caso a sua eventual participação seja enquanto utente com lombalgia, é importante considerar que a recusa em aceitar este convite não afetará o seu tratamento, que será realizado de acordo com a decisão do seu médico.

O que acontece se aceitar participar no estudo?

Será convidada(o) para uma entrevista de grupo (com 6 a 8 participantes), em formato online, numa das unidades integradas nos ACES participantes e num período do dia que seja conveniente para todos os elementos do grupo. Nesta entrevista, serão colocadas questões que promovam a discussão do grupo sobre a aceitabilidade, viabilidade, barreiras e

facilitadores da implementação de um programa de tratamento para prevenção de recorrências de lombalgia implementado no âmbito do Projeto MyBack. Estima-se que tenha uma duração máxima de 90 minutos.

Quais são as possíveis vantagens em participar?

Não existe garantia de que venha a retirar qualquer benefício da participação neste estudo. Contudo, o conhecimento que esperamos adquirir poderá ajudá-la(o) a si e/ou outras pessoas no futuro, quer a sua participação tenha sido motivada pelo diagnóstico de lombalgia, quer esteja diretamente envolvida(o) na prestação de cuidados de saúde, enquanto fisioterapeuta.

Quais são as possíveis desvantagens ou riscos se aceitar participar?

Não são esperadas quaisquer implicações negativas para os participantes neste estudo.

Tenho liberdade para abandonar o estudo a qualquer momento?

É livre de desistir do estudo a qualquer momento, sem que tenha que o justificar. Solicita-se apenas que informe o elemento da equipa de investigação que o contactou no âmbito da participação neste estudo.

Caso a sua eventual participação seja enquanto utente com lombalgia, é importante considerar que a desistência do estudo não afetará o seu tratamento, que será realizado de acordo com a decisão do seu médico.

O que irá acontecer às informações que eu transmitir?

A informação que transmitir durante a entrevista de grupo será gravada em formato áudio e vídeo e transcrita na íntegra com o intuito de ser analisada posteriormente. Os investigadores guardarão as gravações e transcrições num lugar seguro, na Escola Superior de Saúde do Instituto Politécnico de Setúbal, de forma a impedir o acesso a elementos externos à equipa de investigação. As gravações serão preservadas por um período máximo de cinco anos após o término do estudo.

A minha participação neste estudo será confidencial?

Sim. A recolha de dados pessoais no âmbito deste estudo cumpre as disposições da Lei de Proteção de Dados Pessoais (nº67/98 de 26 de outubro). Serão adotados vários procedimentos de natureza ética com o intuito de assegurar que a sua participação será mantida em confidencialidade. Para além do acesso restrito aos dados anteriormente referido, não será incluída a sua identificação na transcrição da entrevista, sendo utilizado um nome fictício.

O que acontece se não aceitar participar no estudo?

Caso a sua eventual participação seja justificada pelo diagnóstico de lombalgia, esta decisão não terá qualquer impacto no seu tratamento atual ou futuro, ou direitos de saúde e legais.

Caso a sua eventual participação seja justificada por estar envolvida(o) na prestação de cuidados a utentes com lombalgia, esta decisão não terá qualquer impacto na sua atividade profissional.

E se houver algum problema, quem poderei contactar?

Se tiver alguma questão sobre qualquer aspeto relacionado com este estudo, poderá conversar com um membro da equipa de investigação, com quem tenha estabelecido contacto prévio. Faremos o nosso melhor para responder às suas questões. Caso pretenda, poderá contactar-nos também através do e-mail eduardo.cruz@ess.ips.pt.

Se desejar contactar um elemento externo ou fazer uma reclamação poderá contactar a Comissão de Ética Especializada para a Investigação da Escola Superior de Saúde do Instituto Politécnico de Setúbal, através do email ceei.ctc@ess.ips.pt.

O que irá acontecer com os resultados deste estudo?

Os dados recolhidos no âmbito deste estudo poderão vir a ser usados para publicar os resultados e conclusões em relatórios, revistas científicas, congressos ou outra forma de disseminação. Na divulgação dos resultados serão utilizadas transcrições do discurso dos

participantes, sem que seja mencionada a sua verdadeira identidade em qualquer circunstância.

Caso tenha interesse em receber a informação que consigamos recolher, contacte o investigador principal, Professor Doutor Eduardo Brazete Cruz, através do e-mail eduardo.cruz@ess.ips.pt.

Declaração sobre remuneração da equipa de investigação

A equipa de investigadores não é remunerada para a realização deste trabalho de investigação.

Muito obrigada por ler este documento,

Eduardo Brazete Cruz

Professor Coordenador

Departamento de Fisioterapia da Escola Superior de Saúde do Instituto Politécnico de Setúbal

Investigador responsável pelo Projeto MyBack

eduardo.cruz@ess.ips.

7.2. Appendix 2. Participant informed consent

CONSENTIMENTO INFORMADO, LIVRE E ESCLARECIDO PARA PARTICIPAÇÃO EM INVESTIGAÇÃO

de acordo com a Declaração de Helsínquia[8] e a Convenção de Oviedo[9]

Por favor, leia com atenção a seguinte informação. Se achar que algo está incorreto ou que não está claro, não hesite em solicitar mais informações. Se concorda com a proposta que lhe foi feita, queira assinar este documento.

Título do estudo: Aceitabilidade, viabilidade, barreiras e facilitadores da implementação de um programa personalizado para promoção da autogestão na prevenção de recorrências e incapacidade persistente em utentes que recuperaram de um episódio de lombalgia

Enquadramento: Estudo enquadrado no âmbito do projeto de investigação e de melhoria dos cuidados de saúde "*MyBack - Efetividade e implementação de um programa de autogestão personalizado para prevenir recorrências e incapacidade e promover a saúde músculo-esquelética em utentes com lombalgia*". Projeto implementado, em parceria, pela Escola Superior de Saúde do Instituto Politécnico de Setúbal, a Escola Nacional de Saúde Pública e a NOVA Medical School/ Faculdade de Ciências Médicas da Universidade Nova de Lisboa nos Agrupamentos de Centro de Saúde (ACES) da Arrábida, Arco Ribeirinho, Almada-Seixal, Cascais e Médio Tejo. Tem como Investigador Responsável o Professor Doutor Eduardo Brazete Cruz, Professor Coordenador da Escola Superior de Saúde.

Explicação do estudo: Pretende-se investigar a aceitabilidade, viabilidade, barreiras e facilitadores da implementação de um programa personalizado para promoção da autogestão na prevenção de recorrências e incapacidade persistente em utentes que recuperaram de um episódio de lombalgia. Será conduzido um estudo qualitativo, onde se incluem grupos focais, também conhecidos como entrevistas de grupo.

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[8] http://portal.arsnorte.min-saude.pt/portal/page/portal/ARSNorte/Comiss%C3%A3o%20de%20%C3%89tica/Ficheiros/Declaracao_Helsinquia_2008.pdf

[9] http://dre.pt/pdf1sdip/2001/01/002A00/00140036.pdf

Foi convidada(o) a participar neste estudo, enquanto utente com lombalgia, em tratamento num dos ACES participantes, ou enquanto Fisioterapeuta que interveio em utentes com lombalgia.

O seu envolvimento no estudo implica a participação numa entrevista (com seis a oito participantes), em formato online, num período do dia que seja conveniente para todos os elementos do grupo. Estima-se que a entrevista de grupo tenha uma duração máxima de 90 minutos.

Nesta entrevista, serão colocadas questões que promovam a discussão do grupo sobre a sua perspetiva acerca da aceitabilidade, viabilidade, barreiras e facilitadores da implementação do programa de prevenção de recorrências para utentes que recuperaram de um episódio de lombalgia implementado no âmbito do Projeto MyBack. As entrevistas serão gravadas em formato áudio e vídeo e transcritas na íntegra, para análise posterior. Todos os ficheiros associados à recolha de dados serão preservados até um período máximo de cinco anos após o término do estudo, sendo nesse momento destruídos.

Condições e financiamento: A participação no estudo é de carácter voluntário e não implica o pagamento de deslocações ou quaisquer contrapartidas. Não se identificam prejuízos, assistenciais ou outros, decorrentes desta participação. O estudo é financiado pela Fundação para a Ciência e Tecnologia e mereceu pareceu favorável da Comissão de Ética Especializada para a Investigação da Escola Superior de Saúde do Instituto Politécnico de Setúbal.

Confidencialidade e anonimato: A recolha de dados pessoais no âmbito deste estudo cumpre as disposições da Lei de Proteção de Dados Pessoais (nº67/98 de 26 de outubro). Serão adotados vários procedimentos com o intuito de assegurar que a participação de cada indivíduo será mantida em anonimato e confidencialidade. A identificação pessoal associada aos dados de caracterização será removida e substituída por um código numérico. No caso das transcrições, a identificação de cada indivíduo será substituída por um nome fictício. Todos os ficheiros relativos às gravações e transcrições serão armazenados em local seguro, com acesso restrito à equipa de investigação.

Os dados recolhidos destinam-se a uso exclusivo no âmbito do presente estudo. Poderão vir a ser usados para publicar os resultados e conclusões em relatórios, revistas científicas,

congressos ou outra forma de disseminação. Na divulgação dos resultados, a identificação dos participantes não será tornada pública em qualquer circunstância.

Agradeço a atenção disponibilizada.

Eduardo Brazete Cruz,

Investigador responsável pelo estudo.

Professor Coordenador na Escola Superior de Saúde do Instituto Politécnico de Setúbal.

Contacto de e-mail: eduardo.cruz@ess.ips.pt

-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

Declaro ter lido e compreendido este documento, bem como as informações verbais que me foram fornecidas pela/s pessoa/s que acima assina/m. Foi-me garantida a possibilidade de, em qualquer altura, recusar participar neste estudo sem qualquer tipo de consequências. Desta forma, aceito participar neste estudo e permito a utilização dos dados que de forma voluntária forneço, confiando em que apenas serão utilizados para esta investigação e nas garantias de confidencialidade e anonimato que me são dadas pelo/a investigador/a.

Código (facultado pela equipa de investigação) *: ____________

☐ Tomei conhecimento e aceito participar*

Antes de submeter, clique, no seu browser, na opção “Imprimir” ou “Exportar como PDF” e guarde o ficheiro no seu computador para ficar com uma cópia.

SUBMETER

*Preenchimento obrigatório

7.3. Appendix 3. Ethics committee's approval

COMISSÃO ESPECIALIZADA DE ÉTICA EM INVESTIGAÇÃO

Parecer 77/AFP/2021

SOLICITAÇÃO

Pedido de parecer à Comissão Especializada de Ética para Investigação da ESS-IPS pelo Professor Doutor Eduardo Brazete Cruz, referente a estudo conduzido no âmbito do Projeto "MyBack - Efetividade e implementação de um programa de autogestão personalizado para prevenir recorrências e incapacidade e promover a saúde músculo-esquelética em utentes com lombalgia" e que se enquadra no âmbito de um protocolo de colaboração para projetos assinado entre a Escola Superior de Saúde do Instituto Politécnico de Setúbal, a Escola Nacional de Saúde Pública e a NOVA Medical School/ Faculdade de Ciências Médicas da Universidade Nova de Lisboa. O projeto é financiado pela Fundação para a Ciência e Tecnologia, com a referência PTDC/SAU-SER/7406/2020.

DOCUMENTAL

1. Requerimento do parecer;
2. Sinopse do estudo – contextualização, objetivos, plano de investigação e métodos e referências bibliográficas;
3. Ficha informativa para participante;
4. Formulário de consentimento informado;
5. Guião de Entrevista;
6. Cronograma do Estudo.

ANÁLISE E PARECER

- O estudo tem como objetivo:

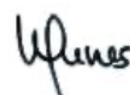
Avaliar a viabilidade, aceitabilidade e identificar barreiras e facilitadores para a implementação do programa MyBack nas unidades de saúdes de diferentes Agrupamentos de Centros de Saúde (ACES) da Administração Regional de Saúde de Lisboa e Vale do Tejo (ARSLVT), nomeadamente, ACES da Arrábida, Arco Ribeirinho, Almada-Seixal, Cascais e Médio Tejo.

- Os participantes são utentes e fisioterapeutas dos ACES parceiros.
- Serão realizados um total de 4 grupos focais, com um mínimo de 6 e máximo de 8 participantes por grupo: 2 grupos focais com todos os fisioterapeutas dos ACES parceiros com prática clínica em utentes com lombalgia, que tenham acesso e saibam utilizar um computador e/ou um smartphone com ligação à internet; e 2 grupos focais com utentes, com 18 ou mais anos, que recuperaram de um episódio de lombalgia, que tenham acesso e saibam utilizar computador e/ou smartphone com ligação à internet, e que compreendam e saibam expressar-se em língua portuguesa. Os utentes serão recrutados de forma intencional (purposive sample) pelo respetivo fisioterapeuta na alta do tratamento a um episódio de lombalgia. Carta convite e folha de informação ao participante no documental enviado.
- Os grupos focais serão realizados em formato online. Estarão presentes 2 investigadores, um com a responsabilidade de dinamizar a discussão e outro de realizar anotações e apresentar a síntese dos pontos-chave da discussão. Será utilizado um guião de entrevista semiestruturada, com o intuito de recolher a informação essencial e conduzir a discussão sem a influenciar. Cada grupo focal será gravado em formato áudio e vídeo e transcrito na íntegra. No processo de transcrição todos os nomes dos participantes serão substituídos por nomes fictícios. A análise contará com a participação de dois elementos da equipa de investigação que codificarão de forma independente as transcrições e discutirão em seguida os temas e subtemas emergentes da análise.
- Formulário de consentimento informado, livre e esclarecido evidencia os aspetos éticos - informação detalhada aos participantes, incluindo duração estimada da entrevista de grupo; assegurado o direito ao anonimato e à confidencialidade da informação prestada; direito de abandonar o estudo; informação sobre possibilidade de envio de queixa/reclamação para a Comissão Especializada de Ética para Investigação da ESS-IPS.

Considera-se que o estudo preenche os requisitos éticos, com preocupações relativas à proteção dos direitos dos participantes do estudo, pelo que se emite parecer favorável.

2021-07-01

P'la CEEI



7.4. Appendix 4. Semi-structured interview guide developed for the focus groups

Os objetivos dos grupos focais dos fisioterapeutas são os seguintes:

1. Avaliar as atitudes dos fisioterapeutas relativamente à implementação de uma intervenção de exercício informada por mudança comportamental para a promoção da adoção da prática regular de exercício para prevenção de recorrências de lombalgia.
2. Identificar e compreender os determinantes (barreiras e facilitadores) para a implementação de uma intervenção de exercício informada por mudança comportamental para a promoção da adoção da prática regular de exercício para prevenção de recorrências.

Os objetivos dos grupos focais dos utentes são os seguintes:

1. Avaliar as atitudes dos utentes relativamente à adoção da prática regular de exercício para prevenção de recorrências.
2. Identificar e compreender os determinantes (barreiras e facilitadores) para a adoção de uma prática regular de exercício em utentes em risco de recorrência de lombalgia;

Organização do Grupo Focal

Parte A: Apresentações e Introdução da Intervenção (20 minutos)

Parte B: Tópicos de discussão dos grupos focais (60 minutos)

Parte C: Resumo e próximos passos (5-10 minutos)

Guião

Parte A: Apresentações e Introdução da Intervenção

1. Apresentação da equipa e participantes

- Equipa de estudo
- Nome do participante e história prévia de episódios de lombalgia;

2. Apresentação geral da intervenção

- Breve explicação do objectivo do estudo e do grupo focal
- Visão geral da estrutura do grupo focal
- Explicação das regras básicas
    - Gravação para transcrição
    - Uma pessoa a falar de cada vez
    - Confidencialidade
    - Consentimento
- Breve apresentação dos objetivos e principais componentes informados pela evidência para uma intervenção focada na promoção da adoção da prática regular de exercício para utentes em risco de recorrência de lombalgia
- Têm alguma dúvida ou questão específica que necessite de ser esclarecida?

3. Discussão

Fisioterapeutas
• Qual é a sua/ vossa experiência no geral e a sua/ vossa opinião sobre intervenções para a promoção da adoção da prática regular de exercício? o Sucessos, desafios; o Como motivou os utentes a comparecer às sessões, a permanecer no programa/ aderir à intervenção?
Utentes
• Considerando a sua/ vossa experiência no geral sobre o(s) episódio(s) de lombalgia que já tiveram, o que acha/ acham que podem fazer para evitar novos episódios? • Considerando a sua/ vossa experiência no geral sobre os episódios de lombalgia que já tiveram, o que acha/ acham que podem fazer, durante o episódio, para minimizar a sua dor e voltar a realizar as suas/ vossas atividades do dia-a-dia e o regresso ao trabalho? • Considerando a sua/ vossa experiência no geral sobre os episódios de lombalgia que já tiveram, já receberam informação/ ensino sobre estratégias para lidar com a dor e limitações no vosso dia-a-dia/ trabalho? Ou para prevenir novos episódios ou agravamento da lombalgia? • Qual é a sua/ vossa opinião sobre a informação/ ensino que receberam? o Sucessos, desafios;

Parte B: Tópicos de discussão dos grupos focais

Explorar a Capacidade

COM-B	Theoretical Domains Framework	Questões Utentes	Questões Fisioterapeutas
Capacidade física Aptidões Físicas [APTF]	**Aptidões Físicas [APT]** O utente/ profissional de saúde têm as aptidões e competências para levar a cabo essas práticas?	Sente que está fisicamente preparado para realizar uma intervenção de exercício? **[APTF]**	***(Não se coloca)***
Capacidade psicológica A capacidade de se envolver nos processos de pensamento necessários - compreensão, raciocínio.	**Aptidões Interpessoais e Cognitivas [APTIC]** O utente/ profissional de saúde tem as aptidões e competências interpessoais e cognitivas para levar a cabo essas práticas?	Para além da aptidão física, considera que existem outras competências que precisa desenvolver para conseguir realizar um programa de exercícios? **[APTIC]**	Sente que tem as competências necessárias para implementar uma intervenção para a promoção da adoção da prática regular de exercício? **[APTIC]** Que competências considera que precisa desenvolver para implementar uma

			intervenção para a promoção da prática regular de exercício? **[APTIC]**
	Conhecimento [CO] O utente/ profissional de saúde tem conhecimento das melhores práticas baseadas na evidência descritas nas normas de orientação clínica/ artigos científicos?	Sabe as razões pelas quais é recomendado que aprenda a prevenir futuros episódios/ gerir novos episódios de lombalgia? **[CO]** Sabe as razões pelas quais é recomendado realizar um programa de exercícios para prevenir futuros episódios/ gerir novos episódios de lombalgia? **[CO]** Sabe o que fazer se voltar a ter um novo episódio de lombalgia? **[CO]**	Sabe as razões pelas quais é recomendado que os utentes aprendam a prevenir futuros episódios/ gerir novos episódios de lombalgia? **[CO]** Sabe as razões pelas quais é recomendada a adoção de uma prática regular de exercício para prevenir futuros episódios/ gerir novos episódios de lombalgia? **[CO]** Sabe o que deve ensinar ao utente para que este saiba o que fazer se voltar a ter um novo episódio de lombalgia? **[CO]**
	Memória, atenção, e processos de decisão Qual a probabilidade da implementação da nova prática ser esquecida? Costuma estar envolvido em intervenções desta natureza?	Normalmente faz exercício para as suas costas? Se sim, realiza sempre os mesmos exercícios ou vai variando? Como faz para se lembrar dos exercícios que deve realizar? **[MAPD]**	Qual é a sua experiência anterior relacionada com a implementação e/ou participação em intervenções desta natureza? **[MAPD]**
	Regulação comportamental Que procedimentos e medidas já estão em vigor para ajudar a realizar a nova prática? Existem instrumentos para ajudar os utentes/ profissionais de saúde a lembrarem-se de realizar a nova prática (por exemplo, lembretes, avisos ou sugestões)? Que estratégias adicionais podem ajudar?	Na sua/ vossa opinião o que o poderia ajudar a adotar uma prática regular de exercício? **[RC]** Tem o hábito de avaliar como estão as suas costas? **[RC]** Que estratégias o/a poderiam ajudar a integrar o programa de exercícios na sua rotina diária? **[RC]**	Considerando a vossa prática atual, que tipo de práticas existentes podem facilitar a implementação da intervenção? E dificultar? **[RC]** Na sua/ vossa opinião o que o poderia ajudar a integrar a intervenção na vossa prática do dia-a-dia? **[RC]**

Explorar a Motivação

COM-B	TDF	Questões Utentes	Questões Fisioterapeutas
Motivação reflexiva Crenças sobre o que é benéfico e prejudicial, intenções, decisões e planos conscientes;	**Identidade e papel social/profissional [IPSP]** A prática está alinhada com a forma como o profissional de saúde vê a sua identidade profissional? Será que a clínica se enquadra no seu papel atual?	Frequentar uma intervenção para a promoção da prática regular de exercício é importante para si? **[IPSP]** Sabendo da existência deste programa, em que medida sente que tem responsabilidade sobre a sua saúde e que deve participar? **[IPSP]**	Considera que a implementação de uma intervenção para a promoção da prática regular de exercício é importante para si, para a sua prática atual, e para a sua profissão? **[IPSP]** Em que medida a implementação desta intervenção é algo que sente que deve fazer parte? **[IPSP]**
	Crenças sobre capacidades [CsCap] Será que o utente/ profissional de saúde se sente confiante de que pode levar a cabo a prática descrita no artigo/ normas de orientação clínica? Que barreiras reduzem a sua confiança?	Sente-se confiante para adotar uma prática regular de exercício? Tem algum constrangimento? Por exemplo, relativamente ao exercício? **[CsCap]** Quão fácil ou difícil é para si realizar e adotar um programa de exercícios? **[CsCap]**	Sente-se confiante para implementar uma intervenção para a promoção da adoção da prática regular de exercício? **[CsCap]** Quão fácil ou difícil é para si participar na implementação da intervenção? **[CsCap]**
	Optimismo [O] Em geral, será que o profissional de saúde/ utente sente que alterar a sua prática/ comportamento conduzirá a resultados positivos?	Acha que vai conseguir adotar uma prática regular de exercício? Se não/sim, porquê? **[O]** Considera que, após a sua participação na intervenção, terá menos episódios de lombalgia? **[O]**	Considera que a implementação de uma intervenção para a promoção da adoção da prática regular de exercício vai ser bem-sucedida no seu local de trabalho? **[O]** Acha que esta intervenção pode ter um papel importante na prevenção de recorrências da lombalgia? **[O]**
	Crenças sobre as consequências [CsCons] O que pensa o profissional de saúde/ utente que acontecerá, seja positivo ou negativo, se a prática atual/ comportamento atual for alterado para se alinhar com as normas de orientação clínica/ evidência (por exemplo, em termos de resultados para os utente, processos de cuidados, relação com colegas, impacto em si próprio como profissional de saúde)? O profissional de saúde/ utente acredita	Algumas pessoas referem que as preocupa fazer exercício ou atividade física porque isso pode agravar a sua dor ou que estão preocupadas que essas atividades causem mais danos nas suas costas - o que pensa sobre isto? **[CsCons]** Quais são os benefícios que espera obter com a adoção de uma prática regular de exercício? **[CsCons]**	Considera que uma intervenção para a promoção da adoção da prática regular de exercício trará benefícios aos utentes, tanto agora como no futuro? Que tipo de benefícios? **[CsCons]** Acha que a introdução da intervenção na sua prática rotineira trará mais benefícios do que custos? **[CsCons]**

	que os benefícios da mudança na prática/ comportamento compensam os custos?	Considera que a adoção da prática regular de exercício tem alguns riscos associados? **[CsCons]**	
	Intenções [INT] Os profissionais de saúde/ utentes querem realizar a nova prática? Se não, porque não? Com quantos dos seus utentes querem? Se não todos, porque não?	Pretende adotar uma prática regular de exercício? **[INT]** Quão prioritário é para si adotar uma prática regular de exercício? Porquê? **[INT]**	Pretende implementar uma intervenção para a promoção da adoção da prática regular de exercício? Se não, porque não? Com todos os utentes que recuperam de um episódio de lombalgia e em risco de recorrência? Se não, porque não? **[INT]** Qual é o nível de prioridade que atribui à implementação da intervenção? Porquê? **[INT]**
	Objectivos [OBJ] Foram estabelecidos objectivos desafiantes mas exequíveis com os profissionais de saúde em relação às práticas selecionadas?	Existem outras coisas que deseja fazer que podem interferir com a adoção de uma prática regular de exercício? **[OBJ]**	
Motivação automática Respostas emocionais, desejos, impulsos e hábitos resultantes da aprendizagem associativa e estados fisiológicos	**Reenforço [R]** Que tipos de incentivos e recompensas existem para o fazer (por exemplo, cumprimento das normas organizacionais, obtenção de acreditação, satisfação profissional, incentivos financeiros, ou satisfação com a prestação de cuidados de alta qualidade)? Existem alguns desincentivos para o fazer?	Quando faz algo para cuidar das suas costas, a sua família e amigos reconhecem o seu esforço? **[REF]** Qual é a opinião dos seus familiares e amigos acerca da sua prática de exercício? **[REF]** Existe algo que outras pessoas possam fazer para o ajudar a adotar uma prática regular de exercício? **[REF]**	Sente que a implementação de uma intervenção para a promoção da adoção da prática regular de exercício lhe trará maior reconhecimento no seu contexto de trabalho? Se não/sim, porquê? **[REF]**
	Emoção [EM] Como se sentem os profissionais envolvidos em relação a realizar o novo comportamento/ prática? Fazer a nova prática vai criar stress, ansiedade, ou preocupação? A prática alterada é vista de uma forma positiva ou ameaçadora?	Quando faz algo para cuidar das suas costas, por exemplo exercício, como se sente? Esta sensação facilita ou dificulta-lhe a realização do exercício? **[EM]**	Quando implementa uma intervenção baseada na melhor evidência científica disponível como é que isso o/a faz sentir? – Esta sensação torna mais fácil ou mais difícil realizar essa intervenção? **[EM]**

Explorar a Oportunidade

COM-B	TDF	Questões utentes	Questões Fisioterapeutas
Oportunidade física Oportunidade proporcionada pelo ambiente;	**Contexto ambiental e recursos [CAR]** O profissional de saúde tem tempo suficiente para realizar a nova prática? Existem tarefas concorrentes que possam impedir o profissional de saúde de realizar a nova prática? Em caso afirmativo, quais são elas? Estão disponíveis os recursos necessários para permitir a mudança? Se não, o que é necessário (mudança de espaço físico, adição de ferramentas, material e equipamento, software, apoio financeiro)?	Considera que a sua vida do dia a dia favorece/ encoraja a realizar exercícios de forma rotineira? **[CRA]** Considera que a sua vida do dia a dia permite frequentar uma intervenção fornecido no Centro de Saúde? **[CRA]** Considera que tem os recursos necessários em sua casa para realizar o programa de exercícios (Por exemplo, tem um local onde possa colocar o colchão e realizar os exercícios sem ser interrompido)? **[CRA]**	Considera que o seu contexto de trabalho favorece/encoraja a implementação de uma intervenção para a promoção da adoção de uma prática regular de exercício? **[CAR]** Considera que tem as condições necessárias (tempo e recursos) para implementar a intervenção? **[CAR]**
Oportunidade social Oportunidade proporcionada pelo meio cultural que dita a forma como pensamos sobre as coisas	**Influências sociais [IS]** Quem pensa que deve fazer isto (profissionais envolvidos)? Alguém pensa que não o devia fazer? (por exemplo, colegas, gestores, organizações profissionais, ou utentes e respectivas famílias)? Em que medida é que estas pessoas influenciam se o farão? Será que os profissionais de saúde já o fazem?	Acha que as pessoas à sua volta (família e amigos) influenciam a possibilidade de adotar uma prática regular de exercício? **[IS]** [Explorar]	Acha que o seu ambiente de trabalho, incluindo os seus colegas, outros profissionais, coordenação, promovem e apoiam a implementação de programas desta natureza? **[IS]**

Parte C: Resumo e próximos passos (5-10 minutos)

- Resumo dos principais aspetos abordados no grupo focal;
- Indicar os próximos passos
- Desenvolvimento de uma intervenção para suportar a implementação de uma intervenção para a promoção da prática regular de exercício (Fisioterapeutas) / Desenvolver uma intervenção para promover a adoção da prática regular e exercício (Utentes)

7.5. Appendix 5. Physiotherapists' sociodemographic characterization questionnaire

QUESTIONÁRIO DE CARATERIZAÇÃO SOCIODEMOGRÁFICA

Código atribuído ao Fisioterapeuta (a preencher pelo responsável do estudo): ___________

Data de preenchimento do questionário: __/__/__

1. Idade: ________

2. Género *(escolha uma das seguintes opções)*

Feminino	☐	Outro: ____________	☐
Masculino	☐	Prefiro não dizer	☐
Não-binário	☐		

3. Qual a sua escola de formação base? *(escolha uma das seguintes opções)*

☐ Instituto Politécnico de Castelo Branco – Escola Superior de Saúde Dr. Lopes Dias
☐ Instituto Politécnico de Coimbra – Escola Superior de Tecnologia da Saúde de Coimbra
☐ Instituto Politécnico de Leiria – Escola Superior de Saúde
☐ Instituto Politécnico de Lisboa – Escola Superior de Tecnologia da Saúde de Lisboa
☐ Instituto Politécnico de Setúbal – Escola Superior de Saúde
☐ Instituto Politécnico do Porto – Escola Superior de Saúde
☐ Universidade de Aveiro – Escola Superior de Saúde de Aveiro
☐ CESPU – Instituto Politécnico de Saúde do Norte – Escola Superior de Saúde do Vale do Ave
☐ CESPU – Instituto Politécnico de Saúde do Norte – Escola Superior de Saúde do Vale do Sousa
☐ Escola Superior de Saúde Atlântica
☐ Escola Superior de Saúde da Cruz Vermelha
☐ Escola Superior de Saúde de Santa Maria
☐ Escola Superior de Saúde de Alcoitão
☐ Escola Superior de Saúde Egas Moniz
☐ Escola Superior de Saúde Jean Piaget – Algarve
☐ Escola Superior de Saúde Jean Piaget de Vila Nova de Gaia
☐ Escola Superior de Saúde Jean Piaget de Viseu
☐ Instituto Superior de Saúde do Alto Ave
☐ Universidade Fernando Pessoa – Escola Superior de Saúde
☐ Outra: ____

4. Quais são as suas qualificações académicas? *(escolha uma das seguintes opções)*

Bacharelato ☐ Mestrado ☐

Licenciatura ☐ Doutoramento ☐

Pós-graduação ☐ Pós-doutoramento ☐

5. Anos de experiência profissional: __________

6. Anos de experiência a nível dos cuidados de saúde primários: ___________

7. Qual o ACES onde exerce funções como fisioterapeuta? *(escolha uma das seguintes opções)*

ACES Alentejo ☐ ACES Arrábida ☐

ACES Almada-Seixal ☐ ACES Arco Ribeirinho ☐

7.6. Appendix 6. Patients' sociodemographic and clinical characterization questionnaire

QUESTIONÁRIO DE CARATERIZAÇÃO SOCIODEMOGRÁFICA E CLÍNICA

Código atribuído ao Utente (a preencher pelo responsável do estudo): ___________

Data de preenchimento do questionário: __/__/__

1. Idade: ________

2. Género *(escolha uma das seguintes opções)*

Feminino	☐	Outro: _____________	☐
Masculino	☐	Prefiro não dizer	☐
Não-binário	☐		☐

3. Qual o seu estado civil? *(escolha uma das seguintes opções)*

Solteiro/a	☐	Divorciado/a	☐
Casado/a	☐	Viúvo/a	☐
União de facto	☐		

4. Quais são as suas habilitações literárias? *(escolha uma das seguintes opções)*

Ensino primário ou inferior	☐	Ensino secundário ou equivalente (12º ano de escolaridade)	☐
Educação básica (9º ano de escolaridade)	☐	Ensino superior completo	☐

5. Qual o subgrupo de risco em que foi classificado/a no programa SPLIT? *(escolha uma das seguintes opções)*

Baixo risco	☐	Elevado risco	☐
Médio risco	☐		

6. Quantos episódios de lombalgia teve no último ano? ______________

7. Quanto tempo durou o seu último episódio de lombalgia (dias)? ___________

8. Encontra-se de baixa remunerada devido a um episódio de lombalgia? *(escolha uma das seguintes opções)*

Sim	☐	Não	☐

9. Se não, qual a sua situação profissional atual? *(escolha uma das seguintes opções)*

A trabalhar e/ou estudante	☐	Doméstico/a	☐
Desempregado/a	☐	Incapaz de trabalhar	☐
Reformado/a	☐		

7.7. Appendix 7: Coding matrix developed for the analysis of the focus groups transcripts

COM-B components		TDF domains	Barriers	Facilitators
1. Capability	1.1. Psychological	1.1a. Knowledge	1.1a–	1.1a+
		1.1b. Cognitive and interpersonal skills	1.1b–	1.1b+
		1.1c. Memory, attention and decision processes	1.1c–	1.1c+
		1.1d. Behavioural regulation	1.1d–	1.1d+
	1.2. Physical	1.2a. Skills	1.2a–	1.2a+
2. Opportunity	2.1. Social	2.1.a. Social influences	2.1a–	2.1a+
	2.2. Physical	2.2.a. Environmental context and resources	2.2a–	2.2a+
3. Motivation	3.1. Reflective	3.1a. Social/professional role and identity	3.1a–	3.1a+
		3.1b. Beliefs about capabilities	3.1b–	3.1b+
		3.1c. Optimism	3.1c–	3.1c+
		3.1d. Beliefs about consequences	3.1d–	3.1d+
		3.1e. Intentions	3.1e–	3.1e+
		3.1f. Goals	3.1f–	3.1f+
	3.2. Automatic	3.2a. Reinforcement	3.2a–	3.2a+
		3.2b. Emotion	3.2b–	3.2b+

7.8. Appendix 8. Definitions of the COM-B components, TDF domains and intervention functions

Table 11. *COM-B components definitions (Michie et al., 2014)*

COM-B components	Definition
Physical Capability	Physical skill, strength or stamina.
Psychological Capability	Knowledge or psychological skills, strength or stamina to engage in the necessary mental processes.
Social Opportunity	Opportunity afforded by interpersonal influences, social cues and cultural norms that influence the way we think about things, e.g., the words and concepts that make up our language.
Physical Opportunity	Opportunity afforded by the environment involving time, resources, locations, cues, physical “affordance”.
Reflective Motivation	Reflective processes involving plans (self-conscious intentions) and evaluations (beliefs about what is good and bad).
Automatic Motivation	Automatic processes involving emotional reactions, desires (wants and needs), impulses, inhibitions, drive states and reflex responses.

Table 12. *TDF domains definitions (Michie et al., 2014)*

TDF domains	Definitions	Theoretical constructs represented within each domain
Knowledge	An awareness of the existence of something.	Knowledge (including knowledge of condition/scientific rationale); procedural knowledge; knowledge of task environment
Skills	An ability or proficiency acquired through practice.	Skills; skills development; competence; ability; interpersonal skills; practice; skill assessment
Memory, attention and decision processes	The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives.	Memory; attention; attention control; decision making; cognitive overload/tiredness
Behavioural regulation	Anything aimed at managing or changing objectively observed or measured actions.	Self-monitoring; breaking habit; action planning
Environmental context and resources	Any circumstance of a person’s situation or environment that discourages or encourages the development of skills and abilities, independence, social competence, and adaptive behaviour.	Environmental stressors; resources/material resources; organisational culture/climate; salient events/critical incidents; person x environment interaction; barriers and facilitators
Social influences	Those interpersonal processes that can cause individuals to change their thoughts, feelings, or behaviours.	Social pressure; social norms; group conformity; social comparisons; group norms; social support; power; intergroup conflict; alienation; group identity; modelling
Social/professional role and identity	A coherent set of behaviours and displayed personal qualities of an individual in a social or work setting.	Professional identity; professional role; social identity; identity; professional boundaries; professional confidence; group

		identity; leadership; organisational commitment
Beliefs about capabilities	Acceptance of the truth, reality, or validity about an ability, talent, or facility that a person can put to constructive use.	Self-confidence; perceived competence; self-efficacy; perceived behavioural control; beliefs; self-esteem; empowerment; professional confidence
Optimism	The confidence that things will happen for the best or that desired goals will be attained.	Optimism; pessimism; unrealistic optimism; identity
Beliefs about consequences	Acceptance of the truth, reality, or validity about outcomes of a behaviour in a given situation.	Beliefs; outcome expectancies; characteristics of outcome expectancies; anticipated regret; consequents
Intentions	A conscious decision to perform a behaviour or a resolve to act in a certain way.	Stability of intentions; stages of change model; transtheoretical model and stages of change
Goals	Mental representations of outcomes or end states that an individual wants to achieve.	Goals (distal/proximal) ; goal priority; goal/target setting; goals (autonomous/controlled); action planning; implementation intention
Reinforcement	Increasing the probability of a response by arranging a dependent relationship, or contingency, between the response and a given stimulus.	Rewards (proximal/distal, valued/not valued, probable/improbable); incentives; punishment; consequents; reinforcement; contingencies; sanctions
Emotion	A complex reaction pattern, involving experiential, behavioural, and physiological elements, by which the individual attempts to deal with a personally significant matter or event.	Fear; anxiety; affect; stress; depression; positive/negative affect; burn-out

Table 13. *Intervention functions definitions (Michie et al., 2014)*

Intervention functions	Definitions
Education	Increasing knowledge or understanding.
Persuasion	Using communication to induce positive or negative feelings or stimulate action.
Incentivisation	Creating an expectation of reward.
Coercion	Creating an expectation of punishment or cost.
Training	Imparting skills.
Restriction	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)
Environmental restructuring	Changing the physical or social context.
Modelling	Providing an example for people to aspire to or imitate.
Enablement	Increasing means/reducing barriers to increase capability (beyond education and training) or opportunity (beyond environmental restructuring)

7.8. Appendix 9. Mapping of physiotherapists' barriers and facilitators to intervention functions

Table 14. *Full mapping of the physiotherapists' barriers (and respective COM-B components and TDF domains) to the intervention functions*

COM-B components	TDF domains	Barriers	Intervention functions								
			Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Psychological Capability	Knowledge	Lack of knowledge on the risk factors for and management of LBP recurrences, and BCTs	×								
	Skills	Lack of skills for the implementation of the intervention					×				
Social Opportunity	Social influences	Lack of peer interaction and discussions							×	×	×
Physical Opportunity	Environmental context and resources	Lack of time to implement and schedule incompatibilities between patients' and primary healthcare's schedules					×		×		×
		Existence of other priorities from their contexts (COVID-19 pandemic and vaccination)					×		×		×
		Lack of management support, that does not consider the intervention a priority					×		×		×
		Lack of human and material resources					×		×		×
		Current focus on treatment rather than prevention					×		×		×
		Low number/lack of patient referrals					×		×		×
		Unable to implement the SPLIT programme					×		×		×
Reflective Motivation	Social/professional role and identity	Practice according to a paternalistic model of care that does not promote patient autonomy	×	×							
	Beliefs about capabilities	Lack of confidence for the implementation of the intervention	×	×						×	×
	Optimism	Pessimism about the implementation of the intervention	×	×							×

Table 15. Full mapping of the physiotherapists' facilitators (and respective COM-B components and TDF domains) to the intervention functions

COM-B components	TDF domains	Facilitators	Intervention functions: Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Psychological Capability	Knowledge	Having knowledge on the recommendations for the management of LBP recurrences	×								
	Skills	Acquisition of skills through participation in the implementation of the intervention					×				
	Memory, attention and decision processes	The intervention is aligned with current practice					×		×		×
		Positive past experiences related to participation in exercise interventions					×		×		×
	Behavioural regulation	Ability to organize and manage work activities according to the needs and availabilities	×				×			×	×
Social Opportunity	Social influences	Therapeutic relationships previously established								×	×
		Relationship with and involvement of the multidisciplinary team							×	×	×
		Professional relationships and collaboration between physiotherapists							×	×	×
Physical Opportunity	Environmental context and resources	Context provides the necessary time to implement the intervention					×		×		×
		Having management support, that consider the intervention a priority					×		×		×
		The intervention's principles are aligned with primary healthcare's principles					×		×		×
		High number of referrals					×		×		×
		Need for few resources					×		×		×
		High incidence of LBP recurrences, which justified the need for the intervention*									
Reflective Motivation	Social/professional role and identity	Benefits for the physiotherapists and for the profession	×	×							
		The intervention aligns with physiotherapists' professional identity and role in primary healthcare	×	×							

	Beliefs about capabilities	High confidence levels for the implementation of the intervention	×	×						×	×
	Optimism	Optimism about the implementation of the intervention	×	×							×
	Beliefs about consequences	Beliefs about the potential patient benefits and improvement of quality of care	×	×							
	Intentions	Willingness to change	×	×	×						
Automatic Motivation	Reinforcement	Joint development of the intervention with higher education institutions			×		×				
		Continuity of care			×		×				
	Emotion	Positive emotions about the implementation of the intervention		×	×						×

* Non-modifiable facilitator

7.9. Appendix 10. Mapping of physiotherapists' barriers and facilitators and intervention functions to BCTs, intervention content and MoDs

Table 16. *Full mapping of physiotherapists' barriers (and respective COM-B components and TDF domains) and intervention functions to selected BCTs, intervention content and MoDs*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery
Psychological Capability	Knowledge	Education	5.1. Information about health consequences 5.3. Information about social and environmental consequences	• Effects of exercise on the prevention of LBP recurrences • Consequences of not practicing exercise • Exercise SOS signs • Determinants for the adoption of regular exercise practice • FITT-VP principles for exercise prescription on healthy adults/recovered from LBP • Behavioural diagnosis and BCTs • Evidence on use of BCTs for adoption of regular exercise practice • Information on implementation of the MyBack Intervention Programme: programme presentation, eligibility criteria, baseline assessment and group allocation • Motivational interview principles and processes • Behavioural change theories – COM-B model and TDF domains	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
	Skills	Training	2.2. Feedback on behaviour 4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 8.1. Behavioural practice/rehearsal 8.7. Graded tasks	• Description of physical fitness assessment tests • Register and interpretation of physical assessment tests • Application of FITT-VP principles in structuring exercise programmes for patients who have recovered from an LBP episode: type, frequency, intensity, duration and progression criteria for each type of exercise • Reassessment indicators and progression criteria for each type of exercise • Exercise monitoring methods • Reassessment of physical fitness and communication of the results to the research team • Provide feedback to patients and communicate results • Teaching of motivational interviewing steps/processes • Description of BCTs • Demonstration on how to perform the physical fitness tests • Demonstration on the structuring of a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Exercise monitoring • Watch and discuss videos related to the use of motivational interview and BCTs • Use of motivational interviewing principles and steps/processes in communication with patients • Use of BCTs according to the behavioural diagnosis • Practice execution of physical fitness tests	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Rehearsal/practice of skills (BCIO:011048) • Video sessions (BCIO:011031)

				• Practice exercises • Practice structuring a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Simulated practice on motivational interviewing • Simulated practice on use of BCTs • Discussion of clinical scenarios with increasing degrees of complexity in terms of exercise prescription • Discussion of clinical scenarios with increasing degrees of complexity in terms of behavioural issues • Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs	
Social Opportunity	Social influences	Environmental restructuring Modelling Enablement	3.1. Social support (unspecified) 3.2. Social support (practical) 6.1. Demonstration of the behaviour 12.2. Restructuring the social environment	• Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme • Share experienced difficulties in carrying out physical fitness tests, exercise prescription and use of motivational interview and BCTs • Promotion of specific moments for discussion and peer sharing	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Physical Opportunity	Environmental context and resources	Environmental restructuring Enablement	1.2. Problem solving 3.2. Social support (practical) 12.1. Restructuring the physical environment 12.2. Restructuring the social environment	• Anticipation of barriers and facilitators to the implementation of the MyBack Intervention Programme and discussion of strategies to overcome or optimize them, respectively • Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme • Discussion of strategies previously used for the implementation of SPLIT	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Reflective Motivation	Social/ professional role ad identity	Education Persuasion	5.3. Information about social and environmental consequences 9.1. Credible source	• Presentation of the MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare • Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
	Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1. Goal setting (behaviour) 1.2. Problem solving 2.2. Feedback on behaviour 6.1. Demonstration of the behaviour 8.7. Graded tasks 11.2. Reduce negative emotions 15.1. Verbal persuasion about capability 15.3. Focus on past success	• Definition of goals and expected results with the implementation of the MyBack Intervention Programme • Share experienced difficulties in carrying out physical fitness tests, exercise prescription and use of motivational interview and BCTs, and define strategies to overcome them • Anticipation of barriers and facilitators to the implementation of the MyBack Intervention Programme and discussion of strategies to overcome or optimize them, respectively • Demonstration on how to perform the physical fitness tests • Demonstration on the structuring of a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Exercise monitoring • Watch and discuss videos related to the use of motivational interview and BCTs • Use of motivational interviewing principles and steps/processes in communication with patients • Use of BCTs according to the behavioural diagnosis • Discussion of clinical scenarios with increasing degrees of complexity in terms of exercise prescription • Discussion of clinical scenarios with increasing degrees of complexity in terms of behavioural issues	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Rehearsal/practice of skills (BCIO:011048) • Video sessions (BCIO:011031)

				• Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs • Feedback on achievement of established goals and action plan for the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Discussion of strategies previously used for the implementation of SPLIT	
	Optimism	Education Persuasion Enablement	1.7. Review outcome goal(s) 5.3. Information about social and environmental consequences 15.1. Verbal persuasion about capability	• Discussion and review of goals related to the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Presentation of the MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)

Table 17. *Full mapping of physiotherapists' facilitators (and respective COM-B components and TDF domains) and intervention functions to selected BCTs, intervention content and MoDs*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery
Psychological Capability	Knowledge	Education	5.1. Information about health consequences 5.3. Information about social and environmental consequences	• Effects of exercise on the prevention of LBP recurrences • Consequences of not practicing exercise • Exercise SOS signs • Determinants for the adoption of regular exercise practice • FITT-VP principles for exercise prescription on healthy adults/recovered from LBP • Evidence on use of BCTs for adoption of regular exercise practice • Information on implementation of the MyBack Intervention Programme: programme presentation, eligibility criteria, baseline assessment and group allocation • Motivational interview principles and processes • Behavioural change theories – COM-B model and TDF domains	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
	Skills	Training	2.2. Feedback on behaviour 4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 8.1. Behavioural practice/rehearsal 8.7. Graded tasks	• Description of physical fitness assessment tests • Register and interpretation of physical assessment tests • Application of FITT-VP principles in structuring exercise programmes for patients who have recovered from an LBP episode: type, frequency, intensity, duration and progression criteria for each type of exercise • Reassessment indicators and progression criteria for each type of exercise • Exercise monitoring methods • Reassessment of physical fitness and communication of the results to the research team • Provide feedback to patients and communicate results • Teaching of motivational interviewing processes • Description of BCTs • Demonstration on how to perform the physical fitness tests • Demonstration on the structuring of a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart)	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Rehearsal/practice of skills (BCIO:011048) • Video sessions (BCIO:011031)

				• Exercise monitoring • Watch and discuss videos related to the use of motivational interview and BCTs • Use of motivational interviewing principles and processes in communication with patients • Use of BCTs according to the behavioural diagnosis • Practice execution of physical fitness tests • Practice exercises • Practice structuring a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Simulated practice on motivational interviewing • Simulated practice on use of BCTs • Discussion of clinical scenarios with increasing degrees of complexity in terms of exercise prescription • Discussion of clinical scenarios with increasing degrees of complexity in terms of behavioural issues • Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs	
	Memory, attention and decision processes	Training Environmental restructuring Enablement	7.1. Prompts/cues 8.1. Behavioural practice/rehearsal 11.3. Conserving mental resources	• Practice execution of physical fitness tests • Practice exercises • Practice structuring a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Simulated practice on motivational interviewing • Simulated practice on use of BCTs • Identification of specific strategies to facilitate implementation of the MyBack Intervention Programme (e.g., using the MyBack support material)	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057 • Rehearsal/practice of skills (BCIO:011048)
	Behavioural regulation	Education Training Modelling Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 1.4. Action planning 2.3. Self-monitoring of behaviour 6.1. Demonstration of the behaviour 11.2. Reduce negative emotions 11.3. Conserving mental resources	• Definition of goals and expected results with the implementation of the MyBack Intervention Programme • Anticipation of barriers and facilitators to the implementation of the MyBack Intervention Programme and discussion of strategies to overcome or optimize them, respectively. • Development of an action plan and monitoring of goals for recruitment and implementation of the MyBack Intervention Programme • Identification of specific strategies to facilitate implementation of the MyBack Intervention Programme (e.g., using the MyBack support material)	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057
Social Opportunity	Social influences	Environmental restructuring Modelling Enablement	3.1. Social support (unspecified) 3.2. Social support (practical) 6.1. Demonstration of the behaviour 12.2. Restructuring the social environment	• Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme • Share experienced difficulties in carrying out physical fitness tests, exercise prescription and use of motivational interview and BCTs • Promotion of specific moments for discussion and peer sharing	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Physical Opportunity	Environmental context and resources	Environmental restructuring Enablement	1.2. Problem solving 3.2. Social support (practical) 12.1. Restructuring the physical environment 12.2. Restructuring the social environment	• Anticipation of barriers and facilitators to the implementation of the MyBack Intervention Programme and discussion of strategies to overcome or optimize them, respectively • Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)

				Discussion of strategies previously used for the implementation of SPLIT	
Reflective Motivation	Social/ professional role and identity	Education Persuasion	5.3. Information about social and environmental consequences 9.1. Credible source	• Presentation of MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare • Discussion on the possible benefits of implementing the MyBack Intervention Programme, at the professional level and at the level of primary healthcare • Peer discussions on potential barriers and facilitators to the implementation of the MyBack Intervention Programme	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
	Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 2.2. Feedback on behaviour 6.1. Demonstration of the behaviour 8.7. Graded tasks 11.2. Reduce negative emotions 15.1. Verbal persuasion about capability 15.3. Focus on past success	• Definition of goals and expected results with the implementation of the MyBack Intervention Programme • Share experienced difficulties in carrying out physical fitness tests, exercise prescription and use of motivational interview and BCTs, and define strategies to overcome them • Anticipation of barriers and facilitators to the implementation of the MyBack Intervention Programme and discussion of strategies to overcome or optimize them, respectively • Demonstration on how to perform the physical fitness tests • Demonstration on the structuring of a tailored exercise programme, based on the results of the physical fitness assessment (decision-making flowchart) • Exercise monitoring • Watch and discuss videos related to the use of motivational interview and BCTs • Use of motivational interviewing principles and processes in communication with patients • Use of BCTs according to the behavioural diagnosis • Discussion of clinical scenarios with increasing degrees of complexity in terms of exercise prescription • Discussion of clinical scenarios with increasing degrees of complexity in terms of behavioural issues • Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs • Feedback on achievement of established goals and action plan for the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Discussion of strategies previously used for the implementation of SPLIT	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Rehearsal/practice of skills (BCIO:011048) • Video sessions (BCIO:011031)
	Optimism	Education Persuasion Enablement	1.7. Review outcome goal(s) 5.3. Information about social and environmental consequences 15.1. Verbal persuasion about capability	• Discussion and review of goals related to the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Presentation of the MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
	Beliefs about consequences	Education Persuasion	5.1. Information about health consequences 5.3. Information about social and environmental consequences 5.6. Information about emotional consequences	• Effects of exercise on the prevention of LBP recurrences • Consequences of not practicing exercise • Discussion of expected results and possible impact of the MyBack Intervention Programme implementation	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)

	Intentions	Education Persuasion Incentivization	5.1. Information about health consequences 5.3. Information about social and environmental consequences 6.3. Information about others' approval 10.3. Non-specific reward	• Presentation of the MyBack Intervention Programme as an evidence-based intervention and aligned with physiotherapy's principles in primary healthcare • Effects of exercise on the prevention of LBP recurrences • Consequences of not practicing exercise • Certificates to physiotherapists who achieve the established goals for the implementation of the MyBack Intervention Programme	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
Automatic Motivation	Reinforcement	Incentivization Training	2.1. Monitoring of behaviour by others without feedback 2.2. Feedback on behaviour 10.3. Non-specific reward 10.4. Social reward	• Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs • Feedback on achievement of established goals and action plan for the implementation of the MyBack Intervention Programme • Highlight physiotherapists who fulfil the MyBack Intervention Programme implementation goals • Certificates to physiotherapists who achieve the established goals for the implementation of the MyBack Intervention Programme	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
	Emotion	Persuasion Incentivization Enablement	2.2. Feedback on behaviour 3.1. Social support (unspecified) 5.6. Information about emotional consequences 10.4. Social reward 11.2. Reduce negative emotions	• Feedback on physiotherapists' performance on the application of the physical fitness tests, exercise prescription, motivational interview and BCTs • Feedback on achievement of established goals and action plan for the implementation of the MyBack Intervention Programme • Reinforcement of physiotherapists' role as agents of change • Discussion of expected results and possible impact of the MyBack Intervention Programme implementation • Highlight physiotherapists who fulfil the MyBack Intervention Programme implementation goals	• Face to face/at-a-distance individual or group discussions and/or presentations (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)

7.10. Appendix 11. Mapping of patients' barriers and facilitators to intervention functions

Table 18. *Full mapping of the patients' barriers (and respective COM-B components and TDF domains) to the intervention functions*

COM-B components	TDF domains	Barriers	Intervention functions								
			Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Physical Capability	Skills	Lack of skills to practice exercise					×				
Psychological Capability	Knowledge	Lack of knowledge on how to manage an LBP recurrence	×								
		Lack of knowledge on exercise	×								
		Not aware of the benefits of physical activity	×								
	Memory, attention and decision processes	Not having exercise habits					×		×		×
	Behavioural regulation	Lack/presence of symptoms	×				×				×
		Daily tiredness sensation	×				×				×
		Having other priorities and demands in daily life	×				×				×
		Lack of behavioural regulation strategies (i.e., time-management skills, inability to self-regulate)	×				×				×
		Self-sacrifice to accommodate others	×				×				×
Physical Opportunity	Environmental context and resources	Negative influence of work context and type of professional activity in the promotion of sedentary behaviours					×		×		×
Reflective Motivation	Beliefs about capabilities	Lack of self-efficacy to practice exercise autonomously	×	×						×	×
		Lack of self-efficacy to manage a potential LBP recurrence autonomously	×	×						×	×
	Beliefs about consequences	Fear-avoidance beliefs about exercise	×	×						×	
		Negative beliefs about condition	×	×						×	

Automatic Motivation	Reinforcement	Motivation to practice exercise dependent on external drivers			×		×				
	Emotion	Negative emotions related to health condition		×	×					×	×
		Fear of having an LBP recurrence		×	×					×	×
		Anxiety/ stress/ fear of pain		×	×					×	×

Table 19. *Full mapping of the patients' barriers (and respective COM-B components and TDF domains) to the intervention functions*

COM-B components	TDF domains	Facilitators	Intervention functions								
			Education	Persuasion	Incentivisation	Coercion	Training	Restriction	Environmental restructuring	Modelling	Enablement
Psychological Capability	Knowledge	Having knowledge on exercise and LBP recurrences	×								
		Understanding the biopsychosocial nature and mechanisms underpinning condition	×								
	Memory, attention and decision processes	Past experiences related with LBP episodes									×
		Having regular exercise habits					×		×		×
	Behavioural regulation	Being able to manage and prioritize musculoskeletal health in daily life	×				×				×
		Recognition of own limits and self-monitoring of symptoms	×				×				×
		Being able to manage exercise practice according to daily availabilities	×				×				×
Social Opportunity	Social influences	Practicing exercise with other people/Being with similar others								×	×
Physical Opportunity	Environmental context and resources	General availability for being at home (e.g., sick leave, retired, etc.)							×		×
		Having a place and material resources to practice exercise							×		×
Reflective Motivation	Social/professional role and identity	Accepting pain as part of "self"	×	×							

	Beliefs about capabilities	Self-confidence to practice exercise	×	×						×	×
	Optimism	Optimism that the expected benefits and results will be achieved	×	×						×	×
	Beliefs about consequences	Anticipating and believing in the benefits of exercise	×	×						×	
	Intentions	Wanting to practice exercise and prioritizing it	×	×	×					×	
	Goals	Having well defined health-related goals	×	×	×						×
Automatic Motivation	Reinforcement	Safety to practice exercise with physiotherapists' support			×		×				
	Emotion	The ability to distinguish self (i.e., body, thoughts and feelings) from pain		×	×					×	×
		Positive emotions related with exercise practice		×	×					×	×

7.11. Appendix 12. Mapping of patients' barriers and facilitators and intervention functions to BCTs, intervention content and MoDs

Table 20. *Full mapping of patients' barriers (and respective COM-B components and TDF domains) and intervention functions to selected BCTs, intervention content and MoDs*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery
Physical Capability	Skills	Training	2.2. Feedback on behaviour 4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 8.1. Behavioural practice/rehearsal 8.7. Graded tasks	• Selection of exercises suitable for the different types of training • Progression criteria for the different exercise training types • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of general health status • Monitoring and register of exercise levels • Exercise adaptation in case of symptoms (e.g., pacing) • Strategies to deal with LBP recurrence • How to perform the exercises properly and safely • Feedback on patients' exercise skills • Feedback on patients' monitoring skills • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Rehearsal/practice of exercise and monitoring skills (BCIO:011048) • Private access to a platform with videos of the exercises (BCIO:011010)
Psychological Capability	Knowledge	Education	5.1. Information about health consequences 5.3. Information about social and environmental consequences	• Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Differences between types of exercise • Different exercise monitoring methods • Progression criteria for the different exercise training types • Importance and benefits of adoption of self-management strategies • Strategies to manage LBP recurrences • Consequences of counterproductive thoughts and behaviours • Recommendations for the adoption of healthy behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Criteria for seeking versus not seeking healthcare	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)
	Memory, attention and decision processes	Training Environmental restructuring Enablement	4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 7.1. Prompts/cues 8.1. Behavioural practice/rehearsal 11.3. Conserving mental resources	• Use exercise postcards and MyBack website • Selection of exercises suitable for the different types of training • Progression criteria for the different exercise training types • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of exercise level • Exercise adaptation in case of symptoms (e.g., pacing) • How to perform the exercises properly and safely • Monitoring and register of symptoms and general health status • Strategies to manage LBP recurrences	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010)

					• Rehearsal/practice of exercise and monitoring skills (BCIO:011048)
	Behavioural regulation	Education Training Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 1.4. Action planning 2.3. Self-monitoring of behaviour 11.2. Reduce negative emotions 11.3. Conserving mental resources	• Definition of SMART goals • Development of an action plan and monitoring goal achievement • Criteria for seeking versus not seeking healthcare • Planning for the future, after finishing the programme • Use exercise postcards and MyBack website • Register of exercise levels • Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Personal barriers and facilitators for the adoption and training of self-management strategies	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010)
Physical Opportunity	Environmental context and resources	Training Environmental restructuring Enablement	1.2. Problem solving 2.3. Self-monitoring of behaviour 3.2. Social support (practical) 7.1. Prompts/cues 8.1. Behavioural practice/rehearsal 11.3. Conserving mental resources 12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.5. Adding objects to the environment	• Identification of specific strategies to increase daily exercise levels (e.g., mobile phone reminders, setting a place and specific time for exercise) • Use exercise postcards and MyBack website • Register of exercise levels	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010)
Reflective Motivation	Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 2.2. Feedback on behaviour 6.1. Demonstration of the behaviour 8.7. Graded tasks 11.2. Reduce negative emotions 15.1. Verbal persuasion about capability 15.3. Focus on past success	• Definition of SMART goals • Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Personal barriers and facilitators for the adoption and training of self-management strategies • Reflection on capabilities to adopt self-management strategies to manage an LBP recurrence • Reinforce patients' capabilities on the adoption of self-management strategies and exercise • Seeking versus not seeking healthcare • How to perform the exercises properly and safely • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of symptoms and general health status • Active self-management strategies (e.g., graded exposure to movement) • Feedback on patients' exercise skills • Feedback on patients' monitoring skills • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Rehearsal/practice of exercise and monitoring skills (BCIO:011048) • Private access to a platform with videos of the exercises (BCIO:011010)

	Beliefs about consequences	Education Persuasion Modelling	5.1. Information about health consequences 5.3. Information about social and environmental consequences 5.6. Information about emotional consequences 6.1. Demonstration of the behaviour	• Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury) • Seeking versus not seeking healthcare • Watching testimonies of people who have recovered from an LBP episode and practice exercise	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010) • Videos with testimonies (BCIO:011031)
Automatic Motivation	Reinforcement	Training Incentivization	2.1. Monitoring of behaviour by others without feedback 2.2. Feedback on behaviour 10.3. Non-specific reward 10.4. Social reward	• Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice • Congratulate patients for achieving the established goals	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
	Emotion	Persuasion Incentivization Modelling Enablement	2.2. Feedback on behaviour 3.1. Social support (unspecified) 5.6. Information about emotional consequences 6.1. Demonstration of the behaviour 10.4. Social reward 11.2. Reduce negative emotions	• Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice • Congratulate patients for achieving the established goals • Fear of movement and LBP recurrences • Consequences of counterproductive thoughts and behaviours • Pain information (pain ≠ injury) • Multifactorial origin of pain	• (Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)

Table 21. *Full mapping of patients' facilitators (and respective COM-B components and TDF domains) and intervention functions to selected BCTs, intervention content and MoDs*

COM-B	TDF	Intervention Functions	BCTs	Content	Mode of delivery
Psychological Capability	Knowledge	Education	5.1. Information about health consequences 5.3. Information about social and environmental consequences	• Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Differences between types of exercise • Different exercise monitoring methods • Progression criteria for the different exercise training types • Importance and benefits of adoption of self-management strategies • Strategies to manage LBP recurrences • Consequences of counterproductive thoughts and behaviours • Recommendations for the adoption of healthy behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Criteria for seeking versus not seeking healthcare	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)

	Memory, attention and decision processes	Training Environmental restructuring Enablement	4.1. Instruction on how to perform the behaviour 6.1. Demonstration of the behaviour 7.1. Prompts/cues 8.1. Behavioural practice/rehearsal 11.3. Conserving mental resources	• Use exercise postcards and MyBack website • Selection of exercises suitable for the different types of training • Progression criteria for the different exercise training types • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of exercise level • Exercise adaptation in case of symptoms (e.g., pacing) • How to perform the exercises properly and safely • Monitoring and register of symptoms and general health status • Strategies to manage LBP recurrences	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010) • Rehearsal/practice of exercise and monitoring skills (BCIO:011048)
	Behavioural regulation	Education Training Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 1.4. Action planning 2.3. Self-monitoring of behaviour 11.2. Reduce negative emotions 11.3. Conserving mental resources	• Definition of SMART goals • Development of an action plan and monitoring goal achievement • Criteria for seeking versus not seeking healthcare • Planning for the future, after finishing the programme • Use exercise postcards and MyBack website • Register of exercise levels • Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Personal barriers and facilitators for the adoption and training of self-management strategies	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Published contents on website and social media (BCIO:011010)
Social Opportunity	Social influences	Environmental restructuring Modelling Enablement	3.1. Social support (unspecified) 3.2. Social support (practical) 6.1. Demonstration of the behaviour 12.2. Restructuring the social environment	• Give the patient the option to perform exercise programme in a group setting • Discussion of strategies to restructure social environment as a way to promote exercise practice	• Face to face/at-a-distance individual or group discussions and exercise practice (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Physical Opportunity	Environmental context and resources	Environmental restructuring Enablement	1.2. Problem solving 3.2. Social support (practical) 7.1. Prompts/cues 11.3. Conserving mental resources 12.1. Restructuring the physical environment 12.2. Restructuring the social environment 12.5. Adding objects to the environment	• Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Identification of specific strategies to increase daily exercise levels (e.g., mobile phone reminders, setting a place and specific time for exercise)	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
Reflective Motivation	Social/ professional role and identity	Education Persuasion	5.1. Information about health consequences 9.1. Credible source	• Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Strategies to manage LBP recurrences • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury)	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)

			• Seeking versus not seeking healthcare • Watching testimonies of people who have recovered from an LBP episode and practice exercise	• Videos with testimonies (BCIO:011031)
Beliefs about capabilities	Education Persuasion Modelling Enablement	1.1. Goal-setting (behaviour) 1.2. Problem solving 2.2. Feedback on behaviour 6.1. Demonstration of the behaviour 8.7. Graded tasks 11.2. Reduce negative emotions 15.1. Verbal persuasion about capability 15.3. Focus on past success	• Definition of SMART goals • Personal barriers to adopt, perform and adapt the exercise programme, and strategies to overcome them • Personal barriers to self-monitor exercise levels, symptoms and general health status, and strategies to overcome them • Personal barriers and facilitators for the adoption and training of self-management strategies • Reflection on capabilities to adopt self-management strategies to manage an LBP recurrence • Reinforce patients' capabilities on the adoption of self-management strategies and exercise • Seeking versus not seeking healthcare • How to perform the exercises properly and safely • Selection, use, interpretation and register of different exercise monitoring methods • Monitoring and register of symptoms and general health status • Active self-management strategies (e.g., graded exposure to movement) • Feedback on patients' exercise skills • Feedback on patients' monitoring skills • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of postcards with exercises (BCIO:011008) • Rehearsal/practice of exercise and monitoring skills (BCIO:011048) • Private access to a platform with videos of the exercises (BCIO:011010)
Optimism	Education Persuasion Modelling Enablement	1.7. Review outcome goal(s) 5.1. Information about health consequences 6.1. Demonstration of the behaviour 15.1. Verbal persuasion about capability	• Discussion and review goals established to adopt regular exercise practice • Watching testimonies of people who have recovered from an LBP episode and practice exercise • Reflection on capabilities to adopt self-management strategies to manage an LBP recurrence • Reinforce patients' capabilities on the adoption of self-management strategies and exercise • Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury)	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010) • Videos with testimonies (BCIO:011031)
Beliefs about consequences	Education Persuasion Modelling	5.1. Information about health consequences 5.3. Information about social and environmental consequences 5.6. Information about emotional consequences 6.1. Demonstration of the behaviour	• Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury) • Seeking versus not seeking healthcare • Watching testimonies of people who have recovered from an LBP episode and practice exercise	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010) Videos with testimonies (BCIO:011031)

	Intentions	Education Persuasion Incentivization Modelling	1.1. Goal-setting (behaviour) 5.1. Information about health consequences 6.1. Demonstration of the behaviour 6.3. Information about others' approval 10.4. Social reward	• Definition of SMART goals • Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury) • Watching testimonies of people who have recovered from an LBP episode and practice exercise • Congratulate patients for achieving the established goals	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010) • Videos with testimonies (BCIO:011031)
	Goals	Education Persuasion Incentivization Enablement	1.1. Goal-setting (behaviour) 1.3. Goal-setting (outcome) 1.4. Action planning 1.5. Review behaviour goal(s) 1.7. Review outcome goal(s) 2.2. Feedback on behaviour 2.3. Self-monitoring of behaviour 5.1. Information about health consequences	• Definition of SMART goals • Development of an action plan and monitoring goal achievement • Criteria for seeking versus not seeking healthcare • Planning for the future, after finishing the programme • Use exercise postcards and MyBack website • Register of exercise levels • Discussion and review goals established to adopt regular exercise practice • Exercise benefits on the prevention of LBP recurrences • Risk factors for LBP recurrence • Importance and benefits of adoption of self-management strategies • Consequences of counterproductive thoughts and behaviours • Healthy behaviours and their relationship with LBP • Healthy behaviours and their relationship with musculoskeletal health • Pain information (pain ≠ injury) • Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008)
Automatic Motivation	Reinforcement	Incentivization Training	2.1. Monitoring of behaviour by others without feedback 2.2. Feedback on behaviour 10.3. Non-specific reward 10.4. Social reward	• Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice • Congratulate patients for achieving the established goals	• Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057)
	Emotion	Persuasion Incentivization Enablement	2.2. Feedback on behaviour 3.1. Social support (unspecified) 5.6. Information about emotional consequences 6.1. Demonstration of the behaviour 10.4. Social reward 11.2. Reduce negative emotions	• Feedback on achieved progressions throughout the MyBack Intervention Programme • Discussion/feedback on established goals and action plan for the adoption of regular exercise practice • Congratulate patients for achieving the established goals • Fear of movement and LBP recurrences • Consequences of counterproductive thoughts and behaviours • Pain information (pain ≠ injury) • Multifactorial origin of pain	• (Face to face/at-a-distance individual or group discussions (BCIO:011003) (BCIO:011004) (BCIO:011055) (BCIO:011057) • Provision of written materials (BCIO:011008) • Published contents on website and social media (BCIO:011010)

7.12. Appendix 13. Content and structure of the MyBack Intervention Programme

Content of the MyBack Intervention Programme:

The MyBack Intervention Programme is a tailored behaviour change-informed exercise intervention, composed of four main components:

- assessment of physical fitness (i.e., aerobic capacity, trunk and lower limb muscle resistance, motor control and flexibility).
- tailored exercise prescription based on the physical fitness assessment results.
- use of behaviour change techniques to facilitate the adoption of regular exercise practice.
- use of motivational interviewing principles to guide the whole intervention.

Structure of the MyBack Intervention Programme:

- The MyBack Intervention Programme will have a total duration of 12 weeks, composed of at least two 60-minute sessions per week (if the exercise programme includes an aerobic component, a third home-based session will be included). During the first 6 weeks, at least one of the sessions will be supervised face-to-face by a physiotherapist, while the remaining sessions may be performed through videoconference or autonomously as home-based exercise sessions. Every face-to-face session will be focused on discussing specific barriers and facilitators to exercise practice and on performing the exercise programme, which may be performed individually or in a group setting (each patient performs their own tailored exercise programme).
- The last six weeks will be exclusively home-based, composed of sessions autonomously performed by the patients. Every 3 weeks (i.e., week 3, week 6, week 9, week 12) the exercise programme will be updated. Since at weeks 9 and 12 the autonomous phase of The MyBack Intervention Programme will be ongoing, a supervised face-to-face session will be scheduled, aimed at updating the exercise programme and discussion of barriers and facilitators.