

Physiotherapy Theory and Practice

An International Journal of Physical Therapy

ISSN: 0959-3985 (Print) 1532-5040 (Online) Journal homepage: www.tandfonline.com/journals/iptp20

The clinical reasoning in neurological physiotherapy: an exploratory qualitative study on the (dis)similarities between Bobath and non-Bobath therapists

Sofia Marques, Julie Vaughan-Graham, Rui Jorge Dias Costa & Daniela Figueiredo

To cite this article: Sofia Marques, Julie Vaughan-Graham, Rui Jorge Dias Costa & Daniela Figueiredo (2025) The clinical reasoning in neurological physiotherapy: an exploratory qualitative study on the (dis)similarities between Bobath and non-Bobath therapists, Physiotherapy Theory and Practice, 41:11, 2418-2435, DOI: [10.1080/09593985.2025.2515476](https://doi.org/10.1080/09593985.2025.2515476)

To link to this article: <https://doi.org/10.1080/09593985.2025.2515476>



© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.



[View supplementary material](#)



Published online: 06 Jun 2025.



[Submit your article to this journal](#)



Article views: 1242



[View related articles](#)



[View Crossmark data](#)



Citing articles: 3 [View citing articles](#)

CASE REPORT



The clinical reasoning in neurological physiotherapy: an exploratory qualitative study on the (dis)similarities between Bobath and non-Bobath therapists

Sofia Marques PT, MSc ^a, Julie Vaughan-Graham PT, PhD ^{b,c}, Rui Jorge Dias Costa PT, PhD ^d,
and Daniela Figueiredo PhD ^e

^aCINTESIS@RISE, IbiMED, Department of Medical Sciences, University of Aveiro, Aveiro, Portugal; ^bDepartment of Physical Therapy, Faculty of Medicine, University of Toronto, Toronto, ON, Canada; ^cSchool of Rehabilitation Science, McMaster University, Hamilton, ON, Canada; ^dIbiMED, School of Health Sciences, University of Aveiro, Aveiro, Portugal; ^eCINTESIS@RISE, School of Health Sciences, University of Aveiro, Aveiro, Portugal

ABSTRACT

Background: Clinical reasoning (CR) is a complex and dynamic process that relies on therapists' cognitive, metacognitive, psychomotor and affective skills. These abilities allow clinicians to synthesize patient information, apply reasoning strategies, and adapt interventions in response to evolving clinical presentations. Despite its critical role in physiotherapy, limited research has explored how neurological physiotherapists develop and apply CR.

Purpose: To examine the CR processes of neurological physiotherapists with and without post-graduate Bobath education.

Methods: Thirty-two experienced neurological physiotherapists were purposefully selected to participate in the study. Participants worked in rehabilitation centers, hospitals, and private clinics. A qualitative interpretive description approach was employed, in which video-recorded treatment sessions, used for stimulated recall, were immediately followed by semi-structured interviews. The interviews were transcribed verbatim and served as the raw data for thematic analysis, employing deductive and inductive methods.

Results: The study included 32 physiotherapists. Participants worked in rehabilitation centers, hospitals, and private clinics. In the Bobath group ($n = 16$), four themes developed: (1) clinical practice guided by contemporary Bobath assumptions and principles; (2) the movement problem centers the CR; (3) reasoning: person-centered and multi-dimensional; and (4) influence of contextual factors. In the non-Bobath group ($n = 16$), the developed themes include: (1) clinical practice: an eclectic mix; (2) prioritizing independence; (3) reasoning: combination of provider-centered and person-centered; and (4) influence of contextual factors.

Conclusion: This study highlights that CR is shaped by clinical, interpersonal, and contextual factors. Bobath-educated therapists demonstrated a movement-centered approach to their reasoning, while NBG's CR revolves around task-independence and exercise-oriented strategies. Further research is needed to explore these aspects of CR.

ARTICLE HISTORY

Received 4 January 2025

Revised 30 May 2025

Accepted 30 May 2025

KEYWORDS

Bobath concept;
neurodevelopmental
treatment; physiotherapy;
clinical reasoning;
movement

Introduction

Clinical reasoning (CR) is a complex, multifaceted process used by healthcare professionals to engage deeply with persons and their environments to enhance the person's individual health and wellness (Trowbridge and Graber, 2015). While CR is often described as an individual cognitive process that health care providers engage in to make clinical decisions guiding their clinical practice (Elvén et al., 2023), it also incorporates contextual, collaborative, and person-centered dimensions, to ensure comprehensive care (Elvén, Prenkert, Holmström, and Edelbring, 2024).

Although CR shares common components across healthcare professions, its application varies based on

profession-specific perspectives and priorities (Elvén, Prenkert, Holmström, and Edelbring, 2024). In physiotherapy, CR integrates cognitive, psychomotor, and affective skills (Christensen et al., 2017; Huhn et al., 2019) to guide assessment, diagnosis and intervention planning (Furze et al., 2022; Higgs, Jensen, Loftus, and Christensen, 2019). Given the nature of physiotherapy practice, CR is centered on movement, function, and occupation (Huhn et al., 2019). Additionally, to navigate complex clinical scenarios, physiotherapists employ different reasoning strategies (Huhn et al., 2019), including hypothetic-deductive reasoning, where clinicians generate and test hypotheses; narrative reasoning, which

CONTACT Sofia Marques  claudiatmarques@ua.pt  Department of Medical Sciences, School of Health Sciences, Campus Universitário de Santiago, Aveiro 3810-193, Portugal

 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/09593985.2025.2515476>.

© 2025 The Author(s). Published with license by Taylor & Francis Group, LLC.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent.

incorporates patient stories and experiences into decision-making; and pattern recognition, which draws on experience to identify familiar clinical presentations (Christensen et al., 2017; Jones, 2018).

Effective CR requires physiotherapists to continuously interpret clinical information, reflect on potential actions, and dynamically adapt their decision-making in response to evolving patient presentations (Daly, 2018; Higgs, Jensen, Loftus, and Christensen, 2019). Physiotherapists rely on observational skills to inform their CR (Edwards, Jones, Braunak-Mayer, and Jensen, 2004), as well as their bodies and hands serving as essential sensorimotor tools for gathering and transmitting clinical information (Oberg, Normann, and Gallagher, 2015; Vaughan-Graham and Cott, 2017). Moreover, the integration of psychosocial factors, evidence-based practice, and behavior change strategies is becoming increasingly central to physiotherapy decision-making (Elvén and Dean, 2017). The application of CR is inherently context-dependent, shaped by external circumstances, like cultural and organizational influences, which may also impact clinical decision-making (Edwards, Jones, Braunak-Mayer, and Jensen, 2004; Elvén and Dean, 2017; Holdar, Wallin, and Heiwe, 2013; Jones, 2018).

Despite the critical role of CR in physiotherapy, limited research has explored how physiotherapists develop and apply CR skills, particularly in specialized fields like neurological rehabilitation (Kume, Tandel, and Indelicato, 2019; Vaughan-Graham and Cott, 2017).

In neurorehabilitation, the Bobath Concept, also known as Neurodevelopmental Treatment (NDT) in the United States, is a widely adopted approach grounded in motor control theory, neuromuscular plasticity, biomechanics, and motor learning (Marques, Vaughan-Graham, Costa, and Figueiredo, 2025; Vaughan-Graham, Cott, and Wright, 2014). This hands-on approach focuses upon recovery of sensorimotor behavior in persons with neurological conditions utilizing individualized assessment and interventions specifically addressing the posture-movement problem (Marques, Vaughan-Graham, Costa, and Figueiredo, 2025; Vaughan-Graham et al, 2019a, 2019b; Vaughan-Graham and Cott, 2016). A key principle of the Bobath Concept is its person-centered approach, fostering patient involvement in decision-making (Michielsen et al., 2017; Vaughan-Graham and Cott, 2016), which is crucial for enhancing satisfaction and optimizing rehabilitation outcomes (Eversole et al., 2021; Langberg, Dyhr, and Davidsen, 2019). The Model of Bobath Clinical Practice (MBCP) underscores the use of cognitive and metacognitive skills, such as reflective self-awareness, in the CR process (Marques, Vaughan-Graham, Costa, and Figueiredo, 2025; Michielsen et al.,

2017). Additionally, visuospatial-kinesthetic perception, an element of technical expertise, is considered integral to the CR of IBITA¹ instructors (Vaughan-Graham and Cott, 2017).

Despite its widespread application and individualized approach, research on CR processes of neurological physiotherapists is limited. Only one study describes CR among IBITA experts (Vaughan-Graham and Cott, 2017). There is no research on the (dis)similarities of CR in Bobath-educated (but not IBITA instructors) and non-Bobath therapists. It is therefore unclear how theoretical and professional practice knowledge influences CR in therapists practicing in neurorehabilitation.

This study aims to explore the clinical reasoning of experienced neurological physiotherapists, highlighting the specificities of those with, and without, post-graduate clinical education in the Bobath concept. By deepening our understanding of CR in neurorehabilitation, this research will contribute to entry-to-practice education, continuing professional development, and clinical decision-making in neurorehabilitation.

Methods

Study design

This study used a qualitative interpretive description approach. Data collection methods included a video-recorded treatment session for stimulated recall immediately followed by an in-depth interview (Braun and Clarke, 2006; Creswell and Cheryl, 2016; Elo et al., 2014; Tracy, 2025). In-depth semi-structured interviews were selected as the method for data collection because they provided the opportunity to explore detailed accounts of participants' experiences (Trainor and Bundon, 2021). The first author, a female researcher with a master and 15 years of experience as a neurological physiotherapist with Bobath clinical education, conducted and transcribed each interview. The interview data formed the raw data of the study, which were analyzed thematically using both inductive and deductive methods (Ezzy, 2013; Tracy, 2025). Reflexive thematic analysis procedures reflect the values of a qualitative paradigm, centering researcher subjectivity, organic and recursive coding processes, and the importance of deep reflection on, and engagement with, data (Braun and Clarke, 2019, 2023). Themes are patterns of meaning anchored by a shared idea or concept (central organizing concept) (Braun and Clarke, 2022; Byrne, 2022). Research ethics approval was obtained from three public rehabilitation centers in Portugal and from two public central hospitals. Informed consent was obtained from all participants, and confidentiality was maintained through

anonymized numerical coding. The Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist guided the reporting of the study (Tong, Sainsbury, and Craig, 2007). For further detail, please refer to Appendix 1.

Research locations

The first author, from each institution where the study was conducted, coordinated the research at multiple geographically accessible locations. Each participating physiotherapist was interviewed, preferably at their respective workplaces. All the facilities were wheelchair accessible and were equipped with the necessary resources to conduct clinical sessions (e.g. hi-lo plinths and various treatment equipment).

Study sample

Participant inclusion and exclusion criteria were informed by previous CR observational studies of cardiorespiratory physiotherapists (Smith, Higgs, and Ellis, 2007; Thackray and Roberts, 2017). The study recruited: i) Physiotherapists with a minimum of 5 years of clinical experience and at least two years of experience in neurological rehabilitation to ensure consistent CR quality (Seale and Utsey, 2020); ii) Daily contact with neurological patients (e.g., types of conditions such as stroke, multiple sclerosis, traumatic brain injury, etc.); iii) Management of at least 10 neurological patients weekly; iv) Working in rehabilitation centers, hospitals, outpatient clinics, or community-based services; v) Independent clinical decision-making; vi) Ability to manage caseloads autonomously; and, vii) Willingness and availability to participate in all study-related activities. Specifically, for the Bobath group: Physiotherapists with post-graduate IBITA certified education, $\geq$ 135 hours of Bobath education, minimum of an IBITA Basic Bobath course.

Participant recruitment

Participant recruitment was undertaken through purposive and snowball sampling techniques aiming to capture expert neurological physiotherapists with and without clinical education in the Bobath concept (Campbell et al., 2020). Researchers used direct contact and referrals from workplace coordinators and peers for recruitment. Recruitment ended once data analysis revealed no new themes (Elo et al., 2014), resulting in a final sample of 32 physiotherapists, equally divided between Bobath and non-Bobath groups. All study participants completed

a “Participant Professional Profile Form” capturing demographic and professional information. No drop-outs were reported. Eight participants were known to the primary researcher in a professional context through academic or professional development courses. Participants were aware of the study’s aim – to explore CR in neurological physiotherapy – and that the first researcher was a neurological physiotherapist.

Thirty-two physiotherapists (25 females, 7 males) with an average of 16.3 years in clinical practice and 14.1 years in neurorehabilitation were recruited to the study. Eleven therapists worked in rehabilitation centers (34%), eight worked in hospitals (25%), seven in private clinics (22%), three therapists in long-term care (16%) and one in a health center (3%). Their educational levels varied: 20 had graduate diplomas of physiotherapy, 10 held master’s degrees, and 2 had doctorates. Of the 16 Bobath-trained participants, all completed at least 125 hours of training, and 8 had further advanced Bobath training. For more details, please refer to Table 1.

Table 1. Summary of physiotherapists demographics.

	Bobath group	Non-Bobath group
Total of participants	16	16
Sex		
Male	3	4
Female	13	12
Age (years)	39.94 [28–53]	37.12 [27–57]
Clinical experience (years)		
5–10	4	5
11–20	6	9
21–30	5	1
>31	1	1
Clinical experience (mean)	18.31 [6–32]	14.43 [5–35]
Neurological experience (mean)	16.63 [6–30]	11.69 [3–35]
Daily hours with neurological patients (mean)	5.56 [4–8]	5.25 [4–8]
Clinical setting		
In-patient rehab		
Hospital	6	2
Rehabilitation center	5	6
Long-term care facilities	1	4
Out-patient rehab		
Private Clinic	4	3
Health center	0	1
Education		
PhD	1	1
MSc	4	6
BScPT	11	9
Clinical educator role		
Currently = Yes	15	12
Previously = No	1	4

Abbreviations: PhD – doctoral; MSc – Master of science; BScPT – bachelor of physiotherapy.

Patients

Patients were required for the success of this study but were not the units of analysis. Recruitment was voluntary, facilitated through the participating clinical centers, and each patient provided informed consent. A stroke diagnosis was chosen as it is the leading cause of adult neurological disability (Prust, Forman, and Ovbiagele, 2024; Zhang, Lu, and Yang, 2024), and therefore enhanced study feasibility as well as being a familiar neurological condition for the study participants. Recruitment was voluntary, facilitated through the participating clinical centers, and each patient provided informed consent. Patient selection was informed by methods described by Vaughan-Graham and Cott (2017), specifically their ability to perform a reaching activity in standing with their less-affected upper limb, indicating adequate trunk/lower limb antigravity activity and, the potential to stand, either independently or with minimal assistance. Individuals with cognitive impairments were excluded, as determined by Mini-Mental State Examination (MMSE) score of <24 (Dick et al., 1984), as well as persons under the age of 18.

The patients were unknown to the study participants, ensuring an unbiased, first-contact scenario. A “*Patient Profile Form*” gathered data on demographics, stroke specifics, upper limb function, rehabilitation context, therapy frequency, and other relevant information. For more details, please refer to Table 2.

Interview guide

An Interview Guide was designed for the semi-structured interviews with specific topic domains. The guide provides a set of predetermined questions, prepared by the primary researcher to guide discussions on CR, whilst also allowing the discussion to be free flowing thus encouraging participant elaboration. The second and fourth authors reviewed the interview guide, one with expertise in neurorhabilitation, and the other in qualitative research to evaluate the questions for potential biases and appropriateness (Creswell and Cheryl, 2016). Based on participant responses, the researcher followed-up relevant subjects with additional questions (Rabionet, 2011; Wengraf, 2001).

The interview guide was piloted with two therapists not included in the study, one with Bobath educated and one non-Bobath. Each therapist reviewed the video-recorded session undertaken with a post-stroke patient, followed by a subsequent interview to explore their CR. During the pilot interviews, it became evident that some questions were overlapped, and the interview guide was

Table 2. Summary of patient participants sociodemographics.

	Bobath group	Non-Bobath group
Sex		
Male	10	10
Female	6	6
Age (years)		
<30	0	1
31–40	1	0
41–50	3	1
51–60	6	9
61–70	4	3
>70	2	2
Age (Mean)	58.75 [39–81]	55.93 [18–75]
Medical Diagnosis		
Right cerebrovascular accident	9	11
Left cerebrovascular accident	7	4
Right arteriovenous malformation	0	1
Time since diagnosis (months)		
<3	3	7
3–6	9	5
6–12	1	4
12–24	1	0
>24	2	0
Functionality capability		
Standing without assistance	13	13
Standing with assistance	3	3
Reaching pattern with the less affected UL: Independent standing	12	14
Reaching pattern with the less affected UL: Minimal assistance for standing	4	2

Abbreviations: UL – upper limb.

excessively long, potentially affecting the depth of responses. Subsequently, the guide was revised to reduce duplication, length and clarity (Seale and Utsey, 2020). The final version of the Interview Guide can be found in Appendix 2.

Data collection

The first author video-recorded one clinical session per participant, followed by a digitally recorded one on one in-depth interview with the physiotherapist immediately following the clinical session. During the interview, the physiotherapist, along only with the primary researcher, reviewed the video of the clinical session, a technique known as “*stimulated recall*” (Lyle, 2003; O’Brien, 1993), facilitating participants to articulate their CRs close as possible to their actual clinical session (Creswell and Cheryl, 2016; Lyle, 2003; O’Brien, 1993).

Therapists were not given a specific time limit for their clinical session but were instructed to conduct the session within the typical duration they usually allocate in their own clinical practice. Patient clinical sessions averaged 51:14 minutes in the Bobath group (ranging from 25:38 to 81:10 minutes) and 50:53 minutes in the

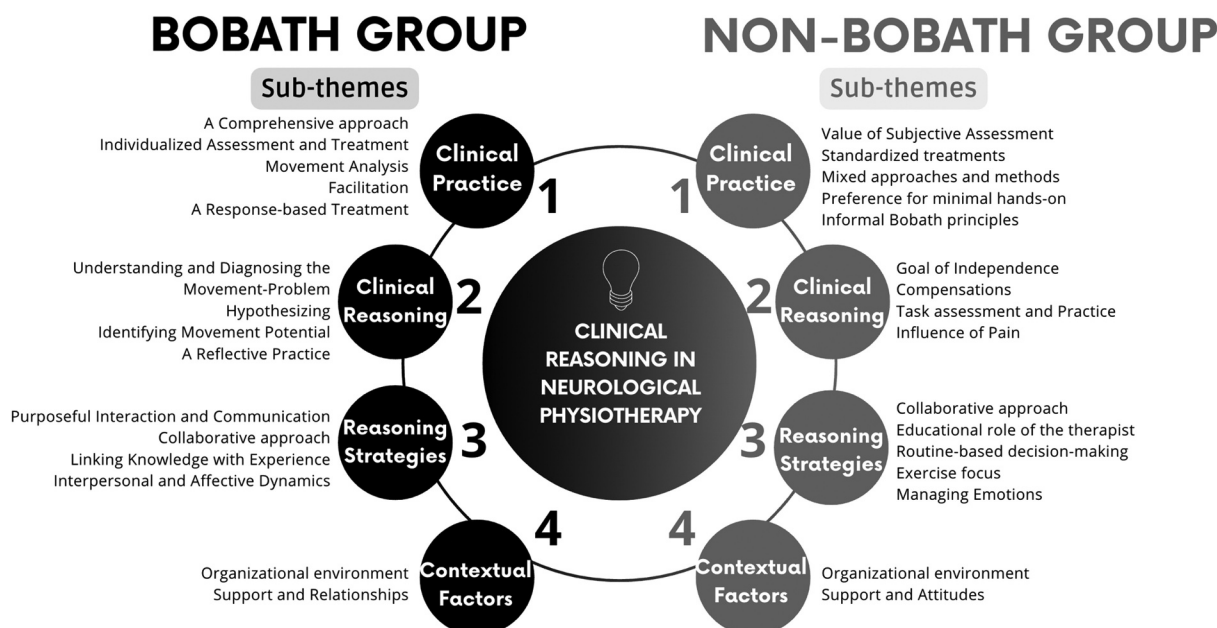


Figure 1. Illustration and description of sub-themes of Bobath group and non-Bobath group.

non-Bobath group (26:12 to 79:49 minutes). Therapists were not given a specific time limit but were instructed to conduct sessions within the typical duration they usually allocate for their own patients. Semi-structured interviews explored the physiotherapists' thought processes, using questions like *"Tell me what you were thinking about as you assessed and treated this person?"* and *"Could you tell me what your goals were with this person?"*. Field notes were taken both during the treatment sessions and throughout the interviews. On average, interviews lasted 47:33 minutes in the BG (17:22–60:09) and 44:05 minutes in the NBG (21:30–60:07).

Data analysis

The primary researcher transcribed verbatim the semi-structured interviews immediately following data collection, forming the raw data of the study. A thematic analysis was conducted, guided by Braun and Clarke's (2006) six step framework, including: (1) Familiarization with the data through repeated readings and note-taking; (2) Generation of initial codes; (3) Thematic development by grouping relevant data extracts; (4) Reviewing sub-themes and themes to refine distinctions; (5) Naming and defining themes and sub-themes to capture their core meanings; and, (6) Producing a report using representative quotes (Braun and Clarke, 2006). Three independent researchers [SM, JVG, DF] analyzed the data and compared findings to reach a consensus, consulting a fourth researcher [RC]

for any unresolved disagreements. The research team reviewed and discussed the final themes and subthemes, with further details of the thematic identification process outlined in Figure 1.

To ensure the credibility, trustworthiness, and rigor of the data, multiple methods were employed, including: (a) Triangulation – multiple researchers[SM, JVG, DF] analyzed data, and diverse data sources (clinical sessions, interviews, participant profiles) were cross-checked; (b) Member checking – transcripts were reviewed with participants (4 Bobath and 5 Non-Bobath physiotherapists) to confirm accuracy and adjust as needed; (c) Contextual understanding – data was collected by an experienced physiotherapist to ensure findings reflected participants' realities accurately. Once member checks were finalized, the transcripts were modified as necessary to prepare for data analysis (Creswell and Cheryl, 2016). This process involved verifying the intended meanings of participant's statements and ensuring that our interpretations aligned with their perspectives. If certain responses were unclear or open to multiple interpretations, therapists were given the opportunity to clarify or elaborate on their statements. This iterative approach strengthened the credibility of the data by enhancing interpretative accuracy and ensuring that the findings remained true to participants' lived experiences (Creswell and Cheryl, 2016).

Data analysis involved a preliminary coding phase followed by iterative coding with WebQDA software, where codes were refined into sub-themes and themes

through team discussions and reflexivity exercises – the researchers attended regular meetings to discuss study-related issues and how their personal experiences and beliefs could affect data analysis. A codebook was developed in which definition of codes and supporting data were verified and supported the development of sub-themes and themes. Themes were validated with participants and contextualized within existing literature. Findings are presented with participant quotes and visual aids, ensuring credibility and trustworthiness of the reported findings, as well as confidentiality and anonymity of participants.

Results

From the Bobath group (BG) participants four themes were developed: (1) clinical practice guided by contemporary Bobath assumptions and principles; (2) the movement problem centers the clinical reasoning; (3) reasoning: person-centered and multi-dimensional; and (4) influence of contextual factors.

From the non-Bobath group (NBG) four themes were identified: (1) clinical practice: an eclectic mix; (2) prioritizing independence; (3) reasoning: combination of provider-centered and person-centered; and (4) influence of contextual factors.

Bobath group

Three themes from the BG were distinct, whilst the fourth theme was common to the BG and NBG. Multiple sub-themes were identified within each theme and will be discussed individually. Refer to [Figure 1](#): Illustration and description of sub-themes of Bobath Group and Non-Bobath Group.

Theme 1: clinical practice guided by contemporary Bobath assumptions and principles

The data linkages, both within the same therapist and between different therapists, revealed five interconnected sub-themes that illustrate how the Bobath conceptual framework guides clinical practice: a) a comprehensive approach, b) individualized assessment and treatment, c) movement analysis, d) facilitation, and e) a response-based treatment.

Bobath is movement, harmonious movement, contextualized. (P12)

Bobath ends up being a holistic view of the person. (P20)

The main difference is to give each [body] segment the opportunity to fulfill its role. (...) And do not work on

the [body] segments in isolation but always maintain a connection with the others. (P30)

Bobath therapists adopt a holistic approach, viewing the patient as a whole person, in their context, rather than focusing on isolated body segments. Recovery is understood as an integrated process, where each body segment is given the opportunity to contribute.

We are constantly evaluating and treating... Objectively, the evaluation starts from the moment she arrives. (P02)

I always evaluate how they do the task, not only if they do it... I evaluate the items from ARAT [Action Reach Arm Test]. (P25)

I tried to understand the behavior of those movements... not only on the left side but also comparing with the right side... if he feels equally... and how he was responding cognitively. (P15)

The BG participants describe that assessment, and treatment is an ongoing interactive process. Targeting purposeful tasks is essential whilst maintaining a solid focus on movement quality and its measurement. This involves comparing both sides of the body and addressing not only motor aspects, but also sensory, and cognitive responses.

We [Bobath therapists] work a lot on posture with our patients. (P24)

I used my hands... to give her information to maintain trunk postural control. (P17)

It didn't make sense to go to the foot without having worked on the alignment of the other segments. (P02)

There is a biomechanical and neuroscience knowledge, particularly related to posture, trunk activity, sensory input, and body alignment, that is considered critical in the intervention plan. This analysis goes beyond observation, as therapists use their hands to assess and influence movement dysfunctions.

I had to have some concern here, because the first thing she does is raise her shoulder. I don't want her to do this compensation. (P26)

Thinking about the tasks or movement sequences more broadly, such as walking, sitting to standing, standing to sitting, and knowing at each moment (...) the relationship between the segments, this is what allows me to make the decision and understand (...) what other strategy or what other part of the sequence I can use that allows me to integrate the components that I want. (P32)

There is an emphasis on movement analysis by closely assessing how a patient performs a task not just whether they can complete it. They focus on identifying and

addressing compensatory strategies, while also understanding the relationships between body segments during key functional transitions.

In terms of handling, we assess, see a response, and adapt ourselves accordingly. (P15)

The treatment is very guided by how you feel through your hands. (P02)

I provided input to his hand, delivering a distal stimulus to influence the proximal movement of the shoulder girdle. (P32)

A simple [manual] contact gives you a completely different response and guidance. (P01)

The tactile sense guides assessment and intervention, shaping the facilitation of movement. Therapeutic touch, facilitation is a bilateral communication between the therapist and the patient, providing sensory input, to facilitate a motor response, as well as providing a source of sensory information to the therapist.

I have prepared the environment so she can do the task. (P26)

Sometimes I am not giving the input I want with my hands, so I use verbal cues initially. (P11)

Environmental setup is also key to optimizing therapy outcomes. While manual input is central, verbal cues are introduced when necessary to enhance communication and optimize movement.

That's where I'm feeling with my hands. It was there that I felt that the foot was not giving me the response I wanted, I changed my treatment because of that. I decided to lay her down to reduce the extensor activity of that big toe, because that way I could access the foot much better. (P01)

There were other times when I felt, 'OK, he's not responding the way I want.' Therefore, I had to give some [verbal] command here. (P15)

As he fails or succeeds [in treatment] I adapt my treatment. (P04)

Bobath therapists continuously refine their approach, ensuring that each movement and task are purposeful and meaningful. The patient's response dictates the next step in therapy, making it a dynamic interaction.

Theme 2: the movement problem centers the clinical reasoning

Four sub-themes comprised this theme: a) understanding and diagnosing the movement-problem; b) hypothesizing; c) identifying movement potential; and d) a reflective practice.

I let him do the transfer to understand how it works, and I immediately realized that lower limb is not well at all, he doesn't integrate it into the activity. (P13)

I quickly noticed he lacked the expected quality of movement seen during the extension of the right lower limb. (P04)

These statements highlight how observation contributes to the therapist movement analysis with respect to the task and the use of atypical motor behavior and its impact on movement performance. The BG participants are interested in the whole movement strategy not only isolated muscle function.

The diagnosis, in fact, is always thought of in terms of this restriction and this restriction may be due, for example, to a limitation in a reaching gesture or a gait restriction. (P32)

We know what movement should be expected and what is changed in relation to that. (P20)

The BG participants are developing a movement diagnosis to describe patient's clinical presentation through their movement analysis and knowledge of typical human movement.

The fact that he is always looking down is probably due to changes in sensitivity. (P20)

When I saw him deviated to his right, I immediately considered these possibilities: could it be neglect, sensory changes, or perhaps cognitive or visual issues? (P12)

As the BG participants observe and analyze the motor behavior, they are beginning to generate working hypotheses as to why person maybe moving this way. They are considering a variety of factors including sensory, perceptual, cognitive or visual aspects that may be contributing to the movement problem.

She has strong potential for walking, despite the knee issue. It will require some work, but I don't believe it will limit the recovery. (P11)

We are always evaluating and intervening . . . I assessed his postural responses and noticed he was more efficient standing than sitting. (P25)

I flexed and extended that lower limb just to understand the weight, to feel the resistance, the tonus . . . it was so hard that I decided to move on to the upper limb and started there instead. (P15)

The BG participants are continually considering the potential of the patient in terms of functional recovery. This is multi-faceted from biomechanical considerations to muscle tone, postural control, muscle tone, influence of gravity, efficiency of movement behavior, as well as what might be significant limitations. It is

their thinking behind the person/s potential that helps guide their therapeutic decisions.

Here [therapist is pointing to the video-recorded session] I was trying to understand how far the upper limb could go, but I had to change my strategy. (P14)

I tried to understand how she is performing the task and what could be contributing to her not doing so well! (P11)

I wanted repetition, depending on the patient's response, but with attention to fatigue. (P24)

The CR process that the BG participants engage is iterative and dynamic. They are continuously reflecting-in-action, and on-action, and are adapting their interventions, integrating moment-to-moment observations to refine clinical decisions in real time, response-based to the patient.

She had pain, so I thought, 'Calm down, I'll have to address this problem first.' Pain changes everything. (P17)

If there is pain, we have to approach it differently. (P20)

Pain reshapes clinical reasoning in real time and influences decision-making, prompting therapists to prioritize pain management before progressing with movement-based interventions.

Theme 3: reasoning – person-centered and multi-dimensional

This theme comprised four sub-themes: a) purposeful interaction and communication; b) collaborative approach; c) linking knowledge with experience; and d) interpersonal and affective dynamics, which are detailed as follows:

I always strive to understand their perception of the treatment... today we have worked the foot, and he can identify the gains of the session. (P30)

This verbal communication is to create a connection with the patient, so she doesn't lose treatment focus. (P11)

Interaction and communication from the BG participants serve multiple functions, reinforcing the patient's understanding of therapy progress, sustaining engagement, and ensuring alignment between therapist intent and patient perception.

If for him the goal is to walk, I have to do it. (P13)

It makes no sense for a person to work on what we think is most important, but on what is most important for the patient. (P02)

The patient must be able to apply our instructions at home to sustain and build on the progress achieved in physiotherapy. (P32)

The BG participants are tailoring interventions to align with patient goals, considering the patient's personal priorities as a critical aspect of the decision-making process. This collaboration extends beyond the therapy session, as therapists emphasize self-management strategies to sustain their progress at home.

I can't separate theory from practice. Nor the practice of theory. (P25)

This 'know how,' understanding the response from the patient, is something I learned in the Bobath training! (P24)

The Bobath participants describe how they are integrating theory with practice, the knowledge gained on post-graduate Bobath courses, and their clinical experience into their CR. This is an interactive process in which theory and practice inform one another.

It's true that I experience moments of frustration... We want them to achieve their goals. I have this ambition! (P32)

I believe that the most significant factor in treating a neurological patient is the passion and motivation you bring to your work. (P03)

I always worry a lot about the future – what will happen once they leave here [rehabilitation center]? (P13)

Personal traits, emotions and engagement all contribute to BG participants reasoning. They describe the passion and emotional investment, balancing frustration with joy in patient progress. Their commitment reflects a deep concern for their patient's futures and is rooted in human connection and empathy. These reflections highlight that clinical reasoning extends beyond the technical and cognitive processes.

Theme 4: influence of contextual factors

This theme is divided in two sub-themes: a) organizational environment; and b) support and relationships.

The biggest barrier we have in this type of case is time... we have very little time to work with these types of cases. (P17)

At the beginning of the session it is important to listen to them, even though we know we have little time, but you give importance to things. (P13)

Time limitations are widely reported among the BG participants as a major challenge. It affects the depth of their assessment but they endeavor to ensure meaningful interaction within constrained timeframes.

The equipment we have here ends up being a facilitator to our work. (P20)

The environment that surrounds us also influences the patient's posture, the patient's response, concentration. . . Today, the noise had a huge influence! (P14)

The noise is a barrier to our clinical reasoning . . . I felt sometimes he was distracted by the noise in the gym. (P24)

The BG participants note their work environment has both positive and negative aspects that have potential to influence the patient and thus their CR. Appropriate equipment can be used to facilitate the patient. In contrast, over crowding and noise were reported as potential barriers to concentration and patient engagement.

There are those moments when it is necessary, I asked my colleague for help, so we help each other, for example, to walk with the patient. (P20)

I can use whatever strategies I want, even if they are not prescribed by a doctor. (P24)

There are people on vacation or sick leave . . . we are facing several situations at the same time. (P12)

An open workspace is highlighted by BG participants as beneficial for team collaboration and ease of communication between therapists, as well as collaboration with the extended healthcare team which in turn reinforced their professional autonomy. Whereas the absence of colleagues due to vacations or sick leave were mentioned as additional stressors affecting workload and time allocation, further limiting decision-making.

Non-Bobath group

From the NBG, three unique themes were developed as follows: (1) clinical practice – an eclectic mix; (2) prioritizing independence; (3) reasoning – combination of provider-centered and person-centered; and (4) influence of contextual factors. Multiple sub-themes were identified within each theme and will be discussed individually. Refer to [Figure 1](#): Illustration and description of sub-themes of Bobath Group and Non-Bobath Group.

Theme 1: clinical practice – an eclectic mix

This theme encompasses five sub-themes: a) value of subjective examination; b) standardized treatments; c) mixed approaches and methods; d) preference for minimal hands-on; and d) informal Bobath principles.

I aim to gain insight into the clinical history and past experiences to identify any factors that might interfere with the current situation. (P09)

What I asked and what he shared with me provided the information I needed to begin his treatment. (P08)

TheNBGparticipants use the insights from the patient's clinical history and personal experiences from their subjective examination to inform their clinical reasoning.

I usually do this approach in the supine position . . . then to prone . . . then sitting, standing . . . I normally do this as my sequence. (P28)

I always take 3 or 4 gestures, techniques . . . what I did about the gait is what I more or less usually do. (P18)

The NBG discussed following a set of sequences of postures with each patient, with interventions applied systematically across different postures or body segments.

I developed in physiotherapy with the PNF philosophy . . . I can't facilitate the movement if I don't analyze, test, and do it again. (P08)

I even incorporated the Perfetti method, we mix all the knowledge we have. (P16)

NBG participants discussed how they include multiple different approaches based on their individual preferences as well as what they have been exposed to over the course of their professional career.

I believe in providing only the necessary information . . . the patient then maintains this activity without our manual contact. (P07)

They have a lot of [motor] compensations . . . but sometimes there are compensations that are positive. (P16)

The NBG participants describe a preference for minimal manual intervention, encouraging independent movement and adaptation, even when motor compensations are present. These therapists support compensation, particularly when supporting independent function, and consider these positive aspects of the clinical presentation.

Manual cues are important . . . we are giving proprioceptive information. That's where I expect the biggest response . . . It ends up being a different work than what my colleague does . . . essentially what I do is Bobath [PT attended a master's degree with Bobath advanced therapists' teachers; PT without IBITA certified education]. (P29)

To have more stability I tried to understand if I could keep his trunk more active. . . this comes from Bobath's knowledge [PT attended a course with other Bobath therapists; PT without IBITA certified education] (P23)

Some of the NBG participants describe integrating Bobath principles informally into their clinical practice, such as trunk stability, sensory feedback and manual guidance.

Theme 2: prioritizing independence

This theme comprised four sub-themes: a) goal of independence; b) compensations; c) task assessment and practice; and d) influence of pain.

My job is to give them independence, it is reflected in all my work. (P07)

There's no point in coming to physiotherapy and not integrating it into your day-to-day life. (P05)

My specific day-to-day goals, which I did also in this case, are sitting in bed, being able to lie down alone, getting out of bed alone. (P09)

Independence in function is a core focus of the NBG participants CRand is essential for PT to be warranted.

If the patient tells me 'That's enough for me.' ... I will not become a delay for him. I'm no longer there wasting time correcting movement patterns. (P18)

Our goal is minimal independence, allowing them to be independent at home when they are alone. We know we have compensations. It is what it is!' (P22)

Compensations are considered inevitable to the NBG and are considered time-efficient on achieving functional independence.

We must work on her gait, because her lower limb has more potential [than upper limb]. (P07)

I use three sets, 20 repetitions, I use that a lot ... I think it's comfortable. (P06)

I take rest into account because of patient's fatigue and mine. (P18)

I don't control the number of repetitions; I control the patient's fatigue. (P21)

I tried to give him as much symmetry in his tasks, both in terms of transfers, getting up and sitting down and moving from lying down to sitting and vice versa. (P19)

The NBG participants focus on task assessment and practice as key features of their treatment planning, considering the tasks in which the patient has the most potential. Task repetition is considered with respect to patient and therapist fatigue, as well as issues such as symmetry.

I tried to focus on her muscle weakness, but she had pain in her upper limb, I wanted to relieve the pain. (P22)

I tried to progress in the treatment with the goal of walking but always paying attention to the knee pain. (P19)

The influence of painful movement was discussed by the NBG as a consideration in their treatment planning and how pain might impact on progress.

Theme 3 :reasoning -combination of provider-centered and person-centered

This theme comprises five sub-themes: a) collaborative reasoning; b) educational role of the therapist; c) routine-based decision-making; d) exercise focus; and e) managing emotions.

Our role is to facilitate the patient to carry out the mechanisms they need. The treatment belongs to the patient, not me. (P08)

It's essential to show that you care about their [patient] difficulties. (...) The better we know the patients, the easier this interaction becomes. (P23)

I can't work without it—without balancing the patient's expectations with what I aim for, something I believe is realistically achievable. (P10)

The NBG participants describe therapy as a shared process, in which the patient plays an active role in their own rehabilitation, illustrating a collaborative approach to therapy, including the need to build trust and rapport.

We are increasingly becoming educators, aren't we? And for that, it's important to receive feedback from the patient as well. (P23)

I really insist on educating transfers, standing up, and positioning in a chair [of the patient] to the caregivers. (P09)

The NBG participants explain education as a fundamental strategy of their practice, benefiting both patients and caregivers and demonstrate that knowledge transfer is key aspect to their CR to promote continuity of care beyond therapy sessions.

The treatment I give them, ... it's always the same. (P09)

I usually start by getting up and sitting down [the patient] with shoes on ... then I lay them down and take off shoes ... for proprioceptive training. (...) (P19)

The NBG describe a structured approach, in which treatment follows a standardized protocol and predefined routines, such that familiar routines are applied through consistent intervention strategies across sessions.

We should resist more, 'use the weapons in our favor' (...). I like eccentric work to promote stretching and motor control. (P22)

I really like to do isometrics [muscular contractions]. I always give small instructions... like extending the leg, just to see they can hold it. (P18)

The NBG demonstrate an exercise-driven approach to their interventions using both eccentric muscle control and isometrics to develop motor behavior.

It's hard for me when they start to cry... I try to stay strong... But I tell them that their problems are theirs to face. (P19)

Many of them have expectations. On average, the vast majority have unrealistic expectations. And I don't like being the bearer of bad news. (P31)

We must build emotional shields to protect ourselves as the patient's recovery can become overwhelming... the patient's problems are theirs to handle. (P22)

The NBG participants describe having to manage the emotions of their patients, balancing maintain hope, but also keeping expectations realistic whilst also being empathic but simultaneously protecting their own emotional well-being all which impact upon their CR.

Theme 4: influence of contextual factors

This theme comprises two subthemes: a) organizational environment; and b) support and attitudes.

We usually leave patients alone doing exercises... while we go to [treat] another patient! We try to handle like this. (P31)

We are with the patient for 1 hour, but it is not direct contact. We leave the patient to exercise while we go to treat another patient. (P27)

Now we are 5 therapists here [gym]... I wouldn't put this patient to do any of this if I hadn't this plinth, maybe I would put him to make the stand-sitting [task]. (P31)

In a gym context... there is always noise, and they [patients] are very distracted. (P16)

The NBG describe balancing multiple patients simultaneously, relying on self-directed exercises to manage high caseloads, leading to less direct contact. Similarly, the availability of equipment and the noise level in shared work environments influences what is possible for the physiotherapists to do and so influences their CR.

At the next meeting, they will pressure me to walk with him, even if it's with a walker, and I don't agree with it yet... We should fight against this. (P21)

"I often feel I work alone. I can't get support to discuss a clinical case, for example". (P29)

"I know he does OT [occupational therapy], I even think we could work together on this dual task issue, but sometimes there is no such openness. (P23)

The NBG participants express feeling constrained by medical priorities, which can shape rehabilitation goals, particularly regarding mobility and assistive devices, and feeling professionally isolated and unsupported, despite being part of a larger healthcare team.

Discussion

This study explored the clinical reasoning process of experienced neurological physiotherapists with and without Bobath education. Similarities and differences were observed between the two groups. Refer to [Table 3: Clinical Reasoning Dimensions of Bobath Group and non-Bobath Group](#).

Table 3. Clinical reasoning dimensions in Bobath group and non-Bobath group.

Dimensions	Bobath group	Non-Bobath group
Clinical Practice	Interventions are individualized and structured within the contemporary Bobath frameworks, emphasizing continuous assessment, quality of movement performance, postural control, body alignment, sensory input, and skilled facilitation. Compensation is viewed critically, with treatment aiming to optimize typical motor patterns and functional participation.	Treatment prioritizes functional independence through task-specific and exercise-based strategies. Approaches vary, with some NBG participants following structured models (e.g. PNF, Perfetti) and others informally incorporating Bobath principles. Compensation is generally accepted when it supports independence.
Clinical Reasoning	CR is described as a reflective, interactive process, that incorporates continuous assessment, real-time movement analysis and manual facilitation. BG participants consider postural control, sensorimotor responses, and therapeutic relationship to guide tailored interventions within a "whole person" framework.	Clinical reasoning is driven by functional independence and follows standardized assessment and treatment methods. NBG participants focus on exercise progression and task performance, integrating both subjective and objective assessment to inform their clinical decisions.
Decision-making	BG participants describe a dynamic, person-centered reasoning process grounded in Bobath principles, combining embodied interaction and reflection. Decision-making is shaped by real-time movement observation, emotional engagement, and a structured understanding of motor behavior, which allows for individualized and adaptable treatment strategies.	NBG participants use a structured, often protocol-driven reasoning strategies that blends patient goals with therapist-led planning. Decision-making is informed by functional goals, patient education, and exercise progression, aiming to support independence and patient participation beyond the clinical setting.
Contextual factors	BG participants describe working in generally supportive environments that allow interdisciplinary collaboration, flexibility in treatment planning, and greater professional autonomy. Contextual elements such as communication and environmental setups are used to optimize individualized care.	NBG participants describe working in high-demand environments where caseloads, time constraints, and institutional protocols impact their reasoning. Standardized methods may be favored in high-volume settings with time constraints and limited professional autonomy.

Ab abbreviations: CR – Clinical Reasoning; PNF – Proprioceptive Neuromuscular Facilitation; Perfetti – Perfetti Method.

Clinical practice

The data highlights both shared and divergent elements in the clinical practice of Bobath-educated (BG) and non-Bobath educated (NBG) therapists.

BG therapists describe their approach as individualized and dynamic, using continuous assessment to adjust interventions, to assist patients in regaining their full sensorimotor potential, consistent with contemporary literature (Marques, Vaughan-Graham, Costa, and Figueiredo, 2025; Michielsen et al., 2017). They frame rehabilitation within a 24-hour approach, considering sensory input, body segment alignment, postural control and trunk stability as essential components to regain motor function. This aligns with the Model of Bobath Clinical Practice (MBCP) framework (Michielsen et al., 2017), which highlights the link between functional movement analysis and skilled facilitation to guide CR, as well as the visuospatial kinesthetic perception clinical skill, as illustrated in the CR of IBITA instructors (Vaughan-Graham and Cott, 2017). The BG consistently integrates posture and movement during treatment sessions, where recovery of trunk control is seen as equally important as recovery of limb movement, consistent with recent publications (Marques, Vaughan-Graham, Costa, and Figueiredo, 2025; Vaughan-Graham et al., 2019b), distinct from the NBG.

When considering the NBG practices, they are primarily standardized, typically follow structured treatment sequences, focusing on task-specific training and a hands-off approach. The NBG approach is task-oriented, prioritizing independence in daily activities viewing compensation as inevitable post CNS lesion, thus being aligned with task repetition models (Hubbard, Parsons, and Carey, 2009; Lotter et al., 2020). The BG emphasizes quality of movement performance, seeking to optimize typical motor behavior, within the context of task accomplishment (Levin and Panturin, 2011; Vaughan-Graham and Cott, 2016).

BG therapists view the use of compensation differently from the perspective of learned bad-use and a potential barrier to recovery of typical movement (Vaughan-Graham and Cott, 2016), such that compensatory movement strategies may lead to pain, reduced mobility, or inefficient energy use (Backåberg, Östh, Kimming, and Frykberg, 2025; Krakauer and Carmichael, 2017; Roby-Brami, Jarrassé, and Parry, 2021). Recent research showed that quality-focused training improves motor performance more effectively than conventional care (Krakauer et al., 2021; Levin and Piscitelli, 2022), and impairment-based exercises alone may not lead to functional improvements (Lotter et al., 2020).

NBG therapists often accept and work with compensations, particularly when they enhance functional independence. NBG participants acknowledged that not all compensations are detrimental, and their reasoning aligns with motor learning theories suggesting that task completion and repetition can drive neural reorganization, even in the presence of compensatory patterns. This perspective is consistent with studies emphasizing task salience and repetition as key mechanisms for driving motor learning and neural plasticity (Bocconi et al., 2022).

The application of facilitation (manual, verbal, environment) is a core tenet of the Bobath concept and was a key feature of the BG's clinical practice. The BG describes an individualized CR approach, and uses a dynamic assess-to-treat/treat-to-assess model, in which real-time feedback informs treatment decisions. The BG consistently emphasize the interconnectedness of body segments, viewing movement as a dynamic interaction between different body segments rather than treating body segments in isolation. Their clinical practice is guided through the contemporary Bobath clinical framework and Model of Bobath Clinical Practice (Michielsen et al., 2017, Vaughan-Graham et al., 2019a, 2019b; Vaughan-Graham and Cott, 2016).

The NBG describes a more self-directed model, in which verbal guidance and structured exercises take precedence. The use of structured sequences and progressive task challenges aligns with PNF and Perfetti methods, supporting the role of sensory input on motor control (Sharman, Cresswell, and Riek, 2006). Interestingly, some NBG participants integrate principles of a Bobath approach to neurorehabilitation even though they have not participated in an IBITA Basic Bobath certification course (135 hours of Bobath education), specifically use of somatosensory input and trunk stabilization, suggesting a blended approach to clinical practice informed by diverse formal and informal educational experiences.

Clinical reasoning

Clinical reasoning (CR) is fundamental for effective physiotherapy, involving continuous professional judgments throughout treatment (Edwards, Jones, Braunak-Mayer, and Jensen, 2004; Furze et al., 2022). Both BG and NBG acknowledged CR as a vital component in neurorehabilitation, yet their approaches differ in emphasis and execution.

Bobath clinical reasoning centers around the movement diagnosis and the dynamic interaction between the patient, the patient's movement, the therapist, and

the context. Therapists continuously assess and adjust their interventions based on real-time movement responses. The recent evidence suggests that Bobath CR is consistent with all forms of CR but combines a unique aspect to their CR, visuospatial kinesthetic perception (Vaughan-Graham and Cott, 2017). The BG participants in this study employed blended CR models (collaborative, pattern recognition, deductive), where therapists gather patient-specific data, observe responses, and form hypotheses for individualized interventions. Bobath CR is a constantly evolving reflective process which considers sensorimotor, perceptual, and socioemotional aspects of the clinical presentation, to optimize individualized treatment (Vaughan-Graham and Cott, 2017). Manual facilitation is a two-way process, providing specific sensory input to the patient, whilst simultaneously the therapist is perceiving the patient's response, informing both assessment and treatment to address the individual movement problem (Vaughan-Graham and Cott, 2017), and reinforce the therapeutic alliance (McParlin et al., 2022). The BG discussed the quality of movement performance, examining the relationships between body segments, postural control, and mobility to understand the person's movement problem and functional potential from a whole-person perspective. Their approach incorporates reflection-in-action, where awareness, experience, and the continuous knowledge development refine treatment strategies, aligning with Bobath fundamentals (Vaughan-Graham and Cott, 2017).

The NBG participants prioritize functional independence in daily activities within their clinical reasoning approach. Standardized assessment and treatment protocols are used to address predefined functional goals. The literature suggests that a procedural approach can lead to more rigid treatments where therapists apply set techniques with less engagement of reflective practices (Normann, 2020; Shumway-Cook, Woollacott, Rachwani, and Santamaria, 2023). The NBG's CR revolves around the goal of independence and transfer of functional activities within the home. There is a focus on exercise-based interventions, following a sequential progression from lying to sitting to standing positions, suggesting that all patients follow a set path of recovery following a CNS lesion and that repetitive training is required to transfer activities into daily life. Yet, recent literature suggests that task-oriented practice needs to be meaningful to the patient at their stage of recovery to optimize positive neuroplasticity mechanisms (Levin and Demers, 2021).

Both groups acknowledge that CR is shaped by experience, possibly due to their greater experience in

neurological clinical practice, which aligns with existing research (Edwards, Jones, Braunak-Mayer, and Jensen, 2004; Higgs, Jensen, Loftus, and Christensen, 2019; Paterson, Higgs, and Donnelly, 2013). Both BG and NBG rely on subjective assessment methods to understand patient needs.

CR involves a continuous effort to include the patient and create dynamic, meaningful co-operation (Chowdhury and Bjorbækmo, 2017). Both groups acknowledge the significance of assessment – both subjective (e.g., patient history, questioning) and objective (e.g., movement observation, physical examination). However, their approaches to which participants involve their patients differs. Bobath therapists often integrate patient communication with hands-on techniques, using manual facilitation not only as a treatment strategy but also as part of their objective assessment. Through touch, they gather information about movement quality and patient response while simultaneously engaging the patient in dialogue. This contrasts with NBG therapists, who tend to rely more on verbal guidance and exercise-based interventions, where patient questioning and feedback occur primarily through conversation rather than physical contact. These preferences may also reflect institutional constraints, such as time-limited sessions, which can influence how assessments are conducted.

Identifying movement problems are explored in both groups, aligning the shared understanding that problem-solving is an essential aspect of effective physiotherapy practice (Edwards, Jones, Braunak-Mayer, and Jensen, 2004; Higgs, Jensen, Loftus, and Christensen, 2019). However, how a therapist undertakes movement analysis is dependent upon their theoretical framework. The BG participants understand movement behavior from the perspective of the integration of postural control, sequences of selective movement and sensorimotor performance (Michielsen et al., 2017), whereas the NBG participants relate their movement analysis specifically to task completion, with the inevitable use of compensatory strategies for functional independence.

Reasoning strategies shaping decision-making

Both groups demonstrate various reasoning strategies, shaped by their training, workplace demands, and personal attributes.

The reasoning approach in BG is interactive, person-centered, and multi-dimensional, integrating individual needs with professional expertise. In this study, Bobath therapists describe a continuous cycle of thinking, reflection, and adaption to define their clinical diagnosis

and treatment strategies. Their reasoning aligns with an embodied-enactive model (Chowdhury and Bjorbækmo, 2017) that supports real-time interaction, movement-centered communication, and collaborative engagement to facilitate motor recovery. Bobath training provides a conceptual foundation for reasoning and enhances professional competence, by developing a consistent “motor language” and a structured framework for movement analysis. This “*know how*” enables therapists to dynamically adjust interventions, integrating sensorimotor, cognitive, and emotional factors into their clinical decisions.

The NBG, in turn, reflects a reasoning process that blends person-centered and provider-centered elements. While interactive communication is a key feature of their approach, treatment often follows a structured, protocol-driven framework, where predefined intervention sequences shape clinical-decision-making. This suggests a provider-centric model, within a biomedical approach view, where the therapist assumes control of the process, focusing on the patient’s deficiencies and determines the primary focus of intervention (Elvén and Dean, 2017). On other hand, patient’s education is pivotal and recognized as a valuable tool to promote independence, particularly exercise programs. Many NBG therapists work within rehabilitation centers where patient interaction is time-limited, as such, exercise-based programs that encourage independent practice are prioritized.

Individual therapists’ traits, such as personality, motivation, and self-confidence, profoundly shape reasoning processes Elvén and Dean (2017); Elvén, Prenkert, Holmström, and Edelbring (2024). BG therapists describe strong emotional investment and motivation, often driven by hope, social engagement, and a belief in patient potential. These factors are considered crucial for promoting motor learning and facilitating communication, aligning with research on the role of intrinsic motivation and external support in rehabilitation success (Levin and Demers, 2021; Wulf, Chiviacowsky, and Cardozo, 2014). NBG therapists report greater frustration and emphasize self-protection, reflecting the emotional and mental strain of working with neurological patients. This suggests that coping mechanisms and resilience strategies play a significant role in shaping how therapists navigate long-term engagement in neurorehabilitation (Jensen, Gwyer, Hack, and Shepard, 2007; Musolino and Jensen, 2024).

Contextual factors

CR is a complex and multifactorial process, crucial for optimizing patient care (Furze et al., 2022). Research

shows that CR is influenced by a context-dependent state more than a context-independent trait of a given health care professional, reinforcing its dynamic and situational nature (Musolino and Jensen, 2024).

The organizational environment, including both macro and micro-level factors, plays a significant role in shaping decisions and actions, particularly in larger organizations where structural and procedural complexities are more pronounced. The uncontrollable contextual factors like caseload, resource availability, health care policies, and team dynamics (Higgs, Jensen, Loftus, and Christensen, 2019) strongly impact clinical decision-making (Elvén, Prenkert, Holmström, and Edelbring, 2024; Langridge, Roberts, and Pope, 2015). External pressures, including organizational goals and institutional norms, can shape clinical decision-making and impact the quality of patient care (Holdar, Wallin, and Heiwe, 2013; Langridge, 2019).

In this study, the contextual factors significantly impact the reasoning and decision-making of both groups. The BG therapists describe a generally supportive professional environment, where interdisciplinary collaboration, flexibility and professional confidence facilitate patient-centered care. These findings align with previous research indicating that strong communication between the healthcare team and professional autonomy enhance adaptability in clinical settings (Chapman and Sellheim, 2017). BG report having direct communication with physicians allows for greater flexibility in treatment planning, including the ability to advocate for extended inpatient stays when necessary. While workplace noise and physical space constraints are noted as challenges, BG therapists noted that while workplace noise and physical space impacted their CR, control over session timing was the most influential factor shaping their interventions.

Similarly, NBG therapists, particularly those in rehabilitation centers, describe high caseloads and time constraints as significant factors shaping their clinical reasoning and decision-making. Many NBG therapists report that standardized treatments are often necessary to manage large patient volumes, resulting in template-driven interventions. Institutional demands, fast-paced settings and crowded environments further limit personalized care, leading to frustration among therapists. These findings align with existing literature indicating that resource-limited environments can restrict therapist autonomy and the capacity to tailor interventions to individual patient needs (Elvén, Prenkert, Holmström, and Edelbring, 2024; Lim, Sharma, and Devan, 2021). Moreover, some therapists describe challenges related to medical authority and institutional policies, which may restrict decision-making autonomy. Despite

professional expertise, organizational constraints and medical hierarchies can influence treatment priorities, discharge planning, and rehabilitation timelines, limiting therapists' ability to adjust care strategies in real time. Research suggests that physiotherapy professional autonomy varies across different healthcare systems, with some countries maintaining stronger regulatory and medical dominance over rehabilitation practices (Lim, Sharma, and Devan, 2021).

These findings underscore the profound impact that contextual factors have on CR and decision-making in neurorehabilitation. Understanding and addressing these variables are crucial to tailoring rehabilitation strategies and maximizing recovery outcomes. The contrast between private settings, where therapists may have greater control over treatment decisions, and institutional environments, where workflow constraints influence reasoning strategies, underscores the importance of adapting rehabilitation frameworks to organizational realities. This study offers new insights compared to the previous study on Bobath-trained experts (Vaughan-Graham and Cott, 2017), highlighting that many Bobath experts practice in settings where they may encounter fewer organizational pressures. However, both BG and NBG therapists navigate unique challenges, reinforcing the need for adaptable clinical reasoning strategies that align with different working environments.

Limitations

Several limitations need to be acknowledged. The study specifically targeted clinicians with significant neurological experience, primarily those with advanced Bobath training. This excluded individuals with teaching roles despite previous clinical practice, or less specialized training, potentially narrowing the diversity of perspectives. Financial and institutional barriers also limit access to advanced training courses, as some institutions impose restrictions to off-site education or simultaneous participation in such programs. While not all therapists were advanced Bobath practitioners, they were all experienced in neurological physiotherapy, which supports the validity of the findings for this population. Finally, although most participants worked in diverse settings, such as rehabilitation centers, hospitals and private clinics, only a few were drawn from long-term care and community health centers. All are subject to structural and organizational constraints specific to the national healthcare system. Despite these limitations, the detailed description of this study provides a general understanding of the research objective.

Given the qualitative nature of this study, it is important to acknowledge the influence of the researchers' own perspectives, assumptions, and professional backgrounds on the study design, study collection, and analysis. The research team included individuals with different varying expertise in neurological physiotherapy, qualitative research, and clinical reasoning frameworks. While this interdisciplinary approach enriched the analytical process, we recognize the potential for implicit biases in data interpretation. To enhance reflexivity, we engaged in ongoing critical discussions throughout the analysis, actively questioning how our backgrounds and prior knowledge may have shaped our interpretations. We maintained an audit trail of decisions made during coding and theme development to ensure transparency. Additionally, we sought participant validation by inviting some participants to review preliminary interpretations, confirming that their experiences were accurately represented. These strategies aimed to enhance the credibility of the findings.

Implications for rehabilitation and research

A critical interpretation of these findings suggests that neurological physiotherapy is influenced by structural and cultural environments that are aligned with standardized, protocol-driven approaches, particularly in resource-constrained settings. The results of this study suggest that post-graduate Bobath education provides opportunities to challenge assumptions, and, for critical reflection on accepted norms with respect to neurorehabilitation. The Bobath-trained therapists utilize a reflective, person-centered approach, whereas the non-Bobath-trained therapists utilize a procedural, independence-focused approach. The study findings suggest that both post-graduate education and practice environments shape the clinical frameworks used by therapists. Further research, perhaps utilizing a "Critical Theory" lens, is warranted on how theoretical knowledge and professional practice knowledge shapes neurorehabilitation practice models and, in turn, influences the clinical reasoning of neurological physiotherapists. Understanding "why" and "how" therapists make clinical decisions will broaden and deepen the rehabilitation science evidence base, and provide much needed knowledge for both entry to practice and post-graduate rehab science education.

Conclusions

This study explored the CR of neurological physiotherapists, highlighting the specificities of those with and without Bobath clinical education. The findings suggest

that CR in neurological physiotherapy is a multifaceted and dynamic process shaped by training, experience, and contextual factors. Bobath-trained physiotherapists tend to integrate movement-based reasoning within a collaborative and iterative framework, while non-Bobath practitioners often employ structured protocols emphasizing exercise and independence. Both approaches are influenced by organizational factors, underlining the need to balance standardized methods with individualized strategies to optimize patient outcomes.

Note

1. International Bobath Instructors Training Association.

Acknowledgments

The authors would like to thank the physiotherapy coordinators from rehabilitation centers and hospitals units where the recruitment took place and the participants (physiotherapists and persons with stroke) for their time and availability to share their experiences with us.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by FCT - Fundação para a Ciência e Tecnologia, I.P. by project 2022.12819.BD.

ORCID

Sofia Marques PT, MSc  <http://orcid.org/0000-0003-2745-2376>

Julie Vaughan-Graham PT, PhD  <http://orcid.org/0000-0002-0754-2094>

Rui Jorge Dias Costa PT, PhD  <http://orcid.org/0000-0003-2408-2947>

Daniela Figueiredo PhD  <http://orcid.org/0000-0002-3160-7871>

References

- Backåberg S, Östh KE, Kimming A, Frykberg GE 2025 Sustainable human movements—a threshold concept with potential to open up new perspectives in physiotherapy. *European Journal of Physiotherapy* 27: 72–80.
- Boccuni L, Marinelli L, Trompetto C, Pascual-Leone A, Tormos Muñoz JM 2022 Time to reconcile research findings and clinical practice on upper limb neurorehabilitation. *Frontiers in Neurology* 13: 882797.
- Braun V, Clarke V 2006 Using thematic analysis in psychology. *Qualitative Research in Psychology* 3: 77–101.
- Braun V, Clarke V 2019 Reflecting on reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 11: 589–597.
- Braun V, Clarke V 2022 Conceptual and design thinking for thematic analysis. *Qualitative Psychology* 9: 3–26.
- Braun V, Clarke V 2023 Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a knowing researcher. *International Journal of Transgender Health* 24: 1–6.
- Byrne D 2022 A worked example of Braun and Clarke's approach to reflexive thematic analysis. *Quality and Quantity* 56: 1391–1412.
- Campbell S, Greenwood M, Prior S, Shearer T, Walkem K, Young S, Bywaters D, Walker K 2020 Purposive sampling: Complex or simple? Research case examples. *Journal of Research in Nursing* 25: 652–661.
- Chapman DD, Sellheim DO 2017 Assessment of teaching and learning activities in pediatric physical therapy: Factors influencing knowledge development and confidence. *Journal of Physical Therapy Education* 31: 108–118.
- Chowdhury A, Bjorbakmo WS 2017 Clinical reasoning—embodied meaning-making in physiotherapy. *Physiotherapy Theory and Practice* 33: 550–559.
- Christensen N, Black L, Furze J, Huhn K, Vendrely A, Wainwright S 2017 Clinical reasoning: Survey of teaching methods, integration, and assessment in entry-level physical therapist academic education. *Physical Therapy* 97: 175–186.
- Creswell JW, Cheryl PN 2016 Five qualitative approaches to inquiry. In: Creswell J Cheryl P Eds *Qualitative inquiry and research design: Choosing among five approaches* 4th, pp. 65–110. Thousand Oaks, CA: SAGE Publications.
- Daly P 2018 A concise guide to clinical reasoning. *Journal of Evaluation in Clinical Practice* 24: 966–972.
- Dick JP, Guiloff RJ, Stewart A, Blackstock J, Bielawska C, Paul EA, Marsden CD 1984 Mini-mental state examination in neurological patients. *Journal of Neurology, Neurosurgery & Psychiatry* 47: 496–499.
- Edwards I, Jones M, Braunak-Mayer A, Jensen G 2004 Clinical reasoning strategies in physical therapy. *Physical Therapy* 84: 312–330.
- Elo S, Kääriäinen M, Kanste O, Pölkki T, Utriainen K, Kyngäs H 2014 Qualitative content analysis: A focus on trustworthiness. *Sage Open* 4: 215824401452263.
- Elvén M, Dean E 2017 Factors influencing physical therapists' clinical reasoning: Qualitative systematic review and meta-synthesis. *Physical Therapy Reviews* 22: 60–75.
- Elvén M, Prenkert M, Holmström I, Edelbring S 2024 Reasoning about reasoning—using recall to unveil clinical reasoning in stroke rehabilitation teams. *Disability and Rehabilitation* 46: 6086–6096.
- Elvén M, Welin E, Wiegand Edström D, Petreski T, Szopa M, Durning SJ, Edelbring S 2023 Clinical reasoning curricula in Health professions education: A scoping review. *Journal of Medical Education and Curricular Development* 10: 23821205231209093.
- Eversole J, Grimm A, Patel N, John K, Garcia AN, Garcia A 2021 Why measure patient experience in physical therapy? *Archives of Physiotherapy* 11: 11.
- Ezzy D 2013 *Qualitative analysis*. London: Routledge.
- Furze JA, Black L, Mcdevitt AW, Kobal KL, Durning SJ, Jensen GM 2022 Clinical reasoning: The missing core

- competency in physical therapist education and practice. *Physical Therapy* 102: zac093.
- Higgs J, Jensen G, Loftus S, Christensen N **2019** Clinical reasoning in the health professions. 4th London: Elsevier.
- Holdar U, Wallin L, Heiwe S **2013** Why do we do as we do? Factors influencing clinical reasoning and decision-making among physiotherapists in an acute setting. *Physiotherapy Research International* 18: 220–229.
- Hubbard IJ, Parsons MW, Carey LM **2009** Task-specific training: Evidence for and translation to clinical practice. *Occupational Therapy International* 16: 175–189.
- Huhn K, Christensen N, Wainwright SF, Black LL, Gilliland SJ, Gilliland S, Black L, Wainwright S, Christensen N, Huhn K **2019** Clinical reasoning in physical therapy: A concept analysis. *Physical Therapy* 99: 440–456.
- Jensen G, Gwyer J, Hack L, Shepard K **2007** Expertise in physical therapy practice. 2nd St Louis: Elsevier.
- Jones MA **2018** Clinical reasoning: Fast and slow thinking in musculoskeletal practice. In: Jones M Rivett D Eds Clinical reasoning in musculoskeletal practice 2nd, pp. 2–31. Edinburgh: Elsevier.
- Krakauer J, Kitago T, Goldsmith J, Ahmad O, Roy P, Stein J, Bishop L, Casey K, Valladares B, Harran M, et al. **2021** Comparing a novel neuroanimation experience to conventional therapy for high-dose intensive upper-limb training in subacute stroke: The SMARTS2 randomized trial. *Neurorehabilitation and Neural Repair* 35: 393–405.
- Krakauer JW, Carmichael ST **2017** Chronic Hemiparesis: Motor learning, compensation, and the challenge of reversing impairment in late stroke. In: Krakauer J Carmichael S Eds Broken movement: The neurobiology of motor recovery after stroke 1st, pp. 161–184. Cambridge: The MIT Press.
- Kume J, Tandel R, Indelicato J **2019** Application of the evidence-based practice model by physical therapy clinical practitioners. *Journal of Allied Health* 48: e79–e85.
- Langberg E, Dyhr L, Davidsen A **2019** Development of the concept of patient-centredness - a systematic review. *Patient Education and Counseling* 102: 1228–1236.
- Langridge N **2019** The skills, knowledge and attributes needed as a first-contact physiotherapist in musculoskeletal healthcare. *Musculoskeletal Care* 17: 253–260.
- Langridge N, Roberts L, Pope C **2015** The clinical reasoning processes of extended scope physiotherapists assessing patients with low back pain. *Manual Therapy* 20: 745–750.
- Levin MF, Demers M **2021** Motor learning in neurological rehabilitation. *Disability and Rehabilitation* 43: 3445–3453.
- Levin MF, Panturin E **2011** Sensorimotor integration for functional recovery and the Bobath approach. *Motor Control* 15: 285–301.
- Levin MF, Piscitelli D **2022** Motor control: A conceptual framework for rehabilitation. *Motor Control* 26: 497–517.
- Lim WS, Sharma S, Devan H **2021** Physiotherapists' attitudes towards and challenges of working in a referral-based practice setting – a systematic scoping review. *European Journal of Physiotherapy* 23: 332–343.
- Lotter J, Henderson C, Plawewski A, Holthus M, Lucas E, Ardestani M, Schmit B, Hornby G **2020** Task-specific versus impairment-based training on locomotor performance in individuals with chronic spinal cord injury: A randomized crossover study. *Neurorehabilitation and Neural Repair* 34: 627–639.
- Lyle J **2003** Stimulated recall: A report on its use in naturalistic research. *British Educational Research Journal* 29: 861–878.
- Marques S, Vaughan-Graham J, Costa R, Figueiredo D **2025** The Bobath concept (NDT) in adult neurorehabilitation: A scoping review of conceptual literature. *Disability and Rehabilitation* 47: 1379–1390.
- McParlin Z, Cerritelli F, Rossetini G, Friston K, Esteves J **2022** Therapeutic alliance as active inference: The role of therapeutic touch and biobehavioural synchrony in musculoskeletal care. *Frontiers in Behavioral Neuroscience* 16: 897247.
- Michielsen M, Vaughan-Graham J, Holland A, Magri A, Suzuki M **2017** The Bobath concept - a model to illustrate clinical practice. *Disability and Rehabilitation* 41: 2080–2092.
- Musolino GM, Jensen GM **2024** Clinical reasoning: Why it matters. In: Musolino G Jensen G Eds Clinical reasoning and decision making in physical therapy: Facilitation, assessment, and implementation, pp. 3–16. Thorofare, NJ: SLACK Incorporated.
- Normann B **2020** Facilitation of movement: New perspectives provide expanded insights to guide clinical practice. *Physiotherapy Theory and Practice* 36: 769–778.
- Oberg G, Normann B, Gallagher S **2015** Embodied-enactive clinical reasoning in physical therapy. *Physiotherapy Theory and Practice* 31: 244–252.
- O'Brien J **1993** Action research through stimulated recall. *Research in Science Education* 23: 214–221.
- Paterson M, Higgs J, Donnelly C **2013** Artistry and expertise. In: Robertson L Ed Clinical reasoning in occupational therapy: Controversies in practice, pp. 93–106. Oxford, United Kingdom: Wiley-Blackwell.
- Prust ML, Forman R, Ovbiagele B **2024** Addressing disparities in the global epidemiology of stroke. *Nature Reviews Neurology* 20: 207–221.
- Rabionet SE **2011** How I learned to design and conduct semi-structured interviews: An ongoing and continuous journey. *The Qualitative Report* 16: 563–566.
- Roby-Brami A, Jarrassé N, Parry R **2021** Impairment and compensation in dexterous upper-limb function after stroke. From the direct consequences of pyramidal tract lesions to behavioral involvement of both upper-limbs in daily activities. *Frontiers in Human Neuroscience* 15: 662006.
- Seale J, Utsey C **2020** Physical therapist's clinical reasoning in patients with gait impairments from hemiplegia. *Physiotherapy Theory and Practice* 36: 1379–1389.
- Sharman MJ, Cresswell AG, Riek S **2006** Proprioceptive Neuromuscular Facilitation Stretching Mechanisms and Clinical Implications. *Sports Medicine* 36: 929–939.
- Shumway-Cook A, Woollacott MH, Rachwani J, Santamaria V **2023** A conceptual framework for clinical practice. In: Shumway-Cook A, Woollacott M, Rachwani J Santamaria V Eds Motor control: Translating research into clinical practice 6th, pp. 146–162. Philadelphia: Lippincott Williams & Wilkins.
- Smith M, Higgs J, Ellis E **2007** Physiotherapy decision making in acute cardiorespiratory care is influenced by factors related to the physiotherapist and the nature and context of the decision: A qualitative study. *Australian Journal of Physiotherapy* 53: 261–267.

- Thackray D, Roberts L [2017](#) Exploring the clinical decision-making used by experienced cardiorespiratory physiotherapists: A mixed method qualitative design of simulation, video recording and think aloud techniques. *Nurse Education Today* 49: 96–105.
- Tong A, Sainsbury P, Craig J [2007](#) Consolidated criteria for reporting qualitative research (COREQ): A 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care* 19: 349–357.
- Tracy S [2025](#) *Qualitative research methods*. 3rd New Jersey: John Wiley & Sons.
- Trainor LR, Bundon A [2021](#) Developing the craft: Reflexive accounts of doing reflexive thematic analysis. *Qualitative Research in Sport, Exercise and Health* 13: 705–726.
- Trowbridge RL, Graber ML [2015](#) Clinical reasoning and diagnostic error. In: Trowbridge R, Rencic J Durning S Eds *Teaching clinical reasoning* 1st, pp. 1–16. Philadelphia: American College of Physicians.
- Vaughan-Graham J, Cheryl C, Holland A, Michielsen M, Magri A, Suzuki M, Brooks D [2019a](#) Developing a revised definition of the Bobath concept: Phase three. *Physiotherapy Research International* 25: e1832.
- Vaughan-Graham J, Cott C [2016](#) Defining a Bobath clinical framework –a modified e-Delphi study. *Physiotherapy Theory and Practice* 32: 612–627.
- Vaughan-Graham J, Cott C [2017](#) Phronesis: Practical wisdom the role of professional practice knowledge in the clinical reasoning of Bobath instructors. *Journal of Evaluation in Clinical Practice* 23: 935–948.
- Vaughan-Graham J, Cott C, Holland A, Michielsen M, Magri A, Suzuki M, Brooks D [2019b](#) Developing a revised definition of the Bobath concept. *Physiotherapy Research International* 24: e1762.
- Vaughan-Graham J, Cott C, Wright V [2014](#) The Bobath (NDT) concept in adult neurological rehabilitation: What is the state of the knowledge? A scoping review. Part II: Intervention studies perspectives. *Disability and Rehabilitation* 37: 1909–1928.
- Wengraf T [2001](#) Conceptual frameworks for studying and inferring from (research) interview interaction practice. In: Wengraf T Ed *Qualitative research interviewing: Biographic narrative and semi-structured methods*, pp. 16–50. London: Sage Publications.
- Wulf G, Chiviacowsky S, Cardozo PL [2014](#) Additive benefits of autonomy support and enhanced expectancies for motor learning. *Human Movement Science* 37: 12–20.
- Zhang L, Lu H, Yang C [2024](#) Global, regional, and national burden of stroke from 1990 to 2019: A temporal trend analysis based on the global burden of disease study 2019. *International Journal of Stroke* 19: 686–694.