Original Paper

Understanding Education and Training Needs in Rehabilitation Technologies Among Those With Lived Experience, Rehabilitation Health and Care Professionals, and Technology Professionals: Qualitative Study

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Abstract

Background: Demand for rehabilitation services and associated technologies is increasing globally due to population aging and rising chronic disease burden. Despite their potential to enhance access, efficiency, and outcomes, adoption of rehabilitation technologies in clinical practice is variable. Barriers include limited workforce capability and confidence, resource constraints, fragmented governance, and challenges integrating technologies into existing systems. Collaboration among health and care professionals, educators, technology professionals, and individuals with lived experience is essential to identify training needs and strengthen capability for technology-enabled rehabilitation.

Objective: This study aimed to develop an in-depth understanding of education and training needs for rehabilitation technologies across 3 stakeholder groups—rehabilitation professionals, technology professionals, and individuals with lived experience to inform future training initiatives.

Methods: A qualitative study was conducted, primarily across England, using purposive sampling to recruit stakeholders from each group. Data were collected through online focus groups and individual interviews and analyzed using reflexive thematic analysis. Although thematic analysis is inherently interpretive, the initial analysis focused primarily on the descriptive content of participants' accounts. Subsequently, deeper theoretical interpretation was undertaken through application of the capability, opportunity, motivation–behavior (COM-B) model, selected domains from the Theoretical Domains Framework (TDF), and the Consolidated Framework for Implementation Research (CFIR). COM-B was used to identify behavioral determinants, with selected domains from the TDF used to clarify behavioral influences. CFIR was then applied to situate behavioral determinants within organizational and system-level contexts.

Results: A total of 50 participants contributed to 7 focus groups and 11 individual interviews. Following this, 3 overarching themes were identified: (1) perceived capability and confidence in technology engagement, (2) system-level resource constraints, and (3) fragmented governance structures and organizational decision-making. COM-B mapping indicated that capability-related influences were most prominent among individuals with lived experience, whereas opportunity-related and structural constraints were more influential for rehabilitation and technology professionals. CFIR analysis highlighted that these behavioral determinants were embedded within, and often constrained by, infrastructure, procurement processes, and wider National Health Service (NHS) policy.

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Conclusions: Individuals with lived experience require accessible, ongoing support to build confidence and skills in using rehabilitation technologies. Rehabilitation professionals and technology professionals emphasized the need for structured education on available technologies and practical training on integrating them into clinical workflows, particularly for telerehabilitation and emerging digital and AI-enabled tools. Findings indicate that training initiatives must extend beyond individual skill development to address organizational resources, infrastructure, and governance processes. Coordinated, cross-stakeholder education and training strategies are essential to support equitable and sustainable adoption of rehabilitation technologies within the NHS. Training programs should be co-designed across stakeholder groups, embed behavioral and implementation considerations, and align with NHS infrastructure and procurement pathways. Addressing both capability and system-level constraints will be critical for achieving widespread, confident, and sustained use of rehabilitation technologies.

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KEYWORDS

rehabilitation technology; assistive technology; telerehabilitation; education and training; implementation; qualitative research; thematic analysis; stakeholders

Introduction

Background

Rehabilitation technologies encompass a wide range of tools from mobility aids (eg, wheelchairs) to robotic exoskeletons to virtual reality applications and are used to support rehabilitation across hospital, community, and home settings. For individuals with disabilities, such technologies have the potential to enhance functional recovery, promote independence, and extend access to rehabilitation services [1,2]. Current applications such as telerehabilitation can support underresourced health and care professionals within the National Health Service (NHS) by enabling more flexible models of rehabilitation delivery [3,4]. In the United Kingdom, NHS policy has increasingly promoted digitally enabled models of care and workforce development to support the integration of technologies across health services, including rehabilitation [5-7]. However, translation of these ambitions into routine practice has been inconsistent across organizations and regions, and adoption into clinical practice remains generally low [8]. Barriers include limited education and training for health and care staff, and low professional confidence, situated within a complex, challenging and fragmented environment [8-11]. Education and training represent potentially modifiable factors that may influence how different stakeholders engage with rehabilitation technologies in practice.

Prior work used the Implementation Stakeholder Engagement Model (I-STEM) to co-design an inclusive stakeholder engagement strategy for rehabilitation technology training [12]. Through engagement with rehabilitation professionals, educators, technology innovators, and individuals with lived experience, the study identified key implementation priorities, including accessibility, instructional design, technological integration, stakeholder engagement, and staff competence and training. Stakeholders consistently highlighted gaps in awareness, confidence, and training, identifying education and training as a critical and potentially modifiable determinant of rehabilitation technology adoption and use. While the I-STEM study established priorities for stakeholder engagement and training development, it did not explore in depth how education and training needs differed across stakeholder groups. The present qualitative study was therefore undertaken to examine these perspectives in greater depth and identify priorities for future rehabilitation technology education, training, and implementation initiatives.

To our knowledge, this study is the first to conduct a detailed comparative analysis of the training needs for rehabilitation technologies across individuals with lived experience, rehabilitation professionals, and technology professionals. While grounded in inductive thematic analysis, by integrating behavioral and implementation frameworks, the study also clarifies how individual training needs are shaped by organizational context. The findings illuminate challenges associated with achieving widespread adoption of digital technologies in the NHS following the acceleration of interest and uptake during the COVID-19 pandemic [13], developments which underpin the NHS 10 Year Health Plan (2025) Fit for the Future [14].

Research Objectives

This study aimed to explore in-depth the experiences, perceptions, and needs regarding the use of technology in rehabilitation, with a focus on identifying gaps in education and training, preferred learning formats, and perceived barriers to digital adoption.

Methods

Study Design

This study was guided by a cocreated stakeholder engagement strategy, structured using the I-STEM [12]. The authors recommended a subsequent stage of qualitative research. Hence, this qualitative study was designed to generate richer, deeper insights into the education and training needs in rehabilitation technology among a diverse group of stakeholders. It comprised homogeneous focus groups of between 3 and 9 individuals. Individual interviews were also conducted to accommodate participants' schedules, maximize participation, and increase accessibility. The groups and interviews were moderated using a semistructured topic guide covering key concepts while also allowing the researcher flexibility and autonomy to explore other relevant topics [15]. The guides for each stakeholder were developed by the project team (HB, AT, MH, and VAF) and evolved iteratively during fieldwork (Multimedia Appendices 1-3). After each group or interview, participants were given the opportunity to complete a short semistructured questionnaire

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that sought their views on the research experience. Reporting aligns with the consolidated criteria for reporting qualitative research (COREQ) [16] (Multimedia Appendix 4).

Participants

This study was conducted primarily across England. Three key stakeholder groups were represented:

1. Rehabilitation professionals, defined as health or care professionals working in rehabilitation settings (n=19).
2. Technology professionals, individuals who innovate, develop, or supply rehabilitation technology (n=9).
3. Lived experience, individuals with different levels and types of injury, illness, or disability with lived experience of rehabilitation (n=22). We use the term lived experience throughout as it reflects the majority (n=17), while also representing 2 participants with both lived and care experience and 3 caregivers.

Participants were purposively sampled through a variety of routes to ensure inclusion of stakeholders with direct experience of rehabilitation technologies and representing a wide range of lived experiences, clinical expertise, and technology types. Recruitment occurred through the National Institute for Health and Care Research (NIHR) HealthTech Research Centre for Rehabilitation's website and targeted emails to the researchers' academic and clinical networks as well as posts on professional platforms such as LinkedIn. Participants were also invited to share study information within their networks (snowball sampling).

Study information was disseminated via the project website, which hosted downloadable participant information sheets, consent forms, and demographic questionnaires.

Data Collection

Fieldwork was conducted between December 11, 2025, and February 2, 2026. Interviews and group discussions were conducted online by project researchers (AT and MH) using Microsoft Teams. The researchers who conducted the interviews and focus groups (AT and MH) had no prior professional or personal relationships with participants before study commencement. Their only contact with participants occurred during recruitment and data collection. With participants' consent, sessions were audio and video-recorded and automatically transcribed using Microsoft Teams; transcripts were subsequently checked for accuracy by one of the researchers (AT). Moreover, 2 individual interviews (1 lived experience and 1 technology professional) were not audio-recorded due to technical issues. Detailed notes were taken during these interviews and expanded immediately afterwards. These accounts were included in the analysis alongside the verified transcripts and field notes recorded during data collection. Mean duration of groups and interviews varied by stakeholder type (lived experience: mean 86, SD 13.53 minutes; rehabilitation professionals: mean 52, SD 21.86 minutes; technology professionals: mean 61, SD 26.38 minutes), with group discussions generally lasting longer than individual interviews, reflecting the additional time for debate and discussion among group participants.

Data Analysis

A total of 18 datasets were collected, comprising 7 group discussions (3 lived experience, and 2 each for rehabilitation and technology professionals) and 11 individual interviews (3 with lived experience, 6 with rehabilitation professionals, and 2 with technology professionals).

Inductive data analysis was conducted following the principles of reflexive thematic analysis as described by Braun and Clarke [17]. Transcripts from focus groups and individual interviews were read by the researcher (AT), who conducted most of the focus groups and interviews to maintain close familiarity with the data. Initial codes were generated through AT's iterative engagement with the dataset, capturing features of the data relevant to the research questions. Transcripts from focus groups and individual interviews were analyzed together within a single analytic process, enabling comparison of perspectives across stakeholder groups while retaining attention to differences between participant types. This analysis informed the development of preliminary themes reflecting patterns of shared meaning both within and across participant groups. Theme development was strengthened through comparison across stakeholder groups (individuals with lived experience, rehabilitation professionals, and technology professionals). This process was led by AT, but the themes were reviewed and refined by MH and further informed through ongoing discussion with other members of the research team (HB and VAF), who contributed to the refinement and interpretation of themes through critical reflection and who contributed additional disciplinary perspectives. Themes were then further refined by the research team and descriptively named and checked to ensure that each theme was internally coherent, conceptually distinct, and organized around a unifying concept [18]. A 15-point checklist by Braun and Clarke [19] was used to support the quality and rigor of the thematic analysis (Multimedia Appendix 5). Analysis was conducted manually in Microsoft Word. This approach supported close engagement with the data during coding and theme development and is consistent with reflexive thematic analysis, in which software acts primarily as a data management tool [20,21].

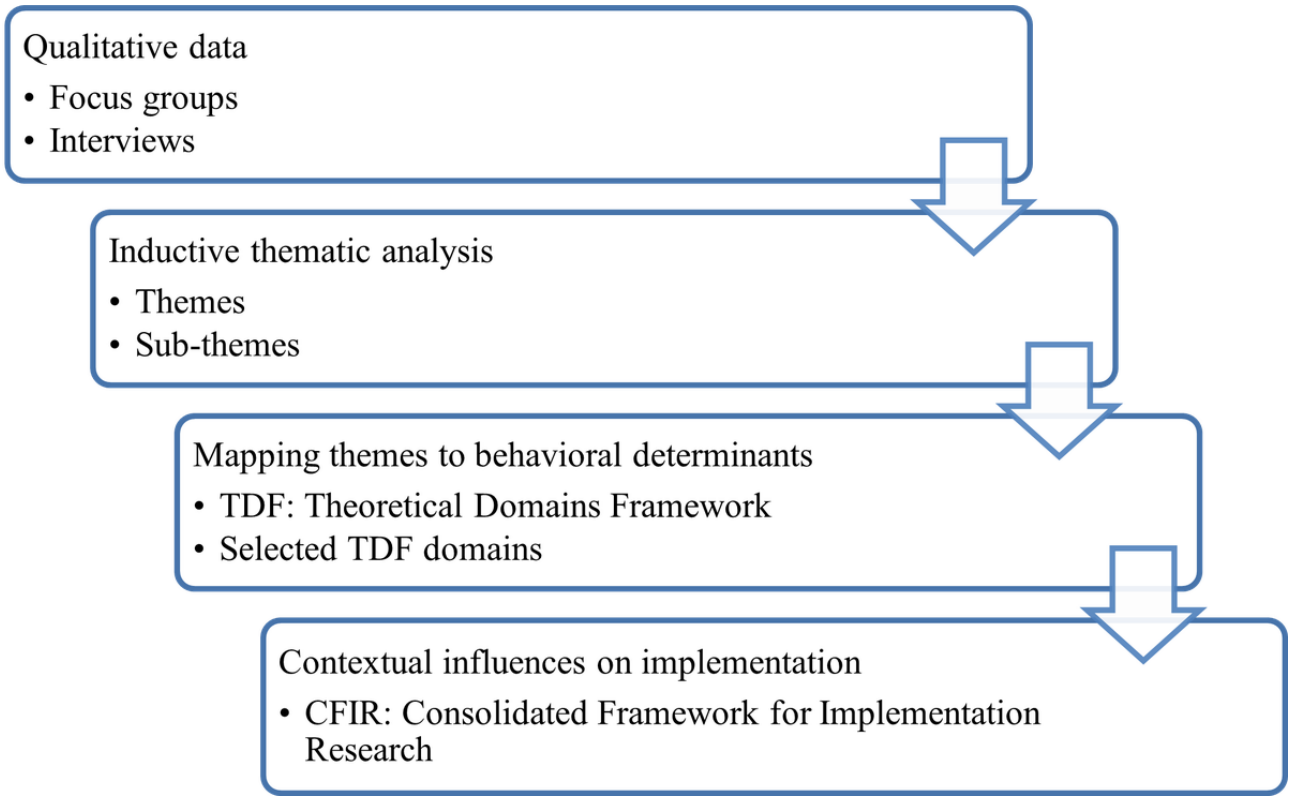
Although reflexive thematic analysis is inherently interpretive, the initial analysis focused primarily on participants' explicit accounts and patterns of shared meaning. Following inductive thematic analysis, themes were subsequently interpreted using theoretical frameworks. First, themes were mapped onto the capability, opportunity, motivation–behavior (COM-B) model [22] to identify behavioral determinants influencing the use of rehabilitation technology, as COM-B provides a structured approach to understanding behavior. Where further clarification was required, relevant domains from the Theoretical Domains Framework (TDF) [23] were used to identify underlying behavioral constructs, with only domains relevant to the emerging themes applied. Finally, findings were interpreted using the Consolidated Framework for Implementation Research (CFIR) [24], enabling behavioral determinants to be considered alongside organizational, technological, and system-level influences (refer to Figure 1 for analysis process). The 3 frameworks were selected because they provide complementary levels of analysis. COM-B identifies the broad behavioral

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determinants underpinning stakeholders' education and training needs, TDF provides greater detail on these behavioral determinants, and CFIR contextualizes these. Theoretical frameworks were applied during interpretation rather than initial analysis to preserve the inductive nature of the thematic analysis.

Due to project timelines and the interpretive nature of reflexive thematic analysis, participants were not asked to review the thematic findings. Instead, analytic rigor was supported through comparison of perspectives across stakeholder groups and ongoing reflexive discussions within the research team.

Figure 1. Qualitative analysis process illustrating the progression from inductive thematic analysis to identification of behavioral determinants (capability, opportunity, motivation–behavior with selected TDF domains) and interpretation within implementation context using CFIR. CFIR: Consolidated Framework for Implementation Research; TDF: Theoretical Domains Framework.



Reflexivity

Reflexive thematic analysis recognizes that themes are actively developed through the researchers' interpretive engagement with the data rather than emerging independently of the analytic process [17]. The research team brought complementary perspectives including behavioral science (HB), psychology and psychotherapy practice (MH), industry-based health technology research (AT), and lived experience (VAF). These perspectives informed interpretation during coding and theme development through reflexive discussions in which assumptions, interpretations, and candidate themes were critically examined and refined.

Ethical Considerations

The University of Nottingham Faculty of Medicine and Health Sciences Research Ethics Committee granted ethics approval on October 30, 2025 (FMHS 16-1025). Minor amendments were noted to file on November 25, 2025. Interested individuals emailed completed documentation to the research team. Written informed consent and demographic data were obtained prior to participation, with verbal consent reconfirmed and audio-recorded at the start of each group or interview.

Results

Participant Characteristics

A total of 50 participants took part in the study—19 rehabilitation professionals, 9 technology professionals, and 22 lived experience participants. We use the term lived experience to represent this stakeholder group, as it reflects the majority (n=17), while also encompassing 2 participants with both lived and care experience and 3 caregivers. Participants were recruited from across England, with individual representation from Northern Ireland in the lived experience group. Demographic characteristics are summarized in Table 1. Lived experience participants demonstrated diversity in age, gender identity, ethnicity, and disability status. The majority identified as having a disability or long-term health condition. Rehabilitation and technology professionals were predominantly female and White and largely did not identify as having a disability. Participant demographics are presented by stakeholder group in Tables 1-3.

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Table 1. Demographic characteristics of lived experience participants (n=22).

Characteristic[a]	Value[b]
Age (y), mean (SD)[c]	37.3 (11.6)
Gender identity, n (%)	
Woman	11 (50)
Man	7 (32)
Nonbinary	4 (18)
Ethnicity, n (%)	
White	8 (42)
Black	5 (26)
Mixed	5 (26)
Asian	1 (5)
Missing or nonresponse	3 (14)
Identifies as having disability or long-term condition, n (%)	17 (85)

[a]Geographic spread: England and Northern Ireland.

[b]Percentages are calculated using the number of respondents to each individual question. Denominators therefore vary across demographic characteristics due to nonresponse. Percentages for missing or nonresponse categories are calculated using the total sample size.

[c]Mean ages and SDs were estimated using the midpoints of the reported age bands, as exact ages were not collected.

Table 2. Demographic characteristics of rehabilitation professionals (n=19).

Characteristic[a]	Value[b]
Age (y), mean (SD)[c]	42.1 (11.9)
Gender identity, n (%)	
Woman	14 (74)
Man	5 (26)
Nonbinary	0 (0)
Ethnicity, n (%)	
White	16 (84)
Black	1 (5)
Mixed	2 (11)
Asian	0 (0)
Identifies as having disability or long-term condition, n (%)	2 (11)

[a]Geographic spread: England (South, Midlands, North).

[b]Percentages are calculated using the number of respondents to each individual question. Denominators therefore vary across demographic characteristics due to non-response. Percentages for missing or nonresponse categories are calculated using the total sample size.

[c]Mean ages and SDs were estimated using the midpoints of the reported age bands, as exact ages were not collected.

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Table 3. Demographic characteristics of technology professionals (n=9).

Characteristic[a]	Value[b]
Age (y), mean (SD)[c]	46.3 (16.8)
Gender identity, n (%)	
Woman	6 (67)
Man	3 (33)
Nonbinary	0 (0)
Ethnicity, n (%)	
White	6 (75)
Black	0 (0)
Mixed	1 (12.5)
Asian	1 (12.5)
Missing or nonresponse	1 (12.5)
Identifies as having disability or long-term condition, n (%)	2 (22)

[a]Geographic spread: England (South, Midlands, North).

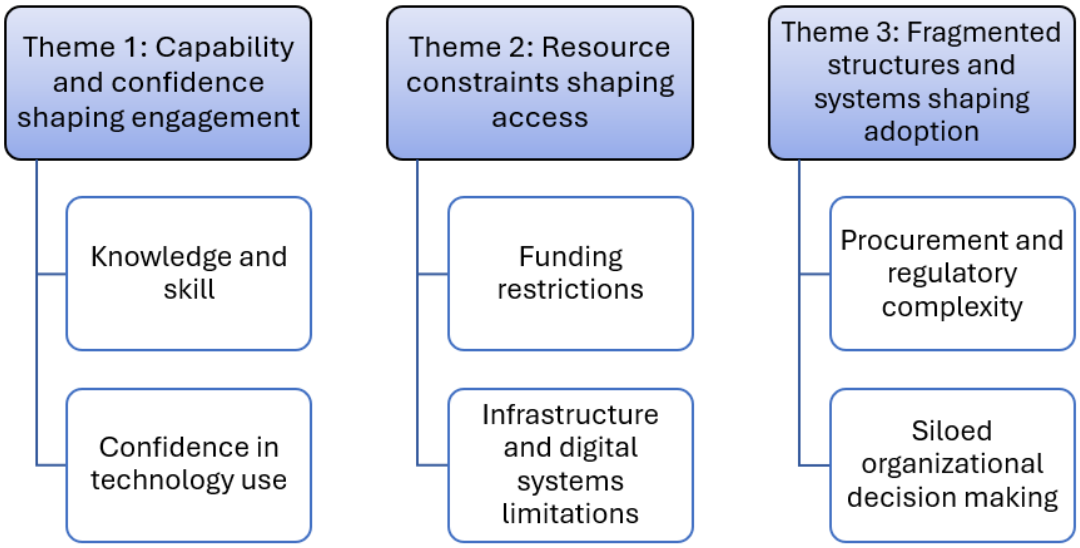
[b]Percentages are calculated using the number of respondents to each individual question. Denominators therefore vary across demographic characteristics due to non-response. Percentages for missing or nonresponse categories are calculated using the total sample size.

[c]Mean ages and SDs were estimated using the midpoints of the reported age bands, as exact ages were not collected.

Thematic Analysis

As presented in Figure 2, 3 main themes (each with 2 subthemes) were identified, which to varying degrees are relevant to all 3 stakeholder types. Each theme, along with its subthemes, is presented in turn. Although analytically distinct, subthemes were interconnected in participants' accounts and are therefore presented together. Participant quotations are labeled using anonymized identifiers showing participant number and stakeholder group (eg, ID12, lived experience) to preserve confidentiality while providing context.

Figure 2. Themes and subthemes identified through reflexive thematic analysis.



Theme 1: Capability and Confidence Shaping Engagement

Overview

Theme 1 consisted of following two subthemes: (1) knowledge and skill, and (2) confidence in technology use.

The extent to which perceived capability and confidence emerged as a theme varied by stakeholder type.

Lived Experience

Participants commonly described limited familiarity with newer rehabilitation technologies, contributing to reduced confidence to engage. Gaps in knowledge and skills led to uncertainty about how technologies functioned and how they might support recovery. This was compounded by what they perceived as limited education and follow-up from health professionals.

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Participants were particularly concerned about using technologies incorrectly, especially where opportunities for feedback or clarification were lacking. Engagement was therefore shaped not only by access, but by the availability of professional support to build knowledge, skills, and confidence.

> *You have to give guidance so that the patient knows when things might not be working. Instead, patients just have to go out into the Wild West and figure it out for themselves.* [ID19, lived experience]

> *Because the rehab center was understaffed, we couldn't see the physiotherapist every time so some things you just have to figure out on your own or from others in your shoes.* [ID12, lived experience]

These accounts highlight how confidence was closely linked to ongoing professional support. Both technology professionals and rehabilitation professionals acknowledged that some patients lacked confidence or motivation to engage, yet rehabilitation staff did not overtly reflect on their own role in shaping this.

Rehabilitation Professionals

Rehabilitation professionals expressed interest in rehabilitation technologies but positioned engagement as constrained primarily by wider NHS pressures (themes 2 and 3).

> *Technology will make rehab easier and more effective.* [ID30, rehabilitation professional]

> *Every week a new piece of tech comes out that we don't get access to, or we can't have access to.* [ID56, rehabilitation professional]

Training opportunities were described as limited and ad hoc, with time pressure restricting engagement. However, unlike lived experience participants, professionals did not emphasize their own knowledge or skill gaps as primary barriers.

> *And then there's the training issues and the time that that's going to take.* [ID61, rehabilitation professional]

Technology Professionals

Technology professionals frequently attribute limited uptake to gaps in clinician capability and confidence. Clinicians were perceived as hesitant to adopt unfamiliar technologies, particularly where these added to existing workload pressures.

> *People…are overstretched in their work, which is what we're trying to alleviate. But when you go and talk to someone… they're like I can't do what I've got on my plate already.* [ID38, technology professional]

> *Clinicians still have a lack of confidence around digital tech.* [ID44, technology professional]

Capability and confidence were experienced differently across stakeholder groups. For lived experience participants, they directly influenced engagement. For rehabilitation professionals, NHS constraints predominated while technology professionals framed clinician engagement partly as a capability issue but also acknowledged wider NHS constraints.

Theme 2: Resource-Constrained Environments Shaping Access

Overview

Theme 2 consisted of following two subthemes: (1) funding restrictions, and (2) infrastructure and digital system limitations.

Across stakeholder groups, engagement was constrained by NHS system-level resource limitations, including restricted funding, which resulted in limited access to rehabilitation technology as well as infrastructure and system limitations.

Lived Experience

Participants primarily experienced these resource constraints as limited access to rehabilitation technologies through the NHS, with many unable to self-fund.

> *Most of the technology is not under the NHS…it's really expensive and I would not say that it is accessible.* [ID18, lived experience]

Engagement was therefore dependent not only on motivation and confidence, but on NHS provision.

Rehabilitation Professionals

Rehabilitation professionals identified funding constraints as a major barrier to adoption, limiting both investment in new technologies and maintenance of existing technology. Even where rehabilitation technologies were available, they were often insufficient to meet patient demand, limiting wider uptake.

> *But you know yourself, the NHS is broke.* [ID62, rehabilitation professional]

Participants described the need to demonstrate cost-effectiveness, for example, through measurable improvements in patient outcomes to justify investment, with rehabilitation competing against more immediate service pressures such as patient care.

> *I think you have to have a really robust case.* [ID61, rehabilitation professional]

Infrastructure limitations further constrained use. Outdated and fragmented IT systems, unreliable Wi-Fi, and limited technical support reduced usability and confidence in technologies that required connectivity.

> *I think there's something like 300 different electronic systems within the NHS.* [ID61, rehabilitation professional]

Limited physical space—which had intensified following the repurposing of facilities during the COVID-19 pandemic—also restricted use, particularly for larger technologies

> *Our physical space then stops us for some of the bigger technology.* [ID55, rehabilitation professional]

Technology Professionals

Technology professionals echoed these constraints, highlighting limited budgets, infrastructure constraints, competing priorities, and difficulties demonstrating the value needed to encourage investment.

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> *The NHS cannot cope with the current demands and so anything new basically goes to the bottom of the list.* [ID44, technology professional]

Infrastructure challenges, particularly fragmented IT systems and aligning new technologies with these, were described as major barriers, and unreliable connectivity, including hospital Wi-Fi, further complicated use.

> *Aligning more with workflows…that is much more challenging.* [ID46, technology professional]

Overall, resource constraints limited access and adoption. Lived experience participants experienced restricted access directly, while rehabilitation and technology professionals emphasized funding, equipment, and infrastructure limitations. These constraints operated at a system level, distinct from capability (theme 1) and fragmented structures and systems (theme 3), although closely related.

Theme 3: Fragmented Structures and Systems Shaping Adoption

Overview

Theme 3 consisted of following two subthemes: (1) procurement and regulatory complexity, and (2) siloed organizational decision-making.

Participants described governance structures within the NHS as shaping whether and how rehabilitation technologies were adopted. Governance encompassed formal approval pathways, procurement processes, regulatory requirements, and organizational decision-making mechanisms.

These issues were only raised by rehabilitation and technology professionals; lived experience participants did not contribute to this theme, reflecting their distance from the approval and purchasing processes that determine technology availability within the NHS.

Rehabilitation Professionals

Participants described procurement processes as slow, inconsistent, and difficult to navigate, with substantial variation across NHS Trusts (NHS Trusts are publicly funded health care organizations responsible for delivering hospital, community, mental health, and ambulance services to local populations). This meant that there was no standardized route for rolling out technologies across NHS Trusts.

> *We're under the same umbrella of NHS, but we work very differently and have our own systems in place.* [ID56, rehabilitation professional]

A small minority also stated data governance requirements added an additional layer of complexity.

> *It's hard to overcome some of the natural governance issues… about how data is going to be collected, stored, used.* [ID62, rehabilitation professional]

Technology Professionals

Technology professionals similarly described regulatory approval as time-consuming and costly. Developers were required to navigate multiple NHS Trust-specific procurement processes, each with distinct requirements and timelines. This fragmentation constrained widespread adoption, even where technologies had demonstrated value. From this perspective, barriers to adoption reflected siloed organizational decision-making.

> *They (NHS Trusts) each have a different set up and they each have a different kind of protocol."* [ID43, technology professional]

Governance structures shaped adoption independently of capability (theme 1) and resource constraints (theme 2). While resources determined what could be supported, governance processes determined what could be approved and implemented. These operated at a system level beyond the control of individual rehabilitation and technology stakeholders and did not directly impact those with lived experience.

Summary of Stakeholder Training Needs

Although the nature of training needs differed across stakeholder groups, several clear priorities emerged. Individuals with lived experience emphasized the need for practical instruction, ongoing professional support, and confidence-building in the use of rehabilitation technologies. Rehabilitation professionals highlighted the need for additional education on available technologies and practical training to support integration into clinical workflows. Technology professionals emphasized the need for training on how to communicate effectively with the NHS and to navigate complex procurement pathways.

Mapping Themes to Behavioral Determinants (COM-B Informed by TDF)

Given the study aim of identifying education and training needs, themes were further interpreted using the COM-B model [22], which conceptualizes behavior as shaped by capability (eg, knowledge and skills), opportunity (eg, environmental and organizational factors), and motivation, including both reflective (eg, beliefs and intentions) and automatic (eg, habits and emotions) components. Selected domains from the TDF [23] were used to clarify the nature of influences evident in stakeholder accounts. Only domains clearly reflected in the data were applied, and mapping was conducted separately for each stakeholder group. Table 4 shows the mapping applied.

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Table 4. Mapping themes to behavioral determinants using the capability, opportunity, motivation–behavior model informed by selected Theoretical Domains Framework domains.

Stakeholder group	Behavior	COM-B[a] components	Determinants (TDF[b] domains)
Lived experience	Engage with and use rehabilitation technologies	Capability and opportunity, with motivation influences	• Limited knowledge and practical skills (knowledge; skills → capability) • Doubts about competence and confidence (beliefs about capabilities → reflective motivation) • Emotional responses (eg, anxiety and uncertainty; emotion → automatic motivation) • Limited access to technologies, guidance, and support (environmental context and resources → opportunity)
Rehabilitation professionals	Adopt and integrate technologies into practice	Opportunity (predominant), with capability and motivation influences	• Limited organizational resources (eg, funding and equipment; environmental context and resources → opportunity) • Infrastructure constraints (eg, IT systems and connectivity; environmental context and resources → opportunity) • Complex procurement pathways (environmental context and resources → opportunity) • Fragmented organizational decision-making (environmental context and resources → opportunity)
Technology professionals	Secure approval and enable adoption of rehabilitation technologies within the NHS[c]	Opportunity (structural), with reflective motivation influences	• Regulatory and approval requirements; variable procurement pathways (environmental context and resources → opportunity) • Infrastructure and system integration challenges (environmental context and resources → opportunity) • Perceived clinician training and confidence gaps (beliefs about capabilities → reflective motivation)

[a]COM-B: capability, opportunity, motivation–behavior.

[b]TDF: Theoretical Domains Framework.

[c]NHS: National Health Service.

For lived experience participants, influences relating to capability were prominent. Participants described gaps in knowledge and practical skills, which created uncertainty about correct use of rehabilitation technologies. These concerns reflected doubts about competence, reducing their confidence and willingness to engage. Opportunity-related influences took the form of limited NHS availability and the inability to purchase technology privately. Limited guidance and support from clinical staff further shaped engagement. In this context, motivation appeared closely tied to confidence and professional support.

For rehabilitation professionals, the key behavior was adopting and integrating rehabilitation technologies into clinical practice. Clinicians noted that education and training opportunities were limited, but engagement was largely constrained by funding, infrastructure, and decision-making processes within the NHS. In practice, this meant restricted availability of equipment, outdated and poorly integrated IT systems, and complex procurement pathways across NHS Trusts. Although clinicians expressed interest in the potential of rehabilitation technologies, motivation appeared closely linked to these practical constraints.

For technology professionals, the principal behavior concerned securing approval for and enabling the use of rehabilitation technologies within the NHS. Engagement was shaped by regulatory requirements, procurement pathways, and variation across NHS Trusts, which determined whether technologies could be adopted. Infrastructure challenges, including integration with existing NHS systems, further limited uptake. Developers perceived clinicians to lack confidence and readiness to use rehabilitation technologies, which they attributed to limited education and training.

Across stakeholder groups, the emphasis of influences differed. Capability-related factors were most visible among lived experience participants, whereas organizational and system-level constraints were more prominent in accounts from rehabilitation and technology professionals.

Contextualizing Behavioral Determinants Within Organizational Systems (CFIR)

While the COM-B interpretation highlighted the influence of capability, opportunity, and motivation on stakeholder engagement, these influences were not independent of the organizational context for rehabilitation technologies. Accounts from rehabilitation and technology professionals pointed to wider NHS systems that shaped what was practically possible. To situate these influences, findings were interpreted in relation to relevant constructs from the CFIR [24], with a primary focus on organizational (inner setting) and external policy (outer setting) factors. Subthemes were aligned with CFIR constructs through a deductive mapping process, with constructs that were clearly or meaningfully reflected in the data prioritized.

Constructs relating to intervention characteristics (eg, evidence strength and quality) were only indirectly represented—primarily through participants' references to cost-effectiveness and the need to demonstrate value—and are therefore indicated as secondary and indirect in Table 5. Similarly, elements of the process domain relating to implementation—primarily stakeholder engagement—were

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evident in accounts of clinician hesitancy and competing demands. However, other process constructs (eg, planning, evaluation, and execution) were not substantively represented; where relevant, engagement is therefore indicated as a secondary and partial construct in Table 5. Constructs relating to individual characteristics were not mapped, as these were more appropriately examined through COM-B and TDF (Theme 1). Table 5 presents the mapping of themes 2 and 3 to relevant CFIR domains and constructs. Theme 1 is not included, as it reflects individual-level influences examined through COM-B and TDF.

Table 5. Mapping of themes 2 and 3 to relevant Consolidated Framework for Implementation Research domains and constructs.

Theme	Stakeholder group	CFIR[a] domain	CFIR constructs	Illustrative determinants
Theme 2: resource-constrained environments shaping access	Lived experience	Inner setting	• Available resources	Limited NHS[b] provision; inability to self-fund technology
Theme 2: resource-constrained environments shaping access	Rehabilitation professionals	Inner setting	• Available resources; • Primary: available resources; compatibility • Secondary: evidence strength and quality (indirect)	Restricted funding; need to demonstrate cost-effectiveness; insufficient equipment; IT integration challenges; unreliable Wi-Fi; limited technical support
Theme 2: resource-constrained environments shaping access	Technology professionals	Inner setting	• Primary: available resources; compatibility • Secondary: evidence strength and quality (indirect)	Infrastructure constraints; fragmented IT systems; limited investment capacity; challenges demonstrating value
Theme 3: fragmented structure and systems shaping adoption	Rehabilitation professionals	Outer setting or inner setting	• Primary (outer setting): external policies and incentives • Primary (inner setting): structural characteristics	Procurement variability; inconsistent NHS Trust approval processes; information governance requirements
Theme 3: fragmented structure and systems shaping adoption	Technology professionals	Outer setting or inner setting; process (partial)	• Primary (outer setting): external policies and incentives • Primary (inner setting): structural characteristics • Secondary (process): engagement (partial)	Regulatory approval requirements; fragmented NHS Trust–level procurement; dispersed decision-making authority; clinician hesitancy; limited capacity to engage with new technologies

[a]CFIR: Consolidated Framework for Implementation Research.

[b]NHS: National Health Service.

Theme 2—resource-constrained environments shaping access—aligned primarily with CFIR constructs relating to available resources and compatibility within the inner setting. Limited funding, insufficient equipment, and infrastructure constraints shaped the feasibility of technology use, constraining opportunity regardless of individual capability or motivation.

Theme 3—fragmented structures and systems shaping adoption—aligned with CFIR constructs across the outer and inner setting domains, particularly external policies and incentives (outer setting) and structural characteristics (inner setting). Regulatory requirements, procurement pathways, and variation across NHS Trusts shaped approval and adoption processes, often constraining implementation before individual behavior became relevant. In this way, governance structures influenced the opportunity for engagement.

Overall, these findings indicate that behavioral determinants identified through COM-B were embedded within organizational and policy contexts. Education and training may strengthen knowledge and confidence, but their impact is likely to depend on resource capacity and governance processes within NHS systems.

Across stakeholder groups, several shared issues relevant to training and education were identified. Individuals with lived experience identified gaps in both the education and training they received from rehabilitation professionals, but their experience was largely limited to low- and mid-technology devices, making it difficult to identify or prioritize training needs related to more advanced technologies. Rehabilitation professionals reported exposure to a broader range of technologies, although access varied but training was described as limited and ad hoc rather than embedded within continuing professional development. Technology professionals also emphasized the importance of training for rehabilitation staff. These findings have direct implications for the design of training and implementation strategies.

Discussion

Key Results

Previous research has typically focused on specific rehabilitation technologies and/or single stakeholder groups. A key novel contribution of this study is the integrated comparative analysis of education and training needs across 3 distinct stakeholder groups—rehabilitation professionals, technology professionals,

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and individuals with lived experience. By examining these groups together, this study identifies specific training needs for each stakeholder group and how these interact to influence the adoption of rehabilitation technologies within the NHS.

This study identified 3 interconnected themes—capability and confidence, resource-constrained environments shaping access, and fragmented structure and systems shaping adoption. By applying behavioral (COM-B or TDF) and implementation (CFIR) frameworks to inductive thematic analysis, this study shows that training needs are shaped by both individual capabilities and wider organizational and system factors within the NHS. Although some constructs span different models, the frameworks were applied at different levels of interpretation. COM-B and TDF were used to understand determinants of individual behavior, whereas CFIR was used to interpret organizational and system-level influences. While capability-related influences were most visible among individuals with lived experience, opportunity-related and structural constraints predominated in professional and developer accounts. Nevertheless, all stakeholder groups recognize the prospective benefits of rehabilitation technologies, particularly their potential to address resource constraints within the NHS and improve patient outcomes and quality of care.

For individuals with lived experience, engagement with rehabilitation technologies was linked to knowledge, confidence, and perceived competence, and participants identified gaps in the education and training they received from rehabilitation professionals. They found it challenging to identify and prioritize training by technology type since their experience of rehabilitation technologies typically focused on low- or mid-tech devices, including mobility aids, activity and health and well-being trackers, and apps, with little experience of smart assessment and training devices. The study findings highlight an opportunity to support individuals with lived experience to better understand the role of newer technologies in rehabilitation, particularly approaches such as telerehabilitation for monitoring and support in the community, where access to specialist services is often limited.

In contrast, rehabilitation professionals had experience of a wide range of rehabilitation technology, although access varied notably both across and within NHS Trusts, reflecting differences in resources, funding, and organizational priorities. Training in emerging technologies was perceived to be limited and ad hoc rather than embedded in continuing professional development (CPD). Interest in technologies such as telerehabilitation, digital patient education and engagement tools, and AI-enabled documentation systems was prioritized, driven by their perceived potential to address workforce resource and capacity pressures.

Technology professionals also highlighted the need for clinician training but confirmed that there are significant barriers to adoption, including resource constraints such as limited funding together with fragmented systems and structures within the NHS.

Implications for Training and Practice

Mapping these findings to the COM-B model enables us to provide actionable, stakeholder-specific recommendations for the design of rehabilitation technology training that extends beyond generic skills development.

For individuals with lived experience, training should prioritize practical hands-on learning to build confidence and capability and include ongoing clinical support and opportunities for a bidirectional feedback loop between users and health and care professionals.

For rehabilitation professionals, technologies such as telerehabilitation, digital patient education and engagement tools, and AI-enabled documentation systems are a priority, and training should address capability and focus on practical integration within clinical workflows and NHS systems and structures. Motivation to adopt technologies appeared to be linked to their perceived value in improving efficiency and patient care, suggesting that training should emphasize practical benefits alongside skill development. However, the effectiveness of training is likely to depend on organizational contexts within the NHS, including resource availability and system infrastructure [25,26].

For technology professionals, including those involved in the development and supply of rehabilitation technologies, training needs are related to the tools to equip them to communicate effectively with the NHS about potential new technologies and to navigate regulatory and procurement processes and decision-making [24,25,27,28]. The main challenge is designing training that can be applied to the NHS as a whole while still accounting for the variability across individual NHS Trusts [29,30]. These system-level barriers may be most effectively addressed by facilitating collaboration between groups of rehabilitation professionals, technology professionals, and NHS representatives from different NHS Trusts and centralized operations where they exist. Rehabilitation engineers may occupy an overlapping position between rehabilitation and technology professionals, with some working as part of multidisciplinary rehabilitation or assistive technology teams [31]. Across all stakeholder groups, training should adopt a multimodal format combining online and experiential learning.

Implications for Adoption of Rehabilitation Technologies

Our findings suggest that while education and training in rehabilitation technologies are necessary, their impact on adoption is likely to be constrained by organizational and system-level factors within the NHS. This highlights that training alone is unlikely to drive widespread adoption without concurrent changes to the contexts in which technologies are implemented. In this context, the NHS 10 Year Health Plan (2025) “Fit for the Future,” which outlines a shift toward a “digital-first” health care system, further emphasizes the need to align training with system readiness to support meaningful integration of rehabilitation technologies into clinical pathways [14].

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Strengths and Limitations

The sample of 50 is relatively large for a qualitative study [20,32,33], and this study is novel in that it provides an in-depth comparative analysis of the training needs of diverse stakeholders. Furthermore, by applying behavioral and implementation frameworks to inductive thematic analysis, the study situates individual training needs within the context of the NHS, thereby informing real-world decisions on how best to design and deliver training in this environment.

Nevertheless, several limitations should be acknowledged. Participants with lived experience and rehabilitation professionals were overrepresented compared with technology professionals. However, despite smaller numbers in the technology group, themes relating to constraints in introducing and using rehabilitation technologies within the NHS were consistent across both professional groups, suggesting sufficient depth and richness of data to support the analytic interpretations.

Group sizes varied (3-9 participants), and both focus groups and individual interviews were conducted. These methodological variations may have influenced discussion dynamics and the extent of individual contribution; however, combining methods is a pragmatic strategy to maximize participation and provide complementary insights [34,35]. The recurrence of themes across both group and interview data reduces concerns that the manner of data collection materially influenced the core findings.

Although lived experience participants reflected diversity in age, ethnicity, and disability status, comparable diversity was less apparent among rehabilitation and technology professionals, and these differences may have influenced the range of views represented. As the study was not designed to examine how demographic characteristics shaped participants' perspectives, no conclusions can be drawn regarding the influence of ethnicity, gender identity, or disability on the findings. Furthermore, the demographic questionnaire was designed for use across all stakeholder groups. Consequently, detailed professional characteristics (eg, profession, clinical role, or years of experience) were not collected for rehabilitation or technology professionals, limiting further characterization of these participants. Further research should collect more detailed information on professional background, clinical role, and experience, alongside seeking greater representation of younger professionals, male stakeholders, those identifying as nonbinary, and individuals from a wider range of ethnic backgrounds.

Although recruitment was UK-wide, the sample was concentrated in England; only 1 participant was based in Northern Ireland, and none were recruited from Scotland or Wales. Given differences across the devolved health care systems, the absence of representation from Scotland and Wales may limit the transferability of these findings beyond the English NHS. Future research should seek greater representation from Scotland, Wales, and Northern Ireland to determine the extent to which these findings apply in these settings.

Finally, 2 individual interviews were not audio-recorded. Although detailed notes were taken, the absence of verbatim transcripts may have reduced the depth and nuance captured from those participants. However, these participants represented a small proportion of the total sample and themes discussed in these interviews were consistent with those identified across the wider dataset [36].

Comparison With Prior Work

Research that specifically addresses the education and training needs for rehabilitation technology across multiple stakeholders such as rehabilitation professionals, technology professionals, and individuals with lived experience and how to collaborate effectively to design effective training initiatives is limited. Training needs for rehabilitation professionals specifically tend to focus on a specific area, such as assistive technology [37] and virtual reality [38,39], or feedback-based technology [40], wireless technologies [41], and telerehabilitation [42]. Research focusing on technology professionals tends to investigate their role in the process rather than explicit training needs [43,44]. The needs of individuals with disabilities are typically viewed through the lens of accessibility and inclusivity and emphasize the importance of user-centered design [9,45-47]. Hence, a key strength of this study is identifying priorities for training in rehabilitation technology across diverse stakeholders and by identifying behavioral factors that determine engagement and situating them within the context of the NHS.

Conclusions

This study highlights that training is necessary but insufficient on its own; workforce development strategies must be accompanied by organizational, infrastructural, and governance changes if rehabilitation technologies are to be adopted sustainably across NHS services. This novel study speaks to the importance of collaboration in the fast-developing multidisciplinary area of rehabilitation science [48].

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Data Availability

Due to the sensitive nature of qualitative data and to protect participant confidentiality, transcripts cannot be publicly shared. Deidentified excerpts are available within the manuscript.

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Generative AI Use

The authors used ChatGPT (OpenAI, GPT-5.5; accessed February-March 2026) during manuscript preparation to support language refinement, improve readability, and explore behavioral and implementation science frameworks that might be relevant for further interpretation following completion of the inductive thematic analysis. ChatGPT did not analyze qualitative data, generate codes or themes, determine framework mapping, or the study design or conclusions. Suggestions generated by ChatGPT were critically evaluated by the authors against the implementation science literature and the study findings before the capability, opportunity, motivation–behavior model, selected Theoretical Domains Framework domains, and Consolidated Framework for Implementation Research were chosen and applied. All data analysis, interpretation, framework mapping, and manuscript content were undertaken by the authors, who take full responsibility for the final manuscript. The relevant ChatGPT prompts are provided in Multimedia Appendix 6.

Authors' Contributions

Conceptualization: HB and VAF
Data curation: AT
Formal analysis: AT
Funding acquisition: HB
Investigation: AT and MH
Methodology: HB and AT
Project administration: HB, AT, and MH
Resources: HB and AT
Writing—original draft preparation: AT and HB
Writing—review and editing: MH, and VAF
All authors have reviewed and approved the final manuscript.

Conflicts of Interest

None declared.

Multimedia Appendix 1

Guide Groups and Interviews – Lived Experience.
[DOCX File , 197 KB-Multimedia Appendix 1]

Multimedia Appendix 2

Guide Groups and Interviews – Rehabilitation Professionals.
[DOCX File , 197 KB-Multimedia Appendix 2]

Multimedia Appendix 3

Guide Groups and Interviews – Technology Professionals.
[DOCX File , 199 KB-Multimedia Appendix 3]

Multimedia Appendix 4

Consolidated Criteria for Reporting Qualitative Research (COREQ).
[DOCX File , 33 KB-Multimedia Appendix 4]

Multimedia Appendix 5

[DOCX File , 24 KB-Multimedia Appendix 5]

Multimedia Appendix 6

ChatGPT Prompt Log February and March 2026.
[DOCX File , 43 KB-Multimedia Appendix 6]

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Abbreviations

CFIR: Consolidated Framework for Implementation Research
COM-B: capability, opportunity, motivation–behavior
CPD: Continuing Professional Development
COREQ: Consolidated Criteria for Reporting Qualitative Research
I-STEM: Implementation Stakeholder Engagement Model

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NHS: National Health Service
NIHR: National Institute for Health and Care Research
TDF: Theoretical Domains Framework

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