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Beyond 'Walk Walk Walk': Barriers and facilitators of physical activity in individuals with claudication

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Background: Individuals with claudication have significantly reduced capacity for walking, which leads to worsening prognosis and decline in overall health status. Basic walking advice is usually provided to individuals with claudication during their routine clinic visits, which has very limited efficacy, resulting in little or no change in physical activity behaviour.
Objective: This study explored barriers and facilitators to physical activity (PA) in individuals with claudication, using the Behaviour Change Wheel (BCW) and the Socioecological Model (SEM) for behavioural diagnosis.
Methods: The study used a phenomenological design. A purposive sampling was used, and five individuals with claudication and three healthcare professionals participated in the study, out of a target sample size of 18 individuals. An online focus group/workshop was conducted, recorded, and transcribed verbatim. Data were coded in NVivo 12 and analyzed thematically. A deductive approach was used to map themes to BCW and SEM frameworks.
Results: Intrapersonal barriers included comorbidities, walking-related pain, and psychological challenges; facilitators were motivation and goal setting. At the interpersonal level, lack of social support was a barrier, while peer support and social connection were facilitators. Organizational-level barriers included lack of guidance, limited access to supervised exercise programmes (SEPs), poor communication, financial challenges, and variability in healthcare access; facilitators included alternative exercise options and access to resources and education. Recommended interventions include enablement, environmental restructuring, persuasion, education, training, and modelling.
Conclusions: Barriers to PA in claudication are complex and multi-level. Addressing them requires system-wide strategies, including patient education, peer-supported and personalized programmes, standardized national guidance, expanded SEP access, and reducing geographic disparities in service provision.
Social media abstract: Barriers to physical activity in individuals with claudication are complex and multi-level. Addressing them requires system-wide strategies @GCU @UoS

Introduction

Claudication is a hallmark symptom of peripheral arterial disease (PAD), characterized by an excruciating pain, cramp, or discomfort in the legs during walking that resolves with rest. PAD affects approximately 237 million people globally[1–3] and about

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20 % of people aged between 55 and 75 years in the UK,[4] with prevalence increasing with age.[4] This condition significantly reduces the quality of life and physical activity (PA) levels of affected individuals, contributing to cardiovascular morbidity and mortality.[2]

Patients with claudication are significantly less active than their healthy counterparts, and low PA levels are strong predictors of functional decline and mortality.[5] The barriers to PA in this population are multifaceted, encompassing physical, psychological, social, and environmental factors.[6] Previous studies identified pain induced by walking, fatigue, comorbidity, low walking capacity, lack of knowledge, adverse weather, and limited access to SEPs common barriers to PA in patients with claudication.[7–9] Facilitators to PA in patients with claudication identified in previous studies included good support systems, cognitive strategies, availability of SEPs, walking advice, belief that walking could be beneficial, and perceived improvement.[8,9] However, findings from a systematic review show that only a small proportion (17 %) of the existing studies on the barriers and facilitators to physical activity in patients with claudication were conducted in the United Kingdom.[16] None of these studies were carried out in Scotland,[16] highlighting the need for a primary study involving patients living in Scotland. Furthermore, while the barriers and facilitators of PA have been described, most existing studies have not used behavioural theories to systematically diagnose the determinants of PA behaviour, an essential step in developing effective and sustainable interventions.[10,11]

Theories help with the understanding of health behaviours, as they can help elucidate why people engage with, or fail to engage with, health-promoting behaviours such as physical activity.[12] Two widely used frameworks in health behaviour research are the Behaviour Change Wheel (BCW) and the Socioecological Model (SEM). The BCW uses the behaviour change theory to facilitate the understanding of behaviour (making a behavioural diagnosis), selection, and specification of the target behaviour prior to developing interventions.[13] The BCW is considered a robust and systematic tool for intervention development, with demonstrated utility in explaining a range of health behaviours.[13] The SEM highlights the interplay between individual, interpersonal, organizational, community, and policy-level influences on human behaviour.[14,15] It is particularly useful for identifying leverage points across different levels of influence, making it a valuable complement to the BCW framework. Applying these frameworks allows for a comprehensive, evidence-based and context-sensitive understanding of the barriers and facilitators to PA in claudication. Therefore, this study aimed to use the BCW and the SEM as guiding frameworks to identify the barriers and facilitators to physical activity in individuals with claudication.

Methods

Design

This study used a phenomenological design to explore the perspectives of individuals with claudication and health care professionals on the barriers and facilitators to physical activity in individuals with claudication. This study is the second phase of a three-phased project (the CREATE study) aiming to co-create an intervention that will facilitate improvement in the physical activity behaviour of patients with claudication. The first phase of the CREATE project focused on patients' lived experiences and healthcare professionals' perspectives of managing claudication.[6] This second phase explored the barriers and facilitators to PA in patients with claudication, mapping them to relevant behaviour change theories. The third phase of the project will aim to leverage the identified barriers and facilitators to co-create (involving patients, healthcare professionals and academics) an intervention for improving PA in patients with claudication. The study was reported following the Consolidated Criteria for Reporting of Qualitative Research (COREQ) guidelines[16] (Supplementary Material 1).

Sample and recruitment

Participants included individuals diagnosed with PAD with symptom of claudication who were 18 years or older, as well as healthcare professionals experienced in managing patients with claudication. Those excluded from the study were individuals with cognitive impairments that could hinder their ability to give informed consent or participate in the study procedures. Ethical approval for the study was received from the *** ethics committee (HLS/PSWAHS/22/096) and the NHS Research Ethics Committee (23/WS/0069). Written informed consent was signed by all participants before they were involved in the study. The target sample was 12 individuals living with PAD and 6 healthcare professionals. This target sample size was informed by earlier research indicating that insights into the phenomenon being studied can typically be captured with data from around six participants.[17] Data saturation was achieved, as recurring themes began to consistently appear during the analysis of the data from the focus group discussions.

Recruitment was purposive and facilitated by two site investigators (a vascular surgeon and a physiotherapist), who were actively involved in managing patients at vascular clinics within two NHS Scotland Health Boards. Additionally, a snowball sampling approach was used to broaden participation, whereby enrolled patients were encouraged to refer others who met the eligibility criteria. Patients recruited directly through clinics provided written consent and participant information sheet in person, while those identified via snowball sampling were emailed the information sheet and consent forms, which they signed and returned prior to participating.

Research team and reflexivity

The research team was composed of three male physiotherapists (two of whom were Senior Lecturers with doctoral degrees and one a PhD student), and a female expert in physical activity (a Senior Research Fellow with PhD). All members had substantial experience and training in qualitative research methodologies. The focus group session was facilitated by two assistants (two female PhD candidates), and a male PhD candidate. Data was analyzed by a male PhD candidate and a Senior Lecturer who are both physiotherapists. Hence, the researchers reflected on how their health background could influence the interpretation of the data, and the risk of interpretive bias was mitigated through peer debriefing and triangulation. Another researcher who does not have a health background but skilled in qualitative research independently reviewed the transcripts and the themes generated. A prior relationship had been established with participants, as the PhD candidate conducted preparatory sessions to introduce the study's objectives and provide guidance on using Zoom for the online discussions. To support the credibility of the findings, the team held debriefing sessions following the focus group and throughout the data analysis process.

Data collection

An online focus group discussion was held via Zoom Video Communications. The decision to use a virtual format was influenced by early engagement with a Patient and Public Involve-

ment (PPI) group, which included individuals living with PAD and claudication, as well as healthcare professionals such as vascular surgeons and physiotherapists. This input, gathered during the project's ideation phase, supported the choice of an online approach to reduce travel expenses and accommodate the professional commitments of participants. The session, which lasted two hours, was facilitated by three researchers (EMA, MV, LMc) and was recorded for analysis. Participants were divided into two breakout groups: one consisting of patients with claudication, and the other comprising healthcare professionals. Each group was led by a designated researcher to guide the discussion. This separation aimed to minimize power imbalances and promote open and honest dialogue. In addition, prior ground rules were set to create a safe space for free expression for all participants. After the breakout sessions, which lasted approximately 30 min for each discussion on barriers and facilitators, all participants reconvened for a plenary discussion to review and expand on key points. A topic guide, accessible only to the facilitators (Supplementary Material 2), was used to steer the discussions. The topic guide was pilot tested with two academics experienced in qualitative design before the session. Based on the feedback received, revisions were made to improve clarity, relevance, and flow of the questions. The Zoom software enabled both audio-visual recording and verbatim transcription of the session. Two researchers (EMA and IBA) reviewed the recordings to verify the transcription's accuracy.

Data analyses

A thematic analysis was conducted using the six staged approach described by Braun and Clarke[18] for a systematic identification and analysis of themes. Two researchers (EMA, CS) independently carried out a systematic coding of the data using the NVivo 12 qualitative analysis software. An inductive approach was used to generate initial codes, identifying repeated ideas, phrases, and topics emerging directly from the data. These codes were then analyzed to identify broader patterns, and subsequently grouped into clusters that represented larger thematic categories. The resulting themes were carefully reviewed and refined to ensure they reflected the deeper meanings within the data. A third researcher (OE) independently read through the transcripts and examined the thematic framework that had been developed. Each theme was considered both on its own and in relation to the others, as well as in the context of the research questions. Consensus was reached among the researchers regarding the final set of key themes. The data from the different participant groups were analyzed individually, however, the themes had contributions from both groups.

Using the SEM, the identified themes were classified into intrapersonal (individual), interpersonal, and organizational/policy-level factors impacting physical activity in individuals with claudication. Furthermore, the identified themes representing the barriers and facilitators to PA were deductively coded by two researchers (EMA, CS) into the COM-B and TDF models of the BCW to obtain a behavioural diagnosis. The need for change in the behaviour and the desired change were also highlighted. Intervention functions and policy categories that could address the barriers were also identified.

To strengthen the credibility of the results, a member checking process was implemented. Participants were given a summary of the identified themes along with a draft of the findings and were asked to review them for accuracy. They were encouraged to provide feedback on whether the interpretations aligned with their own experiences and viewpoints.

Results

Characteristics of participants

A total of 16 patients living with claudication and 6 healthcare professionals (4 vascular surgeons and 2 physiotherapists) were purposively recruited and consented to participate in the study, however, 11 patients and 3 healthcare professionals did not participate in this stage of the study. Reasons for not participating for patients included family bereavement (2 patients), deteriorating health status (2 patients), could not commit to the time (2 patients), did not respond when contacted (3 patients), did not attend (1 patient), and illness of relative (1 patient). The three healthcare professionals that did not participate was because of their unavailability due to clinic duties. Therefore, a total of eight participants, comprised of five patients with a diagnosis of claudication and three healthcare professionals (two vascular surgeons, and a physiotherapist) participated in this stage of the study. However, the data retrieved was sufficient in providing new insights and understanding of the phenomenon of interest,[19,20] which was the goal of this study phase. The patient group were 80 % female, 100 % White, with a mean age of 65.5 ± 6.36 years and length of the condition of 2 to 18 years. The healthcare professionals' group were 67 % female, 100 % White, with a mean age of 49.3 ± 14.29 years, and years of practice from 7 to 35 years.

Barriers to physical activity in patients with claudication

The identified barriers to PA in patients with claudication are summarized using the SEM, COM-B and TDF models (Fig. 1). Also see Table 1 for a summary of the themes and summary quotes. The results are organised by grouping themes under each SEM domains (Intrapersonal, Interpersonal, and Organizational/Policy level factors). Both participant groups (patients and health care professionals) contributed to each theme. See Supplementary Material 3 for full quotes linked to each theme.

The figure shows how each of the themes on barriers to physical activity are mapped to the Socioecological model (SEM), Capability, Opportunity, Motivation and Behaviour (COM-B) model and the Theoretical Domains Framework (TDF).

Intrapersonal factors (Individual level)

The themes representing the intrapersonal level barriers to PA are described below:

Comorbidities affecting mobility

Challenges with other existing health conditions (multimorbidity) such as cardiovascular disease, renal failure, and diabetes mellitus were identified as one of the hinderances to engaging in physical activity. Patients stated that these comorbidities limited their physical capabilities and contributed to uncertainty and fear around exercising safely. As a result, they adjusted or avoided physical activity, perceiving it as potentially harmful or unmanageable due to their broader health concerns. The participants emphasised the need for tailored advice and interventions that consider individual differences in physical health and limitations, suggesting that a one-size-fits-all approach is often ineffective and discouraging.

Pain and discomfort from walking

Pain during walking was reported as a major barrier to physical activity, with patients frequently describing it as severe, limiting,

Table 1
Classification of the themes on barriers to physical activity in patients with claudication using the Capability, Opportunity, Motivation and Behaviour model, Theoretical Domains Framework, and Socioecological models, and identifying potential interventions to address them.

Theme	Socioecological Framework	COM-B Model	TDF Domains	Intervention Functions & Policy Categories (BCW)	Need for Change/ Desired Change	Illustrative Quotes
Comorbidities affecting mobility	Individual level	Capability (Physical)	Physical Skills, Beliefs about Consequences	**Intervention functions:** Enablement, Environmental Restructuring **Policy Categories:** Guidelines, Service Provision	Yes/Integrated care plans addressing multiple conditions	"I've got where my calf muscles are now the size of my ankles, so I've lost my ankles… I'm really struggling to walk because of the kidney failure." (Patient 1)
Pain and discomfort from walking	Individual level	Capability (Physical)	Physical Skills, Reinforcement	**Intervention functions:** Education, Enablement, Persuasion **Policy Categories:** Guidelines, Communication/Marketing	Yes/Clear guidance on pain management strategies	"I'm in pain, a lot of pain. Am I meant to walk through the pain?" (Patient 2)
Psychological barriers: Anxiety, depression and fear about the future	Individual level	Motivation (Reflective)	Emotion, Beliefs about Consequences	**Intervention functions:** Education, Persuasion, Enablement **Policy Categories:** Guidelines, Communication/Marketing	Yes/Psychological support and reassurance for patients	"There's all the anxiety as well connected to it… real anxiety about the future." (Patient 3) "Patients have pain walking… Their understanding is that it's like angina." (HCP 1)
Lack of Social support	Interpersonal	Opportunity (Social)	Social Influences	**Intervention functions:** Enablement, Modelling **Policy Categories:** Environmental/Social Planning	Yes/Establishment of patient-led and peer support programmes.	"We had to find our own support groups on Facebook. There is no formal support." (Patient 1)
Lack of clear guidance on exercise and other information	Organizational/ Policy level	Capability (Psychological)	Knowledge, Skills	**Intervention functions:** Education, Training, Enablement **Policy Categories:** Communication/Marketing, Guidelines	Yes/Structured exercise recommendations with patient education	"Told to walk to the point of agony… but no one tells us how, how much, or why." (Patient 4) "I was told to walk, but no explanation was given. I had to find out everything myself." (Patient 4)
Lack of access to supervised exercise programmes	Organizational/ Policy level	Opportunity (Physical)	Environmental Context and Resources	**Intervention functions:** Environmental Restructuring **Policy Categories:** Environmental/Social Planning, Fiscal Measures, Service Provision	Yes/Increased funding for supervised exercise programs	"walk. That's all I got from the consultants. It's all I've ever had. walk!… I bought a treadmill myself" (Patient 4) "There is no funding to provide a supervised exercise intervention." (HCP 2)
Lack of coordination and communication between healthcare providers	Organizational/ Policy level	Opportunity (Physical)	Environmental Context and Resources	**Intervention functions:** Environmental Restructuring **Policy Categories:** Service Provision, Guidelines	Yes/Better integration of care between specialities	"I am the communication between the vascular Consultant, the cardiologist, the hospital and the GP. There does not seem to be any sharing of notes. There's no joined-up care in the NHS." (Patient 3)
Financial barriers to accessing care	Organizational/ Policy level	Opportunity (Physical)	Environmental Context and Resources	**Intervention functions:** Environmental Restructuring **Policy Categories:** Fiscal Measures, Service Provision	Yes/Reduced financial burden and improved access to services	"I've had to go private…It cost me over £1000 to see the doctor and the consultant" (Patient 3) "Those in deprived areas don't want to travel if they haven't got a community-based service." (HCP 3)
Variability in Healthcare Access:Postcode Lottery	Organizational/ Policy level	Opportunity (Physical)	Environmental Context and Resources	**Intervention functions:** Environmental Restructuring **Policy Categories:** Legislation, Service Provision	Yes/Standardized service provision needed across.	"The only service that has a supervised exercise programme that uses a treadmill for pre and post outcomes is up in Highland…" (HCP 2)

Key: HCP= Healthcare Professional, SEM= Socioecological Model, COM-*B*= Capacity, Opportunity, Motivation and Behaviour model, TDF= Theoretical Domains Framework, BCW= Behaviour Change Wheel.

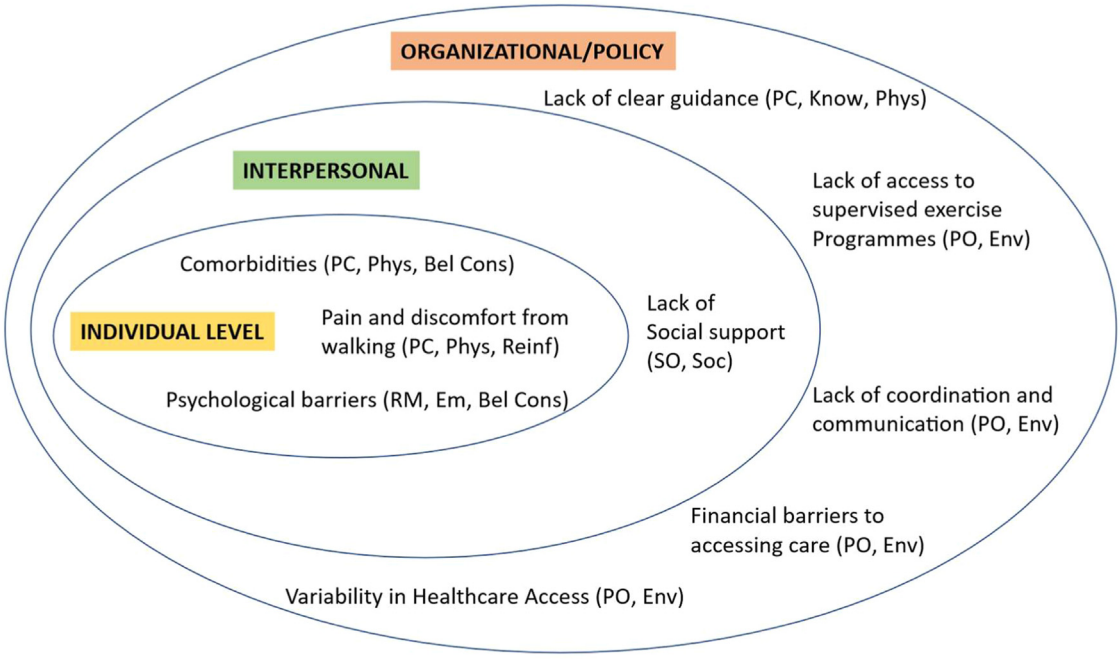

Fig. 1. Classification of themes on barriers to physical activity into SEM, COM-B and TDF.
Key: PC= Physical capability, Phys= Physical skills, Bel Cons= Beliefs about consequences, Reinf= Reinforcement, RM= Reflective motivation, Em= Emotion, SO= Social opportunity, Soc= Social influences, Know= Knowledge, PO= Physical opportunity, Env= Environmental context and resources.

and demotivating. The onset of pain created a cycle of avoidance, reducing opportunities to build physical capacity and reinforce positive exercise behaviours. Many patients were unsure whether to continue walking through the pain or stop, indicating a lack of guidance on managing symptoms safely. This uncertainty often reinforced sedentary behaviour, especially in the absence of clear explanations about whether they should walk through the pain or whether they have already developed collateral blood vessels. The participants highlighted the need for patient education and improved communication so patients would clearly understand why they need to keep being physically active despite their debilitating pain.

Psychological barriers: anxiety, depression and fear about the future

Patients described experiencing psychological barriers such as anxiety, low mood, and fear related to their condition and its progression. These emotional responses often stemmed from uncertainty about their health, lack of support, and perceived loss of control. Concerns about deterioration, or uncertainty about what the future holds for them contributed to avoidance of physical activity. For some, the emotional burden of managing claudication without adequate guidance or reassurance led to feelings of helplessness, further reducing motivation to engage in exercise. The health care professionals noted that some patients often insist on getting reassurance from a vascular surgeon, even when their condition could be effectively managed by other allied health care professionals. They noted that patients end up demotivated as they have to wait for a long time to see a vascular surgeon.

Interpersonal factors

The themes representing the interpersonal level barriers to PA are described below:

Lack of social support

Participants described a lack of social support as a significant barrier to engaging in physical activity. Patients felt isolated in managing their condition and expressed that having no one to share experiences with or encourage them reduced their motivation to be active. The absence of structured support networks, such as peer groups or guided programmes, left patients to navigate their condition alone. Furthermore, patients often turn to the internet to join online support groups, which they depend on as their only source of support. Some patients believe that there is a missed opportunity for the NHS to engage with these informal groups or create formal support groups to address the support gap. Some noted that the burden of self-management was compounded by the lack of understanding of the specific restrictions of the condition from the general public, further diminishing the opportunity for positive social reinforcement.

Organizational/Policy level factors

The themes representing the organizational/policy level barriers to PA are described below:

Lack of clear guidance on exercise and other information

Patients expressed frustration over the lack of clear guidance on how to manage their condition, particularly regarding walking as an intervention. Many patients reported feeling left to navigate their condition on their own, with minimal support or structured advice from healthcare professionals. Participants expressed a need for structured guidance in the form of clear patient information leaflets, online resources, and clinician-led educational sessions to help them understand how to manage their condition effectively.

Lack of access to supervised exercise programmes

Participants identified limited availability and accessibility of supervised exercise programmes as a major barrier to patients engaging in physical activity. Many patients were either unaware of existing services or found that none were available in their local area. The absence of supervised exercise programmes left patients uncertain about how to exercise safely, especially when dealing with pain or comorbidities. The health care professionals emphasised that service provision is uneven across regions, with some areas having established community-based provision while others remain underserved. This variation reflects broader issues of regional inequity and inconsistent commissioning, rather than a uniformly applied national approach.

Lack of coordination and communication between healthcare providers

A significant frustration for both patients and health care professionals was poor coordination between different healthcare providers, leading to delays in treatment and conflicting advice. Many patients reported feeling abandoned in their care, with long waiting times and inadequate follow-ups. Some patients reported that they had more information from informal online support groups than they had been given at their vascular appointments. Specific improvements suggested included implementing shared electronic health records to ensure seamless information transfer, establishing multidisciplinary meetings to improve communication across specialties, and creating clear referral pathways to prevent patients from being lost in the system.

Financial barriers to accessing care

Financial constraints were identified as a significant barrier to accessing appropriate care and support for physical activity. Some patients reported turning to private healthcare due to long NHS waiting times, incurring substantial personal costs. Others mentioned being unable to afford resources such as home exercise equipment or transportation to exercise facilities. These economic limitations reduced their physical opportunity to engage in structured activity or receive timely guidance. The health care professionals also acknowledged the disparity in access to care, particularly for those in lower-income areas.

Variability in healthcare access: postcode lottery

Participants highlighted disparities in access to care and resources based on geographical location, often referred to as a "postcode lottery." The health care professionals identified significant regional disparities in service provision for patients with claudication. They stated that while some areas, like Lanarkshire and Ayrshire, had community-based claudication clinics and structured follow-up pathways, others (including major centres like Glasgow and Dumfries and Galloway) lacked comparable services. This variability resulted in unequal access to care, delayed interventions, and reduced support for physical activity. The absence of consistent service models meant patients' experiences and outcomes were heavily influenced by where they lived rather than clinical need. The health care professionals emphasised that deprived populations were particularly disadvantaged, often unable or unwilling to travel for care, further widening health inequalities.

Facilitators of physical activity in patients with claudication

The identified facilitators of PA in patients with claudication are summarized using the SEM, COM-B and TDF models (Fig. 2). Also see Table 2 for a summary of the themes and summary quotes. The results are organised by grouping themes under each SEM domains (Intrapersonal, Interpersonal, and Organizational/Policy level factors). Both participant groups (patients and health care professionals) contributed to each theme. See Supplementary Material 4 for full quotes linked to each theme.

The figure shows how each of the themes on facilitators of physical activity are mapped to the Socioecological model (SEM), Capacity, Opportunity, Motivation and Behaviour (COM-B) model and the Theoretical Domains Framework (TDF).

Intrapersonal factors (Individual level)

The themes representing the intrapersonal level facilitators to PA are described below:

Personal motivation and goal setting

Both patients and health care professionals emphasised the central role of personal motivation in supporting physical activity among individuals with claudication. Several patients expressed a strong desire to maintain independence and prevent disease progression, which served as internal motivators to stay active. Some other patients described motivation rooted in a fear of deterioration and a desire to "do what I can while I can." The health care professionals recognised that individuals with strong intrinsic motivation often engaged more successfully in physical activity. However, they also noted that these highly motivated patients were exceptions rather than the norm. Many others struggled without external support or a structured intervention. Both groups highlighted the importance of goal setting; the patients wanted clear, personalised objectives, and the health care professionals acknowledged that helping patients define meaningful goals could support behaviour change. There was consensus that support in setting and monitoring individual goals, particularly from someone knowledgeable, would strengthen patients' confidence and commitment to physical activity.

Interpersonal factors

The themes representing the interpersonal level facilitators to PA are described below:

Peer support & social connection

Peer support emerged as a key facilitator of physical activity from both patients' and health care professionals' perspectives. Patients valued the emotional reassurance and shared understanding that came from connecting with others who had similar experiences. These interactions reduced feelings of isolation, boosted morale, and helped normalise the struggles associated with claudication. Patients stated that they frequently sought out and benefited from online forums and informal peer networks, especially when formal support was lacking. The health care professionals echoed the importance of peer interactions, noting that seeing others make progress could inspire hope and increase accountability. They described how sharing success stories and learning from others' journeys helped motivate individuals who were uncertain about the benefits of exercise. However, the health care professionals also acknowledged the lack of formal peer support structures, particularly within the NHS, and identified this gap as a missed opportunity to reinforce engagement. Both groups suggested that building accessible, patient-led support networks could be an effective strategy for enhancing physical activity through social influence.

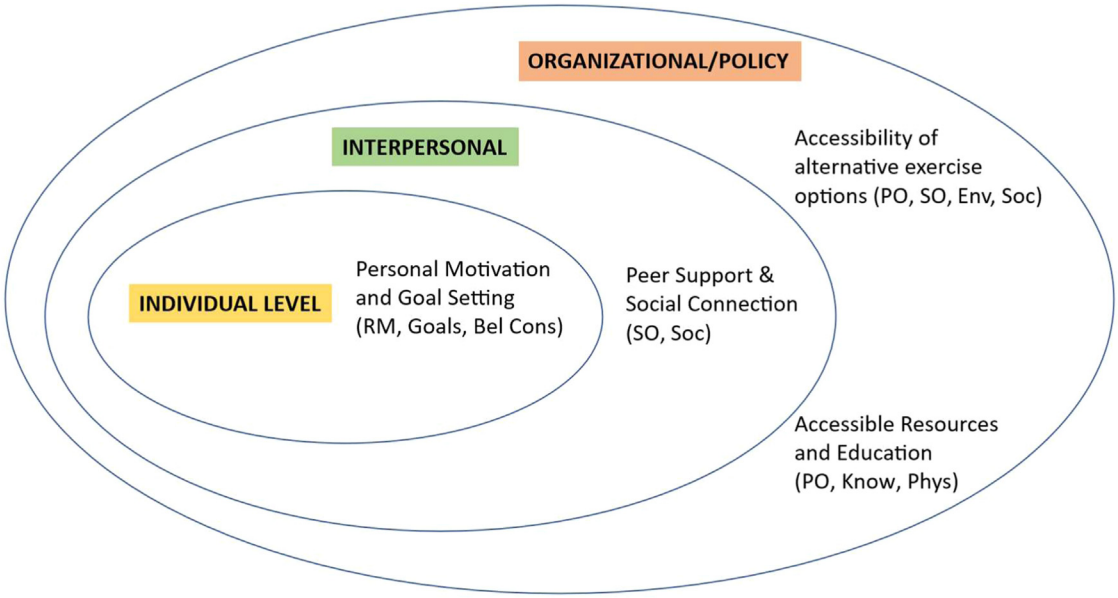

Fig. 2. Classification of themes on facilitators of physical activity into SEM, COM-B and TDF.
Key: RM= Reflective motivation, Bel Cons= Beliefs about consequences, SO= Social opportunity, Soc= Social influences, PO= Physical opportunity, Env= Environmental context and resources, Know= Knowledge, Phys= Physical skills.

Table 2
Mapping of themes on the facilitators of physical activity in patients with claudication to Capability, Opportunity, Motivation and Behaviour model, Theoretical Domains Framework, socioecological models, and interventions/policy categories.

Theme	Socioecological Framework	COM-B Model	TDF Domains	Intervention Functions (BCW)	Policy Categories (BCW)	Need for Change/ Desired Change	Illustrative Quotes
Personal Motivation and Goal Setting	Individual level	Motivation (Reflective)	Goals, Beliefs about Capabilities	Education, Persuasion	Communication/ Marketing	Yes/Encourage self-driven activity planning and goal setting	To stay alive, I work bloody hard… I'm motivated. (Patient 4) The fear of it getting worse? Yeah, I will do what I can while I can to my full potential. (Patient 3)
Peer Support & Social Connection	Interpersonal	Opportunity (Social)	Social Influences	Enablement, Modelling	Environmental/ Social Planning	Yes/Create structured peer-support platforms and group activities	"You have more support for mental health, from people who are diagnosed with this…there needs to be a mechanism for that to be recognised, talking to each other, because it's the only chance we get." (Patient 1) "There are online groups where patients share their experiences and successes. This has been very helpful for motivation." (HCP 1)
Accessibility of alternative exercise options	Organizational/ Policy level	Opportunity (Physical & Social)	Environmental Context and Resources, Social Influences	Environmental Restructuring, Enablement	Environmental/ Social Planning	Yes/Promote activity through enjoyable daily routines	I swim, swim, swim instead of walk, walk, walk. But it works. I'm still here. (Patient 1) "For those who can't attend supervised exercise, remote programmes could help. Maybe an app or structured online guidance." (HCP 1)
Accessible Resources and Education	Organizational/ Policy level	Opportunity (Physical)	Knowledge, Skills	Education, Enablement	Communication/ Marketing, Guidelines	Yes/Disseminate national guidance and alternative exercise info	"Knowing that walking builds collaterals helped me stay motivated." (Patient 3) "Information through the leaflets is something…general information about claudication and one being more specifically about the benefits of exercise and why it's important to do that. " (HCP 2)

Key: HCP= Healthcare Professional, SEM= Socioecological Model, COM-*B*= Capacity, Opportunity, Motivation and Behaviour model, TDF= Theoretical Domains Framework, BCW= Behaviour Change Wheel.

Organizational/Policy level factors

The themes representing the organizational/policy level facilitators to PA are described below:

Accessibility of alternative exercise options

Both patients and health care professionals identified the availability of alternative exercise options, beyond walking, as an important facilitator of physical activity. Some patients reported adapting their activity by using tools such as treadmills, virtual reality, or participating in activities like swimming and chair yoga. These alternatives allowed them to maintain physical activity while working around pain, comorbidities, or mobility limitations. The health care professionals supported this approach, highlighting the need for a flexible, individualised model of care that accommodates varying physical abilities and preferences. They emphasised that a "one-size-fits-all" strategy often excludes patients who struggle with conventional walking-based programmes. Providing varied, home-based, or remote options such as DVDs, online resources, or tailored apps was seen by health care professionals as essential, particularly for patients in remote areas or those with limited access to supervised programmes.

Accessible resources and education

Participants from both patient and health care professional groups emphasised the importance of accessible educational resources in enabling physical activity. Patients frequently reported discovering helpful content, such as exercise videos and informational leaflets, either independently or through peer networks, often in the absence of formal guidance. These resources provided knowledge about claudication and practical strategies for exercising safely, helping build their confidence and capability to engage in physical activity. The health care professionals highlighted the importance of providing clear and consistent educational materials, such as the NHS-backed cardiac rehabilitation programmes that offer structured information and step-by-step guidance. Similar approaches tailored for PAD patients, including printed leaflets, online modules, and video-based guidance, could help improve engagement and understanding.

Discussion

This study explored the barriers and facilitators of PA in individuals living with claudication, using the BCW and SEM to provide a structured behavioural diagnosis. The findings highlight multifactorial and interrelated influences across the intrapersonal, interpersonal, and organizational/policy domains of the SEM influencing PA in individuals with claudication. Six intervention functions including enablement, environmental restructuring, persuasion, education, training and modelling were identified by participants as essential in addressing the multi-level barriers identified. Furthermore, six complementary policy categories including guidelines, service provision, communication/marketing, environmental/social planning, fiscal measures, and legislation that could facilitate the implementation of the intervention functions were identified.

Consistent with results from earlier studies,[7,8] our findings identified intrapersonal level factors such as pain and discomfort from walking as predominant barriers to PA in patients with claudication. However, participants in our study expressed additional uncertainty around whether and how to walk through the pain (psychological barriers), which suggests a more profound gap in clinical communication and patient education. This aligns with the reports in previous studies[21,22] stating that psychological factors, including fear-avoidance beliefs, significantly hinder PA engagement in patients with claudication. Comorbidities (such as cardiovascular disease and diabetes), which are also intrapersonal level factors were also frequently reported by our participants as barriers to PA, highlighting the importance of holistic, individualized interventions. Previous qualitative studies similarly reported comorbidity as a major barrier to PA in patients with claudication,[9] however, our study emphasized how these conditions shape patients' self-efficacy, risk perceptions, and decisions to avoid PA altogether. Participants in our study identified patient education as an intervention that could address most of the barriers at the intrapersonal level. Other interventions for the intrapersonal level factors identified included enablement, environmental restructuring, and persuasion. Policy actions such as provision of guidelines, clear Communication/Marketing and service provision were identified as strategies that could facilitate the implementation of the interventions.

At the interpersonal level, lack of social support was identified as a major barrier to PA in patients with claudication. Although peer support has been highlighted in other studies as a factor that influence PA in patients with claudication,[8,23] our participants described a near-total absence of formal structures supporting social engagement around PA. Some of the participants reported that they resorted to self-help and sought peer support through social media. This points to a missed opportunity to mobilize community-based or digital peer support frameworks to encourage PA in patients with claudication. Participants identified enablement and modelling as interventions that could address issues related to peer support. Patients could be enabled through the establishment of formal patient-led and peer support programs such as local walking groups, which could help with motivation to engage in PA. Policy actions such as environmental/social planning could facilitate the implementation of the interventions.

At the Organizational/policy-level, we identified lack of clear guidance on exercise, lack of access to supervised exercise programmes, lack of coordination and communication between healthcare providers, financial barriers, and variability in Healthcare Access (postcode lottery) as the major barriers to PA in patients with claudication. These similar themes were reported in previous studies[9,24] as major barriers to PA in patients with claudication. Our study highlighted how these organizational-level issues negatively impacts patients' trust, increase disparities, and push some patients toward expensive private care, an outcome with ethical and equity implications. Furthermore, the lack of clear guidance on exercise reflects an urgent need for national standardized patient education tools. Many participants were unsure whether PA was safe or beneficial in the context of their symptoms, despite walking being a cornerstone of claudication management. This points to an implementation gap between evidence-based guidelines and patient-facing care, an issue also identified in an existing systematic review.[9] Whilst some of the organisational-level barriers (e.g., provision of supervised exercise programmes) may be difficult to address due to resource limitations, issues related to lack of guidance could be easily addressed through the development of structured patient education/information materials. At the policy level, development of clear guidelines highlighting patient education and use of patient-reaching communication media could help address this barrier. Other interventions such as environmental restructuring, training and enablement could also help in addressing these organizational-level barriers.

Several facilitators of PA were identified. At the intrapersonal level, personal motivation and goal setting were identified as strong enablers, especially when patients had clear, meaningful targets. This aligns with self-determination theory, which posits that autonomy and competence enhance motivation.[25] A system-

atic review[9] also noted intrinsic motivation as a factor, but our findings emphasize the potential of structured goal setting as a modifiable facilitator to PA in patients with claudication. At the interpersonal level, peer support and social connection were also identified as strong facilitators to PA in patients with claudication. Participants in our study valued being heard and understood and described peer interactions as emotionally validating and practically useful. This supports recommendations from a recent systematic review[9] suggesting peer-led walking groups or patient ambassadors to model and encourage activity. However, unlike cardiac rehabilitation services where peer support is often integrated as part of the formal care package, claudication pathways lack similar infrastructure, which our participants noted as a barrier.

At the organizational/policy level, accessibility of alternative exercise options, such as swimming or use of virtual reality games, was a novel and promising theme in our findings. Our study revealed that many patients are finding creative workarounds when traditional exercise regimens are too painful or inaccessible. This suggests a paradigm shift may be needed, from rigid walking/exercise prescriptions to more flexible, personalized PA approaches. These insights extend findings in a previous study,[26] which underscored the value of adaptable interventions as alternatives to supervised exercise. Accessible resources and education were some other organizational/policy level facilitators of PA identified in our study. However, patients often found these resources through their own efforts or informal networks, rather than through the NHS. The parallels drawn with cardiac rehabilitation services, where patients are routinely given structured, multimedia educational resources, suggest a missed opportunity for transferable models of care. Expanding tailored educational content for patients with claudication could greatly enhance patient empowerment and self-management.[27,28]

The application of the BCW and SEM allowed for a systematic categorization of barriers and facilitators across levels of influence and behavioural domains (capability, opportunity, and motivation). This approach strengthens the intervention design process, ensuring future efforts are theory-informed and contextually grounded. Notably, many barriers were mapped to the 'physical opportunity' domain of the COM-B model, reflecting systemic and environmental constraints rather than individual deficiencies. These finding challenges overly individualistic approaches and supports calls for health system reform and environmental restructuring.

Strengths and limitations

A major strength of this study is its dual focus on patients and healthcare professionals, which enabled triangulation of perspectives and enriched interpretation of the barriers and facilitators. Furthermore, the use of established behaviour change frameworks enhances the transferability and utility of the findings for intervention development. However, the sample was relatively small and lacked ethnic diversity, limiting transferability. Furthermore, the virtual format used for data collection may have excluded participants without digital access or digital literacy. Nevertheless, the themes identified resonate strongly with previous research and provide detailed insights into the lived experiences of patients with claudication.

Conclusion

The barriers to PA in patients with claudication are multifaceted and cut across individual, interpersonal, and organizational-level factors. To enhance physical activity in patients with claudication, interventions should integrate patient education, peer-based programmes, and personalized programmes. Nationally standardized guidance on exercise for patients with claudication, improved access to SEPs, and flexible alternatives to walking are also urgently needed. Policymakers should address geographic disparities in service provision and invest in training for healthcare professionals to deliver consistent, evidence-based communication on how patients should approach exercise. Also, clear guidelines emphasizing the importance of patient education are needed. Future research should develop and test co-designed, theory-informed interventions addressing the identified barriers, with particular attention to disadvantaged populations disproportionately affected by claudication.

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Declaration of competing interest

None.

CRediT authorship contribution statement

Ebuka Miracle Anieto: Writing – review & editing, Writing – original draft, Visualization, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Philippa Dall:** Writing – review & editing, Supervision, Resources, Investigation, Conceptualization. **Ukachukwu Abaraogu:** Writing – review & editing, Supervision, Resources, Investigation, Conceptualization. **Ijeoma Blessing Anieto:** Writing – review & editing, Visualization, Investigation, Data curation, Conceptualization. **Colette Ramsay:** Writing – review & editing, Investigation, Conceptualization. **Cathy Gormal:** Writing – review & editing, Investigation, Conceptualization. **Kay Smith:** Writing – review & editing, Investigation, Conceptualization. **Obinna Ejiogu:** Writing – review & editing, Investigation, Formal analysis, Data curation. **Chris Seenan:** Writing – review & editing, Supervision, Resources, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

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Supplementary materials

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