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Group-based and individualized physiotherapy for persons with multiple sclerosis

A qualitative observational and interview study

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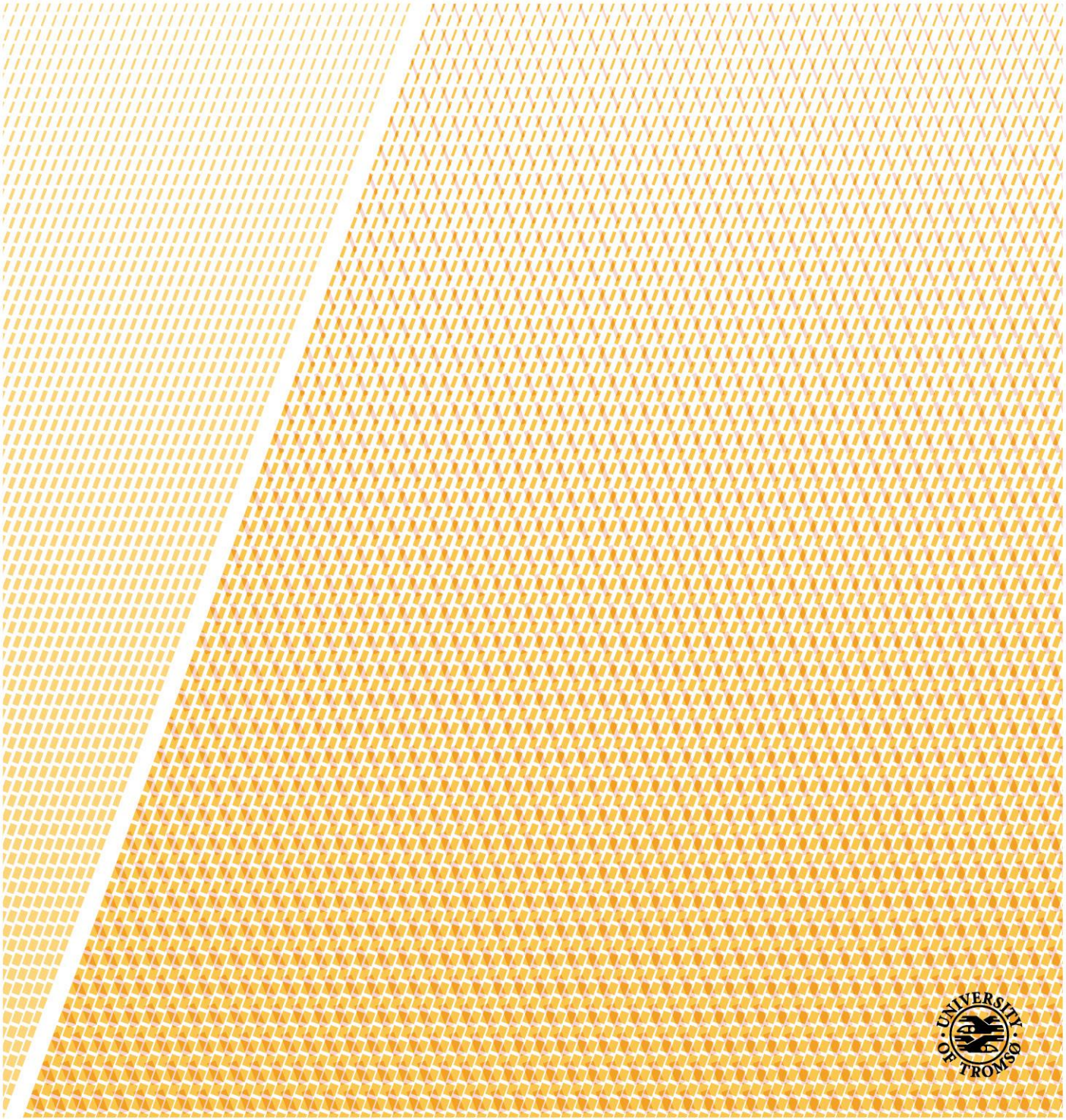

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ABSTRACT

Introduction: Physiotherapy is at the intersection between theoretical knowledge and practical and interactional skills. As such, physiotherapy is a complex professional practice, particularly in the care for persons with multiple sclerosis (MS) who have heterogeneous impairments affecting various daily activities. During the recent decades, emphasis on the practical and interactional aspects of physiotherapy has increased, and modern physiotherapy is characterized by examinations and treatments adapted to the patient's specific needs and desires. Group-based organization of interventions is a common treatment approach in MS rehabilitation, regardless of limited knowledge about essential elements of professional practice in such clinical settings. This dissertation presents and discusses how actions and interactions affect opportunities and challenges for achieving success within a group-based and individualized intervention for persons with MS.

Methods: The empirical material of this doctoral project is based on 30 hours and 12 minutes qualitative video observations of examinations and exercise sessions, and 25 hours and 49 minutes in-depth interviews with physiotherapists (PTs), collected during the conduction of a group-based and individualized exercise intervention for persons with MS. Twenty-five clinical encounters were included, consisting of all together 40 patients in groups of three led by six different PTs. The data material were transcribed and analyzed using Malterud's systematic text condensation method, and theoretically interpreted through the enactive framework emphasizing bodily movements and interactions in sense-making processes.

Results: The analyses of the data material resulted in three papers. Paper I concerns the examination prior to the group intervention, in which hands-on facilitations and emphasis on perceptions of movement changes appeared as powerful sources to build the patients' and PTs' expectations and insights. Paper II concerns individualization in the exercise sessions, in which individual adjustments and progressions depended on advanced ongoing evaluations that could be challenged if patients' functional levels differed largely within the group. Paper III addresses the group dynamics in the exercise sessions, and implies that the patients' individual improvements and success affected the group atmosphere positively, and were strengthened when the PTs encouraged the patients to share their experiences within the group.

Synthesis: Congruencies between findings from the papers grouped into three new categories: *movement changes, PTs' insights and skills,* and *intervention frameworks.* Extended discussions of these categories identified key factors affecting opportunities and challenges for achieving success in the group-based and individualized encounter. Movement changes appeared important to increase the patients' and the PTs' engagement and motivation, and were obtained through skillful PTs who were challenged to perform advanced reasoning processes for three different patients at the same time. Focus on changes and improvements in group discussions was vital, and may be strengthened through set frameworks of the intervention, e.g., rounds of experience-sharing. As such, the dissertation implies that bodily experiences and thought processes are closely connected in clinical practice, and require PTs who combine theoretical knowledge with practical skills and adapted interactional strategies in their meetings with patients. Although challenging, the group organization seems to provide opportunities for increased sense-making, as the patients hold unique experiences that can lead to new insights through mutual interactions.

Conclusion and future research: The findings from this doctoral project imply that group-based interventions in neurological physiotherapy involve both opportunities and challenges for achieving success. Emphasis on patient participation and bodily perceptions of change and improvements appears as vital ingredients for each unique individual and for the group as a whole. The group organization is challenging but holds the potential for strengthening engagement and raise awareness regarding changes and improvements. It seems possible to embed the benefits of individualization in a group setting, which contradicts the prevailing view of group organization in physiotherapy. Future studies should emphasize content and interactional aspects of clinical practice to further develop the knowledge on group-based interventions in neurological physiotherapy.

LIST OF PAPERS

Paper I: Lahelle, A.F., Øberg, G.K. & Normann, B. (2018). Physiotherapy assessment of individuals with multiple sclerosis prior to a group intervention – a qualitative observational and interview study. *Physiotherapy Theory and Practice,* doi: 10.1080/09593985.2018.1488022

Paper II: Lahelle, A.F., Øberg, G.K. & Normann, B. (2018). A group-based, individualized physiotherapy intervention for people with multiple sclerosis – a qualitative study. *Physiotherapy Research International,* e1734, doi:10.1002/pri.1734

Paper III: Lahelle, A.F., Øberg, G.K. & Normann, B. Group dynamics in a group-based, individualized exercise physiotherapy intervention for people with multiple sclerosis – a qualitative observational and interview study. In second review with *Physiotherapy*.

ABBREVIATIONS AND DEFINITIONS

MS	Multiple sclerosis
PT	Physiotherapist
ADL	Activities of daily living
GroupCoreDIST	The name of the intervention that served as the basis for the empirical data of this dissertation. The name is an abbreviation for group-based (Group), core/trunk muscle training (Core), (high) dose, dual task (D), individualized, insights (I), selective movements, specificity, stability, somatosensory activation (S), training, teaching, task oriented (T).
RCT	Randomized controlled trial
CNS	Central nervous system
EDSS	Expanded Disability Status Scale
RRMS	Relapsing remitting multiple sclerosis
SPMS	Secondary progressive multiple sclerosis
PPMS	Primary progressive multiple sclerosis
NLSH	Nordland Hospital Trust, Bodø, Norway

1 INTRODUCTION

Physiotherapy for persons with injuries, diseases and disorders aims to develop, maintain and restore functional abilities through goal-oriented treatments directed towards the individual's capacities to learn and change (WCPT, 2015). Physiotherapists (PTs) provide examinations and treatments tailored to the patient's specific needs and preferences based on high-quality clinical research and practical knowledge and skills (Herbert et al., 2011). Adapting treatment based on thorough clinical examinations is a fundamental principle in physiotherapy, where improving or maintaining functional abilities in the best possible way is considered as a successful goal achievement. Together with exercise, manual techniques and management of tasks and the patients' environment, interactional strategies that promote PTs' and patients' mutual understanding of contextualized movement challenges and needs are fundamental to establishing and implementing meaningful treatment plans (WCPT, 2015). Thus, physiotherapy is a complex professional practice in which theoretical and research-based knowledge merges with clinical experience and interactional skills in the encounter between PTs and patients (Ferreira et al., 2013; Jones, Jensen, & Edwards, 2008). This doctoral project aims to illuminate these complex aspects of professional practice by investigating how strategies, approaches, actions and interactions affect opportunities and challenges for achieving success in a group-based and individualized intervention for persons with multiple sclerosis (MS).

Tailored physiotherapy is recommended as part of rehabilitation management for persons diagnosed with MS (European Multiple Sclerosis Platform [EMSP], 2012; National Institute for Health and Care Excellence [NICE], 2014), the most common disabling disease of the central nervous system (CNS) in young adults (Ramagopalan & Sadovnick, 2011). In Norway, the prevalence of MS is among the highest in the world (203/100 000 (Berg-Hansen, Moen, Harbo, & Celius, 2014)), and most patients receive physiotherapy services from their municipal health care services (Mehus, 2016). Consequently, a considerable number of PTs in rural and urban municipalities bear the professional responsibility for implementing appropriate physiotherapy services for persons with MS. This can be particularly challenging due to the complex and heterogeneous nature of MS symptoms, which lead to a variety of movement problems during activities of daily living (ADL) (Compston & Coles, 2008).

Group-based treatment is a common approach in physiotherapy services for persons with MS (Rasova et al., 2016). However, this approach increases the complexity of the professional practice because several patients participate in the same clinical encounter. Studies of physiotherapy practice commonly investigate individual clinical settings (Shumway-Cook & Woollacott, 2017), leaving a knowledge gap regarding how processes within group-based settings affect essential elements of the clinical encounter such as obtaining improvements, targeted strategies, interactions, sense-making and insights. Research addressing such aspects is needed to develop high-quality physiotherapy services for patients and to provide clinicians with applicable insights that contribute to the development of skills that optimize everyday practice.

The neurological physiotherapy literature presents a pronounced distinction between individual and group-based interventions. Group-based interventions are considered to be cost-effective, motivating and socially supportive; however, they are not capable of providing the same specificity and opportunities for tailoring as individual interventions (Everett, 2010; Jones & Kulnik, 2018; Mason, 2013). In this respect, the recommendation to provide tailored rehabilitation for persons with MS is challenging to meet through group-based interventions. Plow, Mathiowetz, and Lowe (2009) find such views problematic and call for a development of interventions that implement individual adaptations within a group setting to improve physiotherapy services. To date, no studies have investigated professional practices in relation to such interventions.

The *GroupCoreDIST project* (Normann, Zanaboni, Arntzen, & Øberg, 2016) includes the first intervention for persons with MS that strongly emphasizes individualization within a group setting and constitutes the basis for the data material used in this doctoral project. Through a combination of qualitative observations and interviews and the application of embodied theories, this dissertation and its three papers present and discuss the integration of theoretical, practical and interactional aspects of physiotherapy and their relation to group-based organization of interventions. As such, the doctoral project contributes with new knowledge in an uninvestigated research field in physiotherapy.

2 MULTIPLE SCLEROSIS

MS is an autoimmune inflammatory disease in which demyelination and axonal degeneration cause lesions that restrain the optimal transmission of action potentials in the CNS (Compston & Coles, 2008). MS is commonly classified as *relapsing remitting MS* (RRMS), *secondary progressive MS* (SPMS) and *primary progressive MS* (PPMS). At disease onset, approximately 85-90% of the patients are classified with RRMS, which is characterized by clearly defined attacks (relapses) lasting 24 hours or more, with full or partial recovery with a stepwise decrease of function. Approximately 10-20 years after the onset of RRMS, SPMS occurs. In SPMS, the disease gradually develops, and can present occasional relapses. Approximately 10-15% of patients are classified with PPMS at disease onset, without a preceding period of RRMS (Compston & Coles, 2008; Lublin et al., 2014). Physiotherapy is recommended for all types of MS, particularly after attacks in RRMS to take advantage of the patients' recovery potential (EMSP, 2012; NICE, 2014).

2.1 Cause and epidemiology

The underlying cause of MS is not clear, and a highly complex interaction among genetic susceptibility, gene expression changes and environmental factors makes the disease epigenetic in form (Kucukali, Kurtuncu, Coban, Cebi, & Tuzun, 2015). Viral infections (particularly Epstein-Barr virus), low levels of vitamin D and smoking are associated with an increased risk of MS (Ascherio, Munger, & Simon, 2010; Belbasis, Bellou, Evangelou, Ioannidis, & Tzoulaki, 2015). Recent prevalence estimates of 203/100 000 in Norway (Berg-Hansen et al., 2014) indicate a 10-fold increase during the past eight decades due to multifactorial causes, including more accessible neurologic health care services, more precise and valid diagnostics, and increased survival (Grytten, Torkildsen, & Myhr, 2015). A mean onset age of 35.4 years (Simonsen, Edland, Berg-Hansen, & Celius, 2017), a life expectancy of 74.7 years (Lunde, Assmus, Myhr, Bø, & Grytten, 2017) and the large population (approximately 11 000) of persons with MS in Norway (Berg-Hansen et al., 2014) imply that MS is a lifelong disease with numerous consequences for the patients themselves, their families and health care services – including physiotherapy services.

2.2 Symptoms, diagnosis and treatment

The course of MS is unpredictable, and symptoms vary according to the severity and localization of CNS lesions. Visual disturbances, reduced coordination and motor control, sensory disturbances, cognitive impairments, pain, and fatigue are quality of life-reducing symptoms in all stages of the disease (Brownlee, Hardy, Fazekas, & Miller, 2017). All these symptoms affect movement and balance, and restrict the patient's participation in everyday life (Compston & Coles, 2008).

In Norway, MS is diagnosed by a neurologist in specialist health care services based on clinical examination, magnetic resonance imaging and neurophysiological testing (Aarseth et al., 2017). Thorough information regarding the disease, pharmacological treatment plans, and considerations of rehabilitation needs are provided for newly diagnosed patients. Throughout the course of the disease, patients are followed at specialist outpatient MS clinics where interdisciplinary resources are available. The frequency of these specialist visits varies according to the disease course and pharmacological treatment, but visits are commonly conducted at least once a year. Patients who need physiotherapy mainly receive it at their municipality health care service, but may also be advised to attend to time-limited stays at specialized rehabilitation centers (Aarseth et al., 2017). Consequently, most PTs working in Norwegian municipalities are responsible for providing appropriate care for persons with MS. The complex, unpredictable and heterogeneous characteristics of the disease require that physiotherapy treatment and follow-up should be adapted to the patients' symptoms, needs, and disease progress and course (EMSP, 2012; NICE, 2014).

2.3 Pathogenesis and plasticity of the central nervous system

Damage to the myelin sheaths covering the axons due to autoimmune inflammation is the main pathogenic mechanism in MS (Compston & Coles, 2008). In MS, autoreactive lymphocytes cross the blood-brain barrier and target myelin and oligodendrocytes as foreign objects. This autoimmune-mediated attack on the myelin leads to inflammatory processes, causing damage and constraining the transmission of action potentials (Compston & Coles, 2008). The lesions, or *plaques*, are typically multifocal, and vary in size, number and localization in the CNS. However, patients' symptoms do not necessarily follow anatomical

logic, which underpins the significance of clinical examination and evaluation in addition to imaging and neurophysiological testing.

During an MS attack, the development of oligodendrocytes in lesion sites contributes to the possibility of recovery through remyelination. The production of new myelin can restore the transmission properties of axons, and thus improve patient function after inflammation (Chari, 2007). If the patient adapts to the functional behaviors and compensatory movement strategies that are necessary during the acute phase of the attack, and continues to utilize these learned strategies during and after the remyelination phase, potential resources available for recovery may be unused. This form of *learned nonuse* (Nudo, 2013) further decreases function, even when the neural structures are recovered or partly recovered (Kleim & Jones, 2008). Additionally, compensatory movement strategies and reduced activity may contribute to musculoskeletal problems, such as muscle shortening, reduced flexibility and atrophy (Gjelsvik & Syre, 2016). Consequently, sufficient physiotherapy examination and specific interventions aiming to reduce learned nonuse are vital for achieving potential recovery after an inflammatory attack.

Together with remyelination, neural plasticity forms the neurobiological basis for functional recovery in persons with MS and is a fundamental principle of neurological physiotherapy (Gjelsvik & Syre, 2016; Levin, Kleim, & Wolf, 2009; Shumway-Cook & Woollacott, 2017). Neural plasticity is the ability of the CNS to adapt, restore and reorganize its form and function (Kidd, 1992). In short, neural plasticity concerns the increased release and response of neurotransmitters, the unmasking of silent synapses, axonal and collateral sprouting to create new synapses, and remapping of cortical representation (Kandel et al., 2013). These neurobiological processes are affected by activity – "use it and improve it" and "use it or lose it" (Kleim & Jones, 2008). As such, both positive adaptations due to appropriate use *and* maladaptive plasticity can occur after MS lesions at all ages, stages and phases of the disease (Tomassini et al., 2012). To increase positive plastic changes after CNS lesions, it is essential that the rehabilitation is perceived as meaningful for the patient (Kleim & Jones, 2008). These elements are vital to consider when planning and implementing physiotherapy interventions for persons with MS and require PTs with knowledge and skills in both neurobiological and interactional domains.

2.4 Movement problems associated with MS

Disturbance of postural control is a common and major problem for persons with MS (Comber, Sosnoff, Galvin, & Coote, 2018); it causes fundamental movement problems in activities such as gait, reaching and grasping, balance strategies and other ADLs (Huisinga, St George, Spain, Overs, & Horak, 2014; Lamers et al., 2016; Matsuda et al., 2011; Peterson, Huisinga, Spain, & Horak, 2016). Pollock, Durward, Rowe, and Paul (2000) and Shumway-Cook and Woollacott (2017) define postural control as the human act of controlling the body's position in space, which is the prerequisite for balance. Several of the systems responsible for postural control (visual, somatosensory, motor, vestibular, cognitive, psychological) can be disturbed in persons with MS (Compston & Coles, 2008). Thus, postural control may create challenges in most activities and tasks in daily life for persons with MS and should be prioritized in physical rehabilitation.

Trunk control or *core stability* (these terms are used synonymously) is according to Kibler, Press, and Sciascia (2006, p. 190) "the ability to control the position and motion of the trunk over the pelvis and leg to allow optimum production, transfer and control of force and motion to the terminal segment in integrated kinetic chain activities". Trunk control is a component of postural control, which relies on an appropriate relationship between orienting the moving body to achieve specific tasks and stabilizing the body in response to gravity and surfaces (Pollock et al., 2000). Stability and control of the trunk, pelvis/hips and shoulders are considered vital prerequisites for balance and all ADLs (Gjelsvik & Syre, 2016; Lennon, Verheyden, & Ramdharry, 2018; Shumway-Cook & Woollacott, 2017). Several clinical trials that investigated the effect of balance interventions, e.g., Arntzen et al. (2019), Forsberg, von Koch, and Nilsagård (2016) and Fox, Hough, Creanor, Gear, and Freeman (2016), emphasize the importance of trunk control in the physical rehabilitation of persons with MS.

Interventions addressing movement problems that decrease functional abilities, particularly disturbances of postural control, are core elements in physiotherapy management for persons with MS (Freeman & Gunn, 2018; Gjelsvik & Syre, 2016; Shumway-Cook & Woollacott, 2017). Clinical research on such interventions, however, is a complex field comprising several treatments strategies and approaches, both group-based and one-on-one. The next chapter gives an overview of physiotherapy interventions for persons with MS and

emphasizes the characteristics of professional clinical practice and clinical strategies that are particularly relevant for group-based approaches.

3 PHYSIOTHERAPY FOR PERSONS WITH MS

Most interventions for persons with MS follow treatment principles that encompass activity-dependent enhancement of functional recovery and optimization of motor control (Carr & Shepherd, 2010; Freeman & Gunn, 2018; Shumway-Cook & Woollacott, 2017). Although high-quality evidence is lacking, systematic reviews of MS rehabilitation indicate that physiotherapy interventions are safe and have no adverse events; they improve mobility, balance and quality of life; and they reduce fatigue (Amatya, Khan, & Galea, 2019). These findings clearly contradict outdated beliefs and advice to avoid exercise due to the risk of increased symptoms and "energy waste" (Döring, Pfueller, Paul, & Dörr, 2011). Thus, modern guidelines recommend the inclusion of physical activity and physiotherapy in integrated health care services for persons with MS (EMSP, 2012; NICE, 2014).

Several different types of individual and group-based treatment approaches have been proposed for MS rehabilitation. Interventions targeting balance are common (De Souza & Bates, 2012; Martinkova et al., 2018), as activity limitations due to impaired postural control are among the major challenges in MS (Comber et al., 2018). However, there is no compelling evidence indicating the superiority of any specific interventions or approaches – either for balance (Cattaneo, Jonsdottir, Zocchi, & Regola, 2007; Davies et al., 2016; Fox et al., 2016; Gandolfi et al., 2015; Kalron, Rosenblum, Frid, & Achiron, 2017) or for general functioning (Amatya et al., 2019). Descriptions of interventions in clinical trials are often deficient and constrained by rigorous protocols required for scientific work that fail to reflect real-life clinical practice. It is also challenging to precisely describe the components of real-life physiotherapy interventions for persons with MS. The complex and heterogeneous symptoms and impairments (Compston & Coles, 2008), the principle of specific and adapted treatment strategies (EMSP, 2012; NICE, 2014), and the last decades' emphasis on interpersonal relations (Ferreira et al., 2013; Jones et al., 2008) require that the content and strategies of clinical encounters emerge in the moment, and do not follow standardized and predefined plans.

Consequently, it seems opportune to elaborate on the nature of professional practice, particularly the underrepresented topic of integrating theoretical and research-based knowledge, practical knowledge and interactional skills. In the following sections, these

aspects and relevant approaches within group-based and individualized interventions for persons with MS are presented as a foundation for interpreting the empirical data and discussions of this dissertation. The terminology used in these considerations is derived from *The International Classification of Functioning, Disability and Health* (ICF) (WHO, 2001), which presents a systematic and standardized language for describing how health-related factors affect a person's life (Figure 1).

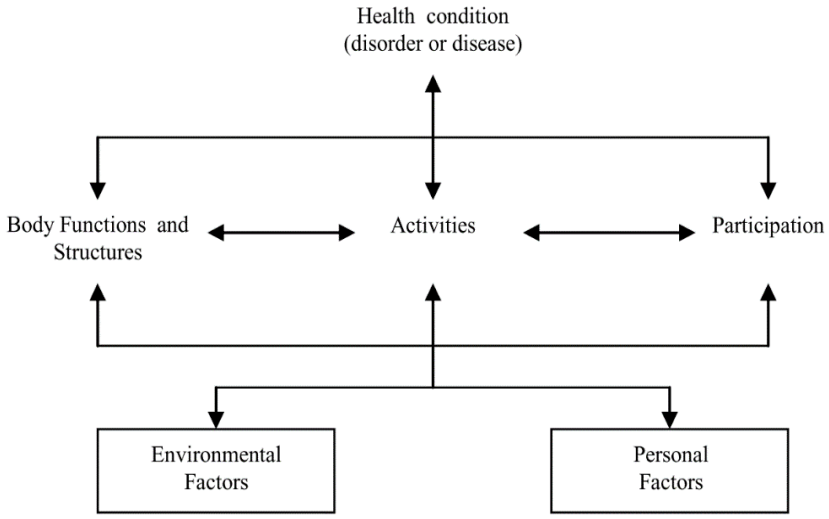

Figure 1 ICF (WHO, 2001)

3.1 Professional physiotherapy – evidence *and* practice

Physiotherapy includes multiple forms of knowledge and skills (Jensen, Gwyer, Hack, & Shepard, 2007; Jones et al., 2008), which underpins the complexity of professional practice. Although evidence and knowledge from biomedical and biomechanical research dominate in physiotherapy (Nicholls & Gibson, 2010), the significance of embodied and relational aspects of clinical interactions has gained momentum in recent decades (Ajjawi & Higgs, 2012; Ferreira et al., 2013; Normann, 2018; O'Keeffe et al., 2016; Øberg, Normann, & Gallagher, 2015). Shaw and DeForge (2012) suggest that physiotherapy should rely on multiple types of knowledge and clinical strategies in which no approach is superior to another. This view is in line with *evidence-based physiotherapy*, in which *high-quality clinical research* is combined with the PTs' *practical knowledge* and thorough considerations of the *patients' preferences* (Herbert et al., 2011).

Knowledge obtained from high-quality clinical research alone is seldom a sufficient foundation for the complex clinical interaction between PTs and patients. Professional physiotherapy also requires practical knowledge and skills for successful clinical encounters, including handling skills, communication and interaction strategies and approaches to generate mutual understandings (Herbert et al., 2011). This interplay between theory and practice implies that both intellectual and incorporated knowledge constitute the PTs' bodily interactions with the patients, in other words the "doing" of the encounter. Schön (1991) and Molander (1996) state that practical knowledge can be tacit and challenging to verbalize. According to Schön (1991), practical knowledge is embedded in our actions and involves behaviors, recognitions and judgments that we engage in without necessarily thinking them through. Hence, he criticizes other technical models that underemphasize complexity, values and uncertainty, and he claims that real-life problems cannot be predefined but are determined here-and-now. These views are recognized in clinical encounters in physiotherapy, in which patients' movement problems are situational, unique, and never specifically defined beforehand through diagnosis or other labels. It is reflections upon actions and interactions in such situations that develop experience and practical knowledge (Schön, 1991), which implies a close connection between thought processes and doing in practical professions. These views of practical knowledge, actions and interactions with accompanying reflections are given primacy in clinical work and comply with Nicholls and Gibson's (2010) notion of the profession's need for expanded and embodied theoretical frameworks.

The move toward taking patients' preferences into account also emphasizes that the outdated model in which the PT makes decisions by him/herself is history. According to Herbert et al. (2011) patients should be encouraged to share their experiences and perceptions to provide sufficient foundations for clinical decisions. The view of clinical decision-making as a mutual process between the PT and the patient complies with Kennedy's (2003) notion of the patient as the expert in him/herself and reflects modern physiotherapy, in which relational matters and multimodal (e.g., verbal and physical) interactions with patients are highly valued in clinical work (Normann, 2018; Øberg et al., 2015).

3.2 Group-based organization

A systematic literature search[1] reveals several studies indicating that group-based physiotherapy for persons with MS improves functional activities and impairments, including strength, postural control and gait; reduces fatigue; and improves quality of life (Arntzen et al., 2019; Carter et al., 2014; Coote, Hogan, & Franklin, 2013; Forsberg et al., 2016; Hogan, Kehoe, Larkin, & Coote, 2014; Learmonth, Paul, Miller, Mattison, & McFadyen, 2012; Tarakci, Yeldan, Huseyinsinoglu, Zenginler, & Eraksoy, 2013; Taylor, Dodd, Prasad, & Denisenko, 2006). Additionally, qualitative interview studies report that perceived improvements in physical fitness, increased independence (Carling, Nilsagård, & Forsberg, 2018; Crank et al., 2017) and being part of a supportive group of peers are experienced as particularly rewarding (Aubrey & Demain, 2012; Clarke & Coote, 2015; Dodd, Taylor, Denisenko, & Prasad, 2006; Learmonth, Marshall-McKenna, Paul, Mattison, & Miller, 2013). The social processes that influence relations within groups, also known as *group dynamics* (Forsyth, 2014; Myers, Abell, & Sani, 2014), mainly rely on cognitivist theories. Therefore, the body and movement are underrepresented and are hardly discussed in studies investigating group-based interventions in neurological physiotherapy. Furthermore, the literature does not thoroughly address and discuss the specific content of interventions and professional practice of group-based interventions, which leaves an undiscovered field in clinical research.

The following sections present three main practice principles relevant for the analyses of the data material in this doctoral project: *individualization, examination,* and *facilitation.* These principles are naturally interrelated and dependent on one another, and they are merged in the discussions of the synthesized findings of this dissertation. For now, the principles are briefly reviewed separately and considered in light of group-based organization.

[1] Search conducted 29.04.2019 in Ovid's MEDLINE, Ovid's Embase and EBSCOhost CINAHL Plus. Search strategy: Subject headings "multiple sclerosis" AND ("physical therapist" OR "physical therapy modalities" OR "exercise therapy") AND ("group therapy*.ti,ab" OR "group exercise*.ti,ab" OR "group organization*.ti,ab" OR "group-based*.ti,ab")

3.2.1 Individualization in group-based interventions

The principle of individualization in neurological physiotherapy for persons with MS (Amatya et al., 2019; EMSP, 2012; NICE, 2014) indicates that examination and treatment should be adapted to the patient's specific needs regarding physical and cognitive functioning, underlying impairments and the patient's life situation and desires. Consequently, physiotherapy depends on PTs who are able to integrate theoretical knowledge regarding the body and movement with here-and-now adaptations to the unique clinical encounter and the patient's changes and progressions throughout the course of an intervention.

A systematic literature search[2] shows that research emphasizing the professional practice of individualization for persons with MS is considerably limited. Descriptions of individualization in neurological physiotherapy are restricted to one-on-one follow-ups (Gjelsvik & Syre, 2016; Lennon et al., 2018; Normann, Sorgaard, Salvesen, & Moe, 2013; Shumway-Cook & Woollacott, 2017), and there is a lack of discussion regarding the possibilities for including individual adaptations in group settings. The educational literature, e.g., Jones and Kulnik (2018), claims that group-based interventions are beneficial for social peer support and group affiliation but cannot address the individual patient's specific and complex treatment needs. These beliefs regarding the mutual exclusiveness of the two approaches are problematic and contradict the core principle of individualization in physiotherapy practice (WCPT, 2015) and the recommendations for patients with MS in particular (Amatya et al., 2019; EMSP, 2012; NICE, 2014).

Hogan et al. (2014) state that their study's group intervention for persons with MS was tailored to the patients' ability level but not to their individual impairments. Such organization is probably common in other studies, and reflects that group interventions are rarely sufficiently individualized in research. Plow et al. (2009) suggest that individualized treatment strategies should be implemented in group settings to embrace integrated needs of persons with MS. To date, there are no studies investigating group-based and individualized

[2] Search conducted 29.04.2019 in Ovid's MEDLINE, Ovid's Embase and EBSCOhost CINAHL Plus. Search strategy: Subject headings "multiple sclerosis" AND ("physical therapist" OR "physical therapy modalities" OR "exercise therapy") AND ("individualization*.ti,ab" OR "tailoring*.ti,ab" OR "adapted*.ti,ab)

interventions for persons with MS that emphasize and discuss the opportunities and challenges related to the integration of these two approaches. As a result, the studies of this doctoral project contribute to development of new knowledge regarding clinical practice in the field of neurological physiotherapy.

3.2.2 Examination prior to group-based interventions

Clinical examinations, the qualitative and systematic practice of interpreting the patients' functional problems (Freeman, 2002; Gjelsvik & Syre, 2016; Shumway-Cook & Woollacott, 2017), are fundamental in physiotherapy and comprise "the first step in the process of rehabilitation" (Wade, 1998, p. 183). Patients' movement problems and dysfunctions must be identified before relevant treatment options can be proposed (Gjelsvik & Syre, 2016; Johnson, 2009; Kersten, 2004; Shumway-Cook & Woollacott, 2017), a sequence that underpins the integrity of physiotherapy as a professional discipline.

Thorough examinations require PTs with the practical knowledge and skills to perform advanced movement analyses that address how impairments of body functions and structures limit activity and restrict participation (Freeman, 2002; Gjelsvik & Syre, 2016; Johnson, 2009; Shumway-Cook & Woollacott, 2017). A typical clinical example is the interpretation of how ankle range of motion and distal proprioception (body function and structure) limit the patient's gait (activity) and restricts his or her opportunities to engage in social interactions (participation). Possible underlying impairments can be revealed through *treatment as examination* (Gjelsvik & Syre, 2016; Johnson, 2009), in which the PT evaluates how, for example, ankle mobilization increases the patient's ability to shift his or her weight over the foot during the stance phase and accordingly improve step length and gait quality. These clinical processes may reveal the patient's *potential for improvement* (Johnson, 2009) and are not standardized but systematic in the sense that each element of the examination is based on previous observations and analyses.

These considerations illustrate that the examination is an essential element of clinical reasoning – the processes that guide management strategies and judgements in physiotherapy practice (Higgs & Jones, 2008). Clinical reasoning during the examination can refer to the PT's analyses of how body functions and structures affect activities and participation and how these insights affect the next step of the examination. These decision-making processes

provide increased insight as the PT continuously interlinks examination and treatment and illustrate the systematic and individually adapted process of gaining information regarding the patient's potential to improve his or her function through physiotherapy treatment.

A systematic literature search[3] reveals that there are no empirical studies targeting MS that investigate the content or efficacy of clinical physiotherapy examination, nor are there studies discussing the role of examinations prior to group-based interventions. Nevertheless, clinical examination is a prerequisite for individualization and should be emphasized prior to individual *and* group-based interventions (Norwegian Physiotherapist Association [NFF], 2015; WCPT, 2015). Thus, it is paradoxical that several studies on group-based interventions for persons with MS lack descriptions and discussions of the significance of the examination (Forsberg et al., 2016; Tarakci et al., 2013; Taylor et al., 2006); this is true even for interventions that claim to be tailored (Carling, Forsberg, Gunnarsson, & Nilsagard, 2017). Additionally, individual examinations prior to group-based interventions seem especially essential as opportunities to continue an ongoing examination process are considerably reduced in group encounters. Consequently, the research field needs studies that investigate and discuss the nature of examinations and their contribution to group-based interventions.

3.2.3 Facilitation in group-based interventions

In the physiotherapy literature, facilitation means "making easy" and concerns treatment strategies intended to provide patients with the perception of easier movements through recruitment of their own sensory-motor activity (Gjelsvik & Syre, 2016, p. 149). Facilitation is a core element of physiotherapy practice and is usually manifested through hands-on contact (handling) between the PT's hands and the appropriate parts of the patient's body. However, it can also include positioning, equipment or tasks that promote desired activities. In movement facilitation, the PT's skilled verbal and bodily interaction increases the opportunity for the patient to perform activities and tasks that he/she might not be able to

[3] Search conducted 29.04.2019 in Ovid's MEDLINE, Ovid's Embase and EBSCOhost CINAHL Plus. Search strategy: Subject headings "multiple sclerosis" AND ("physical therapist" OR "physical therapy modalities" OR "exercise therapy") AND ("neurological examination" OR "physical examination" OR "clinical assessment" OR "evaluation").

perform on his/her own (Vaughan-Graham & Cott, 2016). Through facilitation, the PT receives information *and* provides the patient with sensory input and cues. Such physical and mutual interactions between patients and PTs lead to new and meaningful experiences and insights that are unavailable to them in any other way (Normann, 2018). The main aim of facilitation is to increase the patients' own activity and movement control and gradually reduce the PTs' physical support as the need for external recruitment of sensory-motor activity decreases (Gjelsvik & Syre, 2016; Johnson, 2009). As such, facilitation is *more* than merely touching the patient with instrumental hands-on techniques. Rather, it is targeted and planned to achieve the patients' specific goals. Careful analyses of the patients' individual impairments and advanced reasoning processes are needed, which implies that facilitation is closely linked to examination and individualization.

In clinical practice, physiotherapy interventions that include facilitation principles are among the most common treatment approaches for persons with MS across Europe (Martinkova et al., 2018). However, a systematic literature search[4] shows that studies investigating interventions for persons with MS rarely emphasize facilitation. Findings from Normann et al. (2013) indicate that facilitation is an appropriate approach for persons with MS and leads to meaningful experiences and improved movement quality. Dybesland and Normann (2018)[5], who investigated facilitation in a group-based context, metaphorically call facilitation "a two-edged sword" as some patients' movement performance appeared to improve through facilitation, while others seemed to adopt passive behaviors as they waited for the PT to facilitate their movements. Further investigation of these elements is needed to develop the knowledge base of group-based physiotherapy for persons with MS.

[4] Search conducted 29.04.2019 in Ovid's MEDLINE, Ovid's Embase and EBSCOhost CINAHL Plus. Search strategy: Subject headings "multiple sclerosis" AND ("physical therapist" OR "physical therapy modalities" OR "exercise therapy") AND ("facilitation*.ti,ab" OR "hands-on*.ti.ab" OR "handling*.ti,ab" OR "touch*.ti,ab)

[5] Dybesland and Normann (2018) is a qualitative study investigating the pilot of GroupCoreDIST (Normann, Salvesen, & Arntzen, 2016)

4 AIMS AND RESEARCH QUESTIONS

The aim of this dissertation is to obtain new knowledge in the field of neurological physiotherapy and to contribute to the development of the scientific evidence base in clinical practice. Through investigations of a group-based and individualized intervention for persons with MS, the dissertation explores factors that affect opportunities and challenges for achieving success in such clinical encounters. Specific emphasis is given to bodily interactions, group dynamics, sense-making and the PTs' considerations and reflections regarding their strategic choices within the clinical encounter.

The overarching research question of the dissertation is as follows:

> *What factors affect opportunities and challenges for achieving success during clinical encounters in a group-based and individualized physiotherapy intervention for persons with MS?*

The three papers of the dissertation include the following research questions:

Paper I: *(1) What is the nature of the individual assessment of persons with MS prior to a group intervention; and (2) what are the PTs' reflections regarding conducting such assessments?*

Paper II: *How do professional actions and interactions affect individual adaptations in a group-based intervention for people with MS, and what are the PTs' reflections regarding opportunities and challenges in group settings?*

Paper III: *(1) What is the nature of group dynamics within an individualized and group-based intervention for people with MS, and (2) how do the actions and interactions between PTs and patients affect these dynamics?*

5 THEORETICAL APPROACH

There is a long-lasting lack of suitable theoretical approaches in physiotherapy (Bithell, 2005; Normann, 2018; Tyni-Lenné, 1989), and a clear need to theoretically anchor the complexity of clinical practice. Neural plasticity (Kidd, 1992; Kleim & Jones, 2008) and behavioral pain physiology (Moseley, 2017) are amongst the most important contributors to changes in assumptions in their respective fields of modern physiotherapy practice. However, physiotherapy is not merely neurobiology and physiology. Extended and integrated theories provide additional and important frameworks for interpreting movement, body and behavior in professional physiotherapy practice (Nicholls & Gibson, 2010).

In qualitative research, theories are assumptions about the world that guide research questions, methodological choices, and the interpretation of specific phenomena and empirical data (Malterud, 2016). As such, the theoretical approach of a physiotherapy study is a vital tool for extending and elaborating on how we understand the meaning of described clinical situations and problems. In this doctoral project, we actively apply the *enactive theoretical approach*, which contributed as a tool for interpreting the investigated clinical encounters. The enactive approach offers an embodied and integrated perspective for understanding actions, interactions and sense-making (Di Paolo, Rohde, & De Jaegher, 2010) and is highly relevant and valuable for expanding the knowledge base in physiotherapy, where insights into the body, movements and communication are core elements.

As the enactive approach is motivated and inspired by *neuroscience, dynamic systems theory* and *phenomenology of the body* (Gallagher, 2017), this chapter begins with a brief introduction to the main characteristics of these perspectives and proceeds with elaborations on how the enactive approach offers a complementary and extended interpretation of clinical encounters in group-based physiotherapy. All these perspectives have influenced me as a researcher and the scientific processes and selections within this dissertation and its papers. However, the empirical findings are mainly interpreted and discussed through the lens of the enactive theories.

5.1 Neuroscience, dynamic systems theory and phenomenology of the body

Neuroscience is fundamental in physiotherapy (Shumway-Cook & Woollacott, 2017) and concerns the scientific study of the nervous system's main properties, such as anatomy, physiology and cell biology (Kandel et al., 2013). Throughout history, neurological physiotherapy practice has been based on the available knowledge regarding how neurons and networks of neurons enable people to move, sense, think, feel and learn, and how these functions are affected by disease, disorders and injuries. Knowledge regarding the plasticity of the nervous system and the ability to adapt and rebuild its form and function (Kidd, 1992), has provided physiotherapy practice with essential guiding principles in which intensive, specific and meaningful training are key concepts (Kleim & Jones, 2008). PTs working with persons with MS need to have extensive knowledge regarding relevant processes within the nervous system, e.g., the consequences of myelin degeneration and the nervous system's response to exercise, to provide high quality services (De Souza & Bates, 2012). However, neuroscientific knowledge alone is not sufficient for a full understanding of motor control, learning, movement and interactional aspects of physiotherapy practice, which underpins the significance of other theoretical perspectives.

In the field of movement science, dynamic systems theory is based on the early works of Bernstein (1967) who emphasized that the complex processes of controlling the body's immense movement possibilities are based on interactions between the nervous system *and* the body as a biomechanical system. The development of these ideas are firmly rooted in modern neurological physiotherapy, in which movement control and learning emerge through interaction between the individual containing several subsystems (sensory, motor, perceptual and cognitive), the task and the environment (Shumway-Cook & Woollacott, 2017). As such, movement and the coordination of movement are not viewed as solely a product of commands from higher brain centers but as a distributed processes involving multiple systems and subsystems. Such views entail that PTs should address the properties of the individual (e.g., sensory function of the foot), the task (e.g., walking flat or on stairs) and the environment (e.g., crowded and noisy surroundings) in the examination and treatment of patients with MS. Like neuroscience, dynamic systems theory mainly represents a biomechanical, objective and third-person perspective of the body in which subjectivity is

rooted in the mind and not as part of the moving body. As a result, these perspectives leave a theoretical vacuum regarding bodily and interactional experiences within clinical encounters.

Phenomenology of the body, as a theoretical basis for understanding clinical physiotherapy practice, has gained momentum in recent decades (Shaw & Connelly, 2012) and highlights the subjective first-person perspective of the body, which is missing from the neuroscientific and dynamic systems theories. The *ambiguous body* is a key element (Merleau-Ponty, 1962), which implies that the body is a biological organism (objective) at the same time that it is the center of experience and expression (subjective). The subjective body is given primacy, and implies that we direct ourselves toward the world as moving, experiencing and intentional bodies. As such, the biological lesions and biomechanical restrictions of persons with MS cannot be considered or addressed without taking the patients' experiencing and expressing bodies into account. However, the phenomenology of the body perspective does not primarily emphasize how thought processes and sense-making emerge, particularly in interactions between two or more people. To expand our theoretical horizon in interpreting interactional sense-making processes within group-based clinical encounters, we turn to the enactive approach.

5.2 The enactive approach

The enactive approach can complement and extend the shortcomings of neuroscience, dynamic systems theory and phenomenology of the body by highlighting that cognition and making sense of other people, situations and the world emerge through dynamic interactions between embodied individuals and their environments (Di Paolo et al., 2010). As such, enactive views of cognition offer a theoretical anchoring of the connection between bodily experiences, communication and thought processes, which is essential in meetings between PTs and patients in physiotherapy settings. The enactive approach is not intended for any specific research field, but in recent years, it has gained momentum in pediatric physiotherapy (Håkstad, Obstfelder, & Øberg, 2015, 2017, 2018; Sørvoll, Obstfelder, Normann, & Øberg, 2018a, 2018b) and in neurological physiotherapy for adults (Normann, 2018; Øberg et al., 2015). As the aims of this dissertation and its papers concern bodily interaction and professional considerations in group-based physiotherapy encounters, interpretation of the empirical material through the lens of the enactive approach appears fruitful.

The enactive approach argues that cognition is an active process. Individuals do not passively receive information from their surroundings, they actively form their own cognition through movements and embodied actions and interactions; they "enact a world" (De Jaegher & Di Paolo, 2007, p. 4). In other words, cognition is not "out there" or entirely produced by mental processes alone, but emerges through meetings between people that are affected by contexts and even tools or equipment. The five principles of *autonomy*, *sense-making*, *emergence*, *experience* and *embodiment* (presented in the text box) constitute the cores of cognition as embodied action (Di Paolo et al., 2010) and are integrated into the forthcoming elaborations of how the enactive approach is connected to relevant aspects of clinical physiotherapy practice.

Five principles that constitute the core of the enactive approach (Di Paolo et al., 2010).

Autonomy
Living organisms, individuals and groups of individuals are autonomous and generate an identity through their own activity (as opposed to systems that "have no say" or "follow the railroad track"). The identity is *precarious* – it is affected by multiple processes and can change or even break down if conditions are altered.

Sense-making
Generation of meaning through active, participatory and bodily interactions with other people and the environment. We do not passively retrieve information from the environment – "we enact a world".

Emergence
Properties and capabilities are formed through dynamic interactions within and between organisms and the environment – they emerge.

Experience
Experience is what forms people into unique individuals and represents the process of learning new skills. Experience is intertwined with being alive, and it is not possible to learn without extensive experiences.

Embodiment
Autonomy, sense-making, emergence and experience presuppose activity; in other words, they depend on having a body. Cognition is embodied action and takes place in the brain *and* in the body. When we engage with the world, bodily perceptions and cognitive experiences occur simultaneously. The mind and body are inherent as a whole, which makes cognition dependent on the body.

5.2.1 Enactive connections to interactional systems in clinical encounters

No clinical encounters in physiotherapy are identical. Characteristics of the PT and the patient, context, treatment goals, available resources and equipment, physical function, cognitive impairments, knowledge and skills and organization of services are examples of factors that affect the interaction between PTs and patients. In the empirical data of this doctoral project, the context and the participants are to a certain degree predetermined: they include a group-based organization, a focus on improving balance through specific and adapted exercises, expert PTs and patients diagnosed with MS. All these elements (which are elaborated in chapter *6.2 Context of the study*) will influence and shape the clinical encounter.

According to enactivism, processes within social interactions are examples of *autonomous systems* (Di Paolo et al., 2010). In an example from a group-based exercise session, a PT who attends specifically to one patient to discuss a problem represents one autonomous system, while another autonomous system in the same situation consists of all the people present in the room. Autonomous systems have identities that are actively generated and sustained by several processes within the system and rely heavily on bodily interactions and dynamic relations to the environment (Di Paolo et al., 2010). Consequently, enactive views of interactional systems are appropriate for exploring dynamic group processes in physiotherapy and extend the traditional views that rely on psychological and cognitivist theories (Forsyth, 2014; Myers et al., 2014).

In the group-based exercise session example, both internal processes, e.g., the patient's and the PT's intentions in their discussion, and external processes, e.g., a coincidental comment from another patient, influence the identity of the system. If particular processes of the system change or disappear, the identity of the system or the system itself can change or even break down. These properties underpin the *emergence* of the systems, where continuous dynamic interactions between the PTs and the patients and the contextual environment affect the identities of clinical encounters. In physiotherapy encounters consisting of several people, such as group-based interventions, the systems' identities are more complex than in traditional one-on-one interventions. Interpreting physiotherapy practice through the lens of the enactive notion of autonomous systems may help to illustrate how different professional strategies, patient properties and intervention organizations influence the clinical encounter and vice versa.

5.2.2 Enactive connections to insight obtainment in physiotherapy

Obtaining information regarding patients' challenges and problems is a vital element of neurological physiotherapy (Shumway-Cook & Woollacott, 2017). These processes exceed the history taking and information gathering from external sources and are integrated into the embodied and continuous analyses and considerations of the patients' movement strategies and possibilities for changes in movement quality (Øberg et al., 2015). The literature's descriptions of such processes are mainly based on biological and biomechanical perspectives and lack considerations of how interactions between the PT and the patient lead to the interpretation of relevant information and clinical understanding (Gjelsvik & Syre, 2016;

Shumway-Cook & Woollacott, 2017). The enactive concept of *sense-making* can help to expand the interpretation of empirical data derived from clinical situations, which has not been previously investigated in neurological physiotherapy for adults.

According to the enactive approach, *sense-making*, or "creation and appreciation of meaning" (De Jaegher & Di Paolo, 2007, p. 4), concerns how understanding of phenomena and situations emerges as an outcome of active connections between individuals and the dynamics with their environments. Sense-making is closely connected to the very core of enactivism, which underpins how meaning is generated through moving, expressing and experiencing bodies. The relationship between the enactive approach and the phenomenology of the body is based on these premises; sense-making depends on the integrated brain *and* body (*embodiment*) and is intertwined with the *experience* of being alive in a meaningful world (De Jaegher & Di Paolo, 2007).

A neurological physiotherapy encounter is an excellent illustration of the significant role of the body and physical interaction in sense-making processes. An understanding of movement problems and the generation of hypotheses regarding why patients move the way they do occur through multimodal interactional processes, for example through the observations of movements, verbal discussions, touch, handling of the patient, and explorations of how adaptations of the task and the environment influence the patient's movement quality (Cassidy, Wallace, & Bunn, 2018; Gjelsvik & Syre, 2016). The PT must *tune in* to the patient's verbal and bodily expressions (Normann, 2018), and sense-making processes seem very limited without integrated and embodied forms of communication. These processes illustrate the connection between the body and thought processes in professional practice and are naturally complex in a clinical setting – particularly in group-based interventions, where several patients with different needs are present simultaneously.

The patient's considerations regarding his or her own situation is a valued competency in health care settings (Kennedy, 2003), and physiotherapy scholars underpin that patient participation is vital (Cassidy et al., 2018; Johnson, 2009). The enactive concept of *participatory sense-making* elaborates on how individuals actively *coordinate* their interactions and enrich each other's interpretations of situations (De Jaegher & Di Paolo, 2007; Fuchs & De Jaegher, 2009). Sense-making is affected by the degree of participation and

the characteristics of the individuals' coordinated interactions and moves along a spectrum from *individual sense-making* to *joint sense-making* (Figure 2).

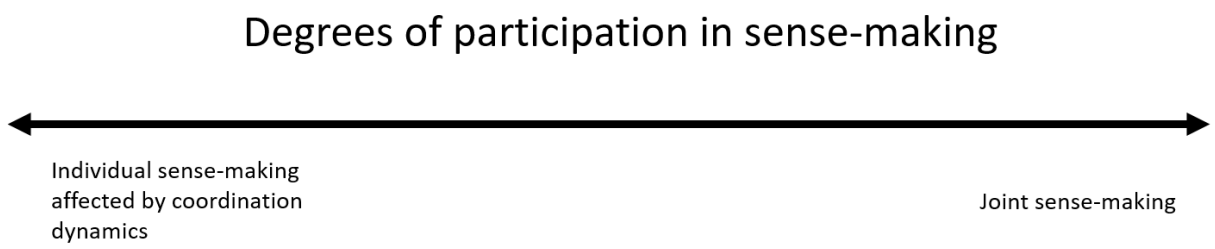

Figure 2 Participatory sense-making (De Jaegher & Di Paolo, 2007)

Coordination between individuals is called *coordination to* when one individual follows another's lead, while *coordination with* is achieved through the individuals' mutual regulation of one another's actions (Fuchs & De Jaegher, 2009). Coordination *with* is required in joint sense-making, while encounters characterized by coordination *to* may lead to individual sense-making. In joint sense-making, embodied processes in the social encounter lead to new understandings that are inaccessible to each individual alone (De Jaegher & Di Paolo, 2007).

The significance of interactional domains is not new to physiotherapy (Ferreira et al., 2013; O'Keeffe et al., 2016). However, appropriate theoretical foundations in which interactional and embodied aspects are intertwined have been sparingly investigated in studies on neurological physiotherapy for adults. Thus, the enactive concept of participatory sense-making provides a new analytical tool whereby interactional processes between PTs and patients are recognized and can contribute to theoretically anchoring tacit and "common sense" phenomena in clinical practice.

5.2.3 Enactive connections to clinical reasoning

Clinical reasoning processes in physiotherapy practice guide management strategies and judgements, and are based on theoretical knowledge, clinical experience, and interactions with patients (Higgs & Jones, 2008). Edwards, Jones, Carr, Braunack-Mayer, and Jensen (2004) present several models for such reasoning strategies, and most educational literature in neurological physiotherapy relies on *diagnostic models* (Gjelsvik & Syre, 2016; Johnson,

2009; Lennon & Bassile, 2018; Shumway-Cook & Woollacott, 2017). The diagnostic models represent the positivist scientific paradigm, with its objective view of the body. Such biological and biomechanical conceptualizations of the body fundamentally violate the enactive approach, in which the body is viewed as lived and subjective (Di Paolo et al., 2010). Øberg et al. (2015) suggest an *embodied-enactive model* in which dynamic and bodily interactions between the PT and the patient constitute the clinical reasoning process.

In embodied-enactive clinical reasoning, bodily interactions between the PT, the patient and the environment are integrated with the "in-the-head" processes of reasoning. Perceptions of and insights regarding the patient's movements obtained through facilitation, "feeling" and guiding are considered vital sources of information and underpin the connection between physical interactions, communication and thought processes. The patient is invited to join the reasoning process as an active participant and is encouraged to express his or her experiences within the situation (Øberg et al., 2015). As such, the embodied-enactive clinical reasoning model is in line with the core concept of enactivism, in which cognition and sense-making emerge through coordinated embodied interactions between individuals and the environment (Di Paolo et al., 2010). The model emphasizes that the "answer" is not out there waiting to be found but is an ongoing and continuous process that develops throughout the clinical encounter.

The enactive-embodied clinical reasoning model seems expedient in physiotherapy for persons with MS as the exploration of possibilities for movement changes through handling and facilitation have a strong role in clinical work (Gjelsvik & Syre, 2016; Normann et al., 2013). Additionally, as Øberg et al. (2015) suggest, patients' participation in the reasoning process may provide them with new and valuable insights regarding their limitations *and* possibilities for improvements.

6 METHODOLOGY AND METHODS

This dissertation includes three qualitative papers investigating the contents of and experiences with leading a group-based and individualized physiotherapy intervention (GroupCoreDIST) for persons with MS. Qualitative research provides descriptions, analyses, and interpretations of the characteristics and qualities of the phenomenon under investigation (Brinkmann & Kvale, 2015; Malterud, 2001; Polit & Beck, 2017), and was used to obtain knowledge regarding contextualized human actions and interactions within this doctoral project. The following methodology and methods sections present the papers' and the dissertation's anchoring in philosophy and theory of science, the context of the study and thorough descriptions and critical considerations of the choices and strategies selected throughout the research process.

6.1 Anchoring in philosophy and theory of science

Shaped by philosophy and theory of science, qualitative research relies on the *interpretative research paradigm*. In the interpretative research paradigm, subjective interpretations of human experiences pervade major assumptions regarding the nature of being and the world (ontology) and the nature of knowledge (epistemology) (Alvesson & Sköldberg, 2017). *Methodologies* within the interpretative paradigm concern the principles of "how things are done" in qualitative research, e.g., systematic collection, organization and analysis of rich data (e.g., observations or interviews), that explore the meaning of social phenomena in natural settings (Malterud, 2001). Several *research traditions* within the qualitative methodologies have developed, and the literature presents different classifications with specific theoretical anchorings, e.g., narrative studies, phenomenology, grounded theory, ethnography and case studies (Creswell, 2013). These traditions follow more or less structured strategies in their methods, e.g., how participants are sampled and how data are collected and analyzed. This dissertation and its papers, along with a large proportion of qualitative studies in the medical field, do not fit into a particular and predetermined research tradition, which is a debated classification system that lacks consensus in the literature (Malterud, 2016). The term *pragmatic studies* has been suggested as an alternative in which a coherent relationship and transparent account of philosophy, theory and methodology are the prerequisites for trustworthiness (Brinkmann & Kvale, 2015; Malterud, 2016). The research

processes of this dissertation and its papers follow such pragmatic strategies, and the subsequent sections emphasize thorough descriptions of choices and approaches that clarify the consistency of all integrated processes.

In accordance with the research questions within this doctoral project, the research processes rely on two philosophical pillars rooted in the interpretative paradigm: *hermeneutics* – interpretation of the meaning of text, discourse and actions in which parts are related to the contextualized whole, and *phenomenology* – interpretations of subjective perceptions of the world that depend on lived experience, values and meaning (Brinkmann & Kvale, 2015; Malterud, 2016). However, the methodology of this doctoral project does not rely on pure phenomenological and hermeneutical research traditions but a pragmatic approach in which findings are interpreted through the enactive theories of embodied cognition. The enactive approach and its relevance is supported in chapter *5 Theoretical approach,* and is coherently related to both the clinical field of physiotherapy and the phenomenological and hermeneutical philosophies of the interpretative paradigm.

6.2 Context of the study

The empirical data of this dissertation were collected consecutively with a randomized controlled trial (RCT) investigating the effect of the GroupCoreDIST intervention (Normann, Zanaboni, et al., 2016). The intervention group in the RCT consisted of 40 patients with MS divided into 13 groups. Six PTs individually examined the patients prior to a group exercise period. In my doctoral project, I observed 12 of the examinations and 13 of the exercise sessions and subsequently conducted interviews with the PTs. Figure 3 gives an overview of the connection between the RCT and my qualitative project.

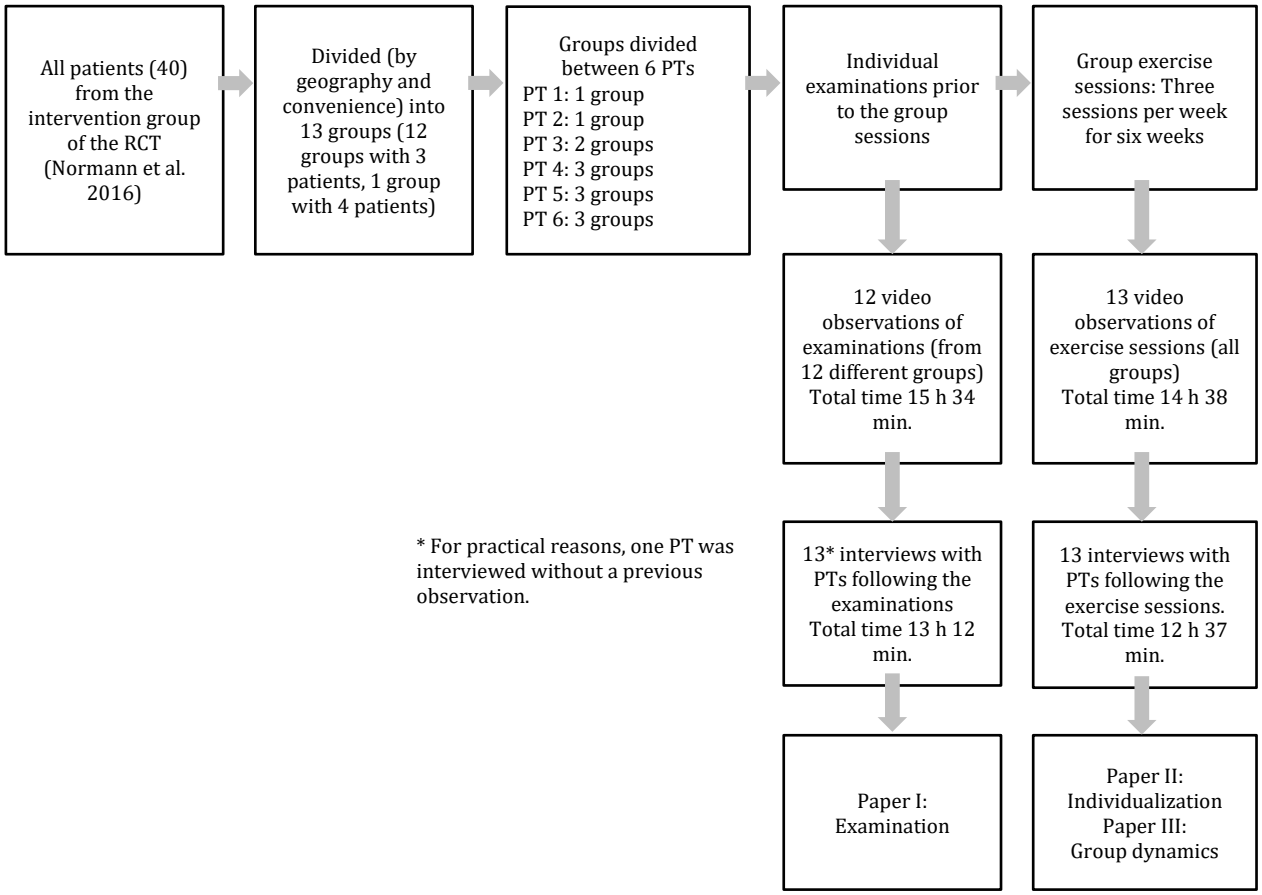

Figure 3 Context and overview of the project

6.2.1 GroupCoreDIST intervention

GroupCoreDIST is a physiotherapy intervention developed for persons with MS ranging from 1 to 6.5 on the Expanded Disability Status Scale[6] (EDSS). This EDSS range encompasses patients with minimal symptoms to those who require constant bilateral use of crutches to walk approximately 20 meters without resting (Kurtzke, 1983). The intervention aims to improve balance and postural control and consists of 33 predefined exercises targeting the activation of postural muscles, the coordination of proximal stability and distal movement, and somatosensory stimulation of the hands and feet. The patients perform the exercises in bare feet and in various postural sets: supine, prone and side-lying, sitting and standing. One

[6] EDSS – a widely used measure in clinical trials and assessments of persons with MS to quantify disability and monitor changes in disability over time (Kurtzke, 1983).

example is the exercise “squats”, in which the patient performs squats in optimal alignment with a large exercise ball between his/her back and a wall (Normann, Zanaboni, et al., 2016). The PTs who lead the exercise groups are provided with a booklet with pictures and specific instructions for all exercises.

GroupCoreDIST is carried out over a period of six weeks, with three PT-led 60-minute sessions at a physiotherapy facility and two 30-minute home sessions per week. The groups consist of three patients each and are led by PTs with expertise in neurological physiotherapy who have attended a five-day practical and theoretical GroupCoreDIST seminar.

Individualization is a core principle of the intervention and implies that the PTs leading the groups are encouraged to adapt the intervention to each patient’s specific needs and desires (Normann, Zanaboni, et al., 2016). To strengthen the opportunities for individualization, the PT who leads the group examines all patients individually prior to start of the intervention. This examination emphasizes analyses of movement strategies and underlying impairments. Additionally, each exercise has five levels of difficulty, which enables the PTs to tailor the exercises to the patients’ functional abilities. To create a positive group atmosphere *and* ensure individualization in the group sessions, patients perform the same exercise simultaneously but at different levels of difficulty according to their impairments.

The group sessions consist of an introduction (5-10 minutes), a main part (45-50 minutes) and a closing part (5-10 minutes). The introduction starts with experience-sharing by the patients – how they think the intervention is going and their experiences with the home exercises. This is followed by a standing exercise in which the patients sense and challenge their balance boundaries by standing on one leg, squatting and closing their eyes, etc. This “balance exploration” exercise is conducted at the beginning and the end of every exercise session, and the patients are encouraged to evaluate, for themselves or in plenary, whether and how their balance is changing. The main part consists of performing the exercises. The PT helps the patients through adaptations based variation, use and positioning of equipment (plinths, balls, bolsters, towels, elastic bands, step boxes), instructions, motivation and hands-on facilitation. The exercises are performed in sets of three and approximately ten repetitions in which optimal alignment and movement quality are emphasized. In the closing part of the session, the “balance exploration” is repeated, followed by a relaxation sequence. The patients are

encouraged to share their experiences and provide the PT with feedback regarding the session. Based on a mutual evaluation of the last session, the PT gives the patients exercises for the home sessions.

6.3 Design

Based on the overall and the three specific research questions in this doctoral project, my supervisors and I chose a design that combined video observations and interviews to investigate the content of examinations and group sessions in the GroupCoreDIST intervention. The observations were complemented by interviews with the PTs to explore professional reflections and considerations regarding the observed encounters.

The project had a design in which the same PTs and patients were followed throughout the six-week intervention. The PTs led several exercise groups over a period of seven months. The observations included the first meeting (examination) with one patient from 12 of the groups, and one observation of all 13 groups (exercise sessions) spread throughout the six-week period. Most of the PTs were interviewed immediately after an observation. We made these design choices to obtain insights into the nature of examinations prior to a group-based intervention, to explore how the examinations affected the forthcoming group sessions, and gain rich and broad data material that represented the content and the PTs' considerations regarding the exercise sessions at various time points in the intervention period.

6.4 Participants and recruitment

The MS nurse at Nordland Hospital Trust, Bodø, Norway (NLSH) sent invitations and consent forms to patients in six municipalities in Nordland (a county in Norway), and the project leader (Britt Normann) invited PTs to participate through the physiotherapy leader in their respective municipalities. Participants who met the inclusion criteria signed informed consent forms (appendix 1 and 2) and were included in the RCT and the qualitative study. None refused to participate or dropped out of the qualitative study.

The qualitative study and the RCT had the same inclusion and exclusion criteria. The inclusion criteria for the patients were the following: a definite diagnosis of MS according to McDonald's criteria (Polman et al., 2011), registered at the outpatient clinic at NLSH, living in one of six selected municipalities (population 1 000 – 50 000), age 18 years or older,

capable of providing signed written informed consent, and an EDSS score 1.0-6.5. The exclusion criteria for the patients were pregnancy at enrollment, exacerbation in the two weeks prior to enrollment, and other acute conditions affecting balance and walking. The PTs who conducted and led the intervention had expertise in neurological physiotherapy (education and/or courses in neurological physiotherapy and working with patients with neurological conditions on a daily basis) and worked in one of the six selected municipalities. Table 1 presents the participant characteristics.

Table 1 Participant characteristics

Patients	**Paper I (n=12)**	**Papers II and III (n=40)**
Age at intervention, mean (SD) range	55.3 (14.6) 24-77	52.2 (13) 24-77
Sex		
Female, n (%)	7 (58)	27 (67.5)
Male, n (%)	5 (42)	13 (32.5)
Type of MS		
RRMS, n (%)	9 (75)	33 (82.5)
SPMS, n (%)	2 (17)	5 (12.5)
PPMS, n (%)	1 (8)	2 (5)
Years of MS, mean (SD) range	10.8 (7.9) 1-27	10,2 (7.9) 0.5-33.0
EDSS, mean (SD) range	3.1 (1.9) 1.0-6.0	2,5 (1.7) 1.0-6.5

Physiotherapists	**(n=6). Same in papers I, II and III**
Sex	
Male	1
Female	5
Years since graduation	
0 – 5	0
6 – 10	2
> 10	4
Postgraduate courses	6
Clinical neurological master's degree	2
Years experience with neurological conditions	
0 – 5	1
6 – 10	1
> 10	4
Experience with group interventions	6
Workplace	
Primary health care with operating grant	3
Primary health care	3

Patients (n=40) and PTs (n=6) from all 13 groups in the RCT were represented in the qualitative study to provide a rich data material. In paper I, data were obtained from 12 examinations, and in papers II and III, data were obtained from one exercise session for each of the 13 groups. The data collection was conducted at various timepoints during the six-week intervention period. These purposive selections, as recommended in the qualitative research

literature (Brinkmann & Kvale, 2015; Malterud, 2001; Polit & Beck, 2017), provided first-hand information relevant to the respective research questions and represented the intervention exhaustively through a variety of participants and timepoints.

6.5 Data collection

I conducted the data collection from September 2015 to March 2016. The observations and interviews followed established theme-based guides (appendix 3, 4, 5 and 6). My supervisors and I developed the guides through discussions based on the preliminary research questions, a review of the literature, the enactive approach, and considerations of our own preconceptions, professional experience and backgrounds – which all are vital principles for planning qualitative research (Brinkmann & Kvale, 2015). Prior to the data collection, I performed a pilot interview with a PT who was familiar with the GroupCoreDIST intervention. Discussions of experiences gained from the pilot interview resulted in slight changes in the structure and type of questions included in the interview guide, and increased our awareness of the interview technique, such as question formulation and the use of follow-up questions. I did not pilot test the observations. Table 2 presents an overview of the three papers' data material.

Table 2 Data material of the papers

	Main topic	**Data material**
Paper I	Individual examination prior to the group sessions	Video recorded observation of 12 examinations (total time 15 hours 34 minutes) and 13 interviews with PTs regarding the examination (13 hours, 12 minutes).
Paper II	Individualization within the group sessions	Video recorded observation of 13 group sessions (total time 14 hours 38 minutes) and 13 interviews (total time 12 hours 37 minutes).
Paper III	Group dynamics within the group sessions	Video recorded observation of 13 group sessions (total time 14 hours 38 minutes) and 13 interviews (total time 12 hours 37 minutes).

6.5.1 Video observations

The observations of examinations and group sessions were conducted at the PTs' ordinary workplace. For practical reasons, one of the planned examination observations was cancelled, and two examination observations and one group session observation were recorded using a fixed tripod without the researcher present. Room size varied from approximately 10 m² to large gymnasiums >60 m² for the examinations, and from rooms of approximately 20 m² to

large gymnasiums >60 m² for the group sessions. All PTs had access to plinths, exercise mats, towels, pillows, steps, boxes, cases, elastic bands, fitness balls and spike balls. The examination observations had a mean duration of 78 minutes and ranged from 49 minutes to 123 minutes, and the exercise session observations had a mean duration of 68 minutes and ranged from 47 minutes to 95 minutes.

To capture the clinical encounter in the most natural way *and* be able to move around in the room, I remained in the room with a hand-held video camera[7] with zoom. This strategy enabled me to capture group processes, interactions between participants, and specific details regarding handling and changes in the patients' movement performance. I strived to not be in the way or disturb the examinations and exercise sessions. As emphasized by Heath, Hindmarsh, and Luff (2010), I preserved the PTs' and the patients' comfort and well-being in the situation by presenting information regarding my presence in an informal way (elaborated in chapter *6.7.7 Ethics*).

The PTs and patients appeared comfortable and "occupied with their own businesses" throughout the observations, and in the subsequent debriefing most of the patients and PTs stated that it felt slightly odd to be video recorded to begin with but that they forgot about me and the camera after a few minutes. Nevertheless, as stated by Heath et al. (2010), the presence of me as a researcher and of the camera probably affected the participants. For example, one of the PTs stated that she felt she had to organize the room in a way that was optimally suited for video recordings.

6.5.2 Interviews with PTs

The interviews were audio-recorded and conducted in rooms with no disturbances in the PTs' workplace. The intention and plan was to conduct all interviews immediately after the observations to enable discussions and considerations regarding details from the observed examinations and exercise sessions. Ten of the interviews regarding the examinations were conducted immediately after the observations, while two interviews (regarding the observations that were video recorded using a tripod) were conducted one and seven days

[7] Canon Legria HFG30, x20 optical zoom

later. One PT was interviewed regarding an examination without a previous video observation (in the case of the examination observation that was cancelled). Eleven interviews regarding the group sessions were conducted immediately after the observations. One interview was conducted the day after the observation by phone, and the interview regarding the group session that was video recorded using a tripod was conducted by phone ten days later. The examination interviews had a mean duration of 61 minutes, and ranged from 47 minutes to 68 minutes, and the exercise session interviews had a mean duration of 58 minutes and ranged from 29 minutes to 72 minutes.

The in-depth conversational style interviews were theme-based and semistructured with open-ended questions. According to Brinkmann and Kvale (2015) such strategies aim to let the subject speak and describe their experiences and considerations freely but still provide the interviewer with the possibility of guiding the interview in the direction of the research question. As an introduction during the interviews, I informed the PTs about the aim of the study and the interview and told them that I was interested in discussing both positive experiences and challenges regarding the examinations and the group sessions. The main themes in the examination interviews were history taking and physical examinations, reflections regarding the patients' disabilities, and plans for the forthcoming intervention. In the interviews regarding the group sessions the main themes were individualization, group dynamics, challenges, exercises, and improvements and progress. Additionally, I brought up specific events from the observations in the interviews to obtain expanded insights into reflections regarding actions and interactions from the examinations and the group sessions.

My supervisors and I listened to and read the transcripts from several interviews during the data collection period and discussed strategies and approaches with the aim of improving my competency as an interviewer. As suggested by Brinkmann and Kvale (2015), we specifically focused on being brief and simple, bringing up concrete examples, accepting and acknowledging silence and providing appropriate follow-up and probing questions. As I have the same profession as the interviewees, it was particularly important to avoid making them feel cross-examined and instead enabling them to verbalize their thoughts and considerations regarding both positive and negative sides of the intervention and their strategic performances.

6.5.3 Combination of observations and interviews

Physiotherapy encounters consist of multimodal and complex interactions. Heath et al. (2010) state that details of complex interactions are challenging to capture in any other way than video observations. I gave priority to the observations in the analyses of the data material as interactions between PTs and patients and their influence on the clinical encounter were emphasized in the research questions. To broaden the insights into the clinical encounters, the data material were complemented by interviews to encourage the PTs reflections regarding their strategies and considerations of the intervention's organization. Combining two different data collection methods broadens insights into phenomena as observations provide direct documentation of actions and interactions (Heath et al., 2010) and interviews provide descriptions of the subjects' experiences of events (Brinkmann & Kvale, 2015). As such, documentation of latent content in the observed clinical encounters was complemented by the PTs' reflections and considerations regarding professional practice.

6.6 Analysis

The initial analyses of the data material started with the data collection, and the analyses of each paper overlapped (Figure 4). All video-recorded observations and audio-recorded interviews were imported, transcribed, organized and analyzed using NVivo 11 software (QSR International, 2016). I transcribed the interviews verbatim, while the video recordings were analyzed directly (this choice is elaborated in chapter *6.7.2 Processing)*. Each interview was closely related to the content of the observation, and the interview and observation were analyzed together. All three papers followed Malterud's (2012) *systematic text condensation* analysis method.

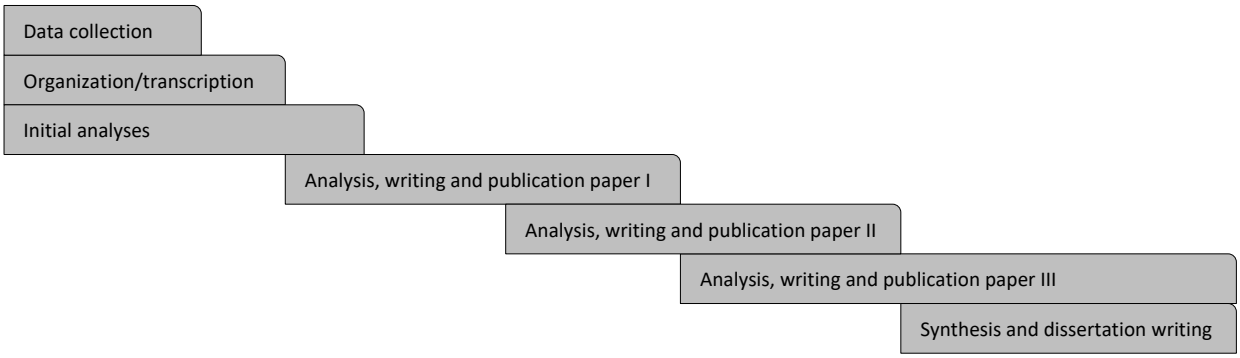

Figure 4 Collection, organization and analyses of data

6.6.1 Systematic text condensation

Systematic text condensation is a thematic cross-case strategy for analyzing qualitative data that emphasizes utility, feasibility and transparency. The method is pragmatic, is designed for different types of qualitative data and is not restricted to specific theoretical perspectives. The influences of theory, situated knowledge and intersubjective research processes are acknowledged and encouraged. The method consists of four analysis steps in which continuous iterative decontextualization and recontextualisation among the parts and the whole is emphasized (Malterud, 2012). The steps are summarized in their general form in the gray text box and are elaborated in the forthcoming sections in which I account for the specific procedures of the three paper's analysis processes. All three analysis processes followed the same procedures, but were conducted at different times and had separate "projects" (working files) in NVivo (Table 2).

Step 1, Total impression: Read through the data material with an open mind to acquire an overall view of the whole. Preconceptions and the theoretical framework are "bracketed", but research questions are not. This process results in approximately four to eight *preliminary themes*.

Step 2, Identification and sorting of meaning units: Organize fragments of the data (*meaning units*) that are relevant for the research question. Only parts of the whole text are meaning units. Each meaning unit is coded; meaning units with the same code constitute a *code group*. Code groups can be split into *subgroups*. The names of the subgroups are determined from the preliminary themes. Flexibility is emphasized, and adjustments are encouraged. Software can be used to improve systematization. Preconceptions, professional positioning and theoretical frameworks are considered in relation to the coding. This step results in three to six code groups.

Step 3, Condensation: In this step, the content of each subgroup is abstracted, a *condensate* (a short, artificial summary) is written for each subgroup. In this step, the condensates are decontextualized from the whole. The text is written in a first-person format to remind the researcher that each participant is represented in the text. The condensate is a basis for the results presentation, which is created in the fourth and final step.

Step 4, Synthesis: In this step, the decontextualized condensates are recontextualized – the pieces are placed back together to form a whole. The condensates are transformed *to analytic texts*, which serve as the result presentation in a paper or report. This step of the analysis considers existing and relevant empirical findings and theory, which are further elaborated in the discussion section. At this stage, the text is re-narrated in a third-person format. The analytic text is compared to the material for validation. A few examples from the data material (observed situations or interview quotes, etc.) that illustrate the analytic text are also presented. Lastly, each analytic text is assigned to a category that represents the main findings, and serve as sub-headings in the result presentation.

Step 1, Total impression: To obtain an initial overview of the material, I watched all the video recordings and read all the interview transcripts several times. My main supervisor, Britt Normann, watched and read considerable portions of the material, and I presented particularly relevant excerpts to my cosupervisor, Gunn Kristin Øberg. Although we kept an open mind to the material, the research question guided us to focus on an overall picture of the actions, interactions and strategies in the clinical encounter and the PTs' considerations of their

professional choices. We discussed possible preliminary themes over several rounds and meetings. These preliminary themes were given names in NVivo 11 (but were not yet connected to specific content) and served as a foundation for the proceeding steps of the analysis process.

Step 2, Identification and sorting of meaning units: In the second decontextualizing step of the analysis, I marked relevant sections of the transcribed text and the video recordings as meaning units. I identified several salient elements from the video observations and sought out where in the interviews these elements were discussed. As such, the leading role of the observations and the PTs' considerations of their strategies were pursued in the analysis process. This strategy illustrates how I started the analysis as early as during the data collection process, when I selected situations from the examinations and exercise sessions that I was interested in discussing further in the interviews with the PTs. In NVivo 11, meaning units can be marked by highlighting the transcribed text of interviews, and videos can be highlighted by marking out specific time sections. We found this strategy superior to transcribing the video and subsequently marking out "video text" as working with the actual video in the analysis gave detailed, real-life impressions. At this stage of the analysis, the research question, the enactive theoretical approach and my preconceptions as a neurological physiotherapist guided my considerations. The enactive theoretical approach (De Jaegher & Di Paolo, 2007; Di Paolo et al., 2010; Fuchs & De Jaegher, 2009) guided me toward analyses in which embodied aspects of communication and interaction were prominent. Based on the preliminary findings, I coded the meaning units and organized the codes into groups and subgroups. I endeavored to avoid deduction by not "placing" meaning units into predefined codes but being open-minded and naming each meaning unit and then sorting them into groups. I had several meetings with my supervisors at this stage in which I presented meaning units with corresponding codes and code groups. We discussed and changed the names and organization of the meaning units in an iterative process. The first paper resulted in three main code groups (categories) with two subgroups each, and the second and third papers resulted in two main code groups (categories) with two subgroups each.

Step 3, Condensation: In the third step, I wrote a condensate, an artificial first-person summary based on the meaning units, for each subgroup. The condensates were written as

"notes" in NVivo and connected to their respective codes. At this stage, the meaning units from the video recordings were transformed into detailed text descriptions. I logically sequenced the order in the condensates, which gave the condensate a natural "story telling" form and not just an unstructured litany of meaning units. After discussions with my supervisors and flexible changes of the condensates, they appeared as a summary of the participants' actions, interactions and considerations.

Step 4, Synthesis: In the last step of the analysis, the main goal was to recontextualize the condensates and form analytic texts that were suited for the results presentations in the papers. I wrote analytic texts in a third-person format, based on the condensates from step 3. I endeavored to make the texts presentable and easy to understand. In this step, my supervisors and I compared the analytic texts with the transcripts and the videos to validate their original representation. This recontextualisation ensured that the text disseminated common synthesized features of the data material and not just isolated stories. I selected specific excerpts from the video material and the interviews and presented them in the papers as illustrative quotations and situations. The names of the code groups and subgroups were discussed again, transferred to final categories, and served as subheadings in the result presentations of the papers.

6.7 Methodological considerations

Trustworthiness and the integrity of qualitative research rely on systematic and thorough accounts of the entire research process and consistency among epistemology, methodology and methods (Carter & Little, 2007). However, there is lack of consensus in the research field regarding what terms to use and procedures to follow when considering the methodology and methods of a study (Polit & Beck, 2017). The use of standardized checklists, such as Consolidated Criteria for Reporting Qualitative Research (Tong, Sainsbury, & Craig, 2007) and Standards for Reporting Qualitative Research (O'Brien, Harris, Beckman, Reed, & Cook, 2014) is often required when submitting papers to peer-reviewed journals, and checklist-based reports are included in the three papers of this dissertation. However, such checklists are criticized for being too narrow and lacking consistency with broader views of qualitative research processes (Barbour, 2001; Stige, Malterud, & Midtgarden, 2009). Stige et al. (2009) suggest an *evaluation agenda, EPICURE,* which I have chosen to use in evaluating the

research process of my doctoral project, in which pluralism concerning ontology, epistemology and methodology is permitted. EPICURE avoids the narrowness of rule-based checklists and overcomes the challenge related to other criteria's tendencies to connect with certain research traditions or methodologies.

The EPICURE acronym includes two dimensions: EPIC (*engagement, processing, interpretation* and *self-critique*), which concerns the use of rich and substantive accounts in the research process, and CURE (*social critique, usefulness, relevance* and *ethics*), which concerns the preconditions and consequences of the study and its findings (Stige et al., 2009). The following sections provide discussions of each of these items.

6.7.1 Engagement

The evaluation of engagement discusses how the researcher's personal involvement, experiences and subjectivity affect the research process (Stige et al., 2009). My background as a clinical PT with experience working with neurologic disorders in the municipality and in specialist health care services has naturally affected this doctoral project's research questions, methodology and interpretations of the empirical material. My scarce experience with group-based physiotherapy, together with the lack of emphasis on the subject in the literature, has aroused an interest in how clinical practice in such settings emerges. Additionally, a theoretical interest in embodied approaches has influenced the focus on bodily interactions and communication when interpreting the empirical material. This theoretical interest is shared with my two supervisors, Britt Normann and Gunn Kristin Øberg, who both have published several theoretical and empirical papers in which embodied theories contribute to extended interpretations of clinical meetings in physiotherapy.

My main supervisor, Britt Normann, is a clinical physiotherapist with experience in the field of neurological practice and is an experienced researcher in the field. She is also the main contributor to the development of the intervention (GroupCoreDIST) of this doctoral project. As Normann has actively contributed to the research process and the analyses of the empirical material in all three papers of this dissertation, it has been important to review the material with an open mind and endeavor to critically evaluate how the frameworks of the intervention affect the clinical encounters. The results sections and discussions of the papers and this dissertation demonstrate that both negative and positive aspects of the execution and the

characteristics of the intervention were thoroughly considered. The analyses from the enactive theoretical perspective have also contributed to providing distance from preconceptions. However, one may assume that a certain feeling of ownership of the intervention influenced the analyses of the material.

Gunn Kristin Øberg, my cosupervisor, is a pediatric clinical physiotherapist and experienced researcher. Her experience in pediatrics has been valuable for questioning preconceptions and presumptions regarding physiotherapy for adults with neurological conditions.

6.7.2 Processing

Processing is the act of systematic production, management, analysis and presentation of empirical data material (Stige et al., 2009). Because this dissertation is based on great amounts of qualitative data (approximately 56 hours of video observation and interviews in total), it was vital to systematically collect, organize and structure the data as a prerequisite to responsible analyses.

As emphasized in the data collection section, I conducted observations and interviews at several timepoints during the exercise period to produce data material that represented as many aspects of the intervention as possible. It was important to gain knowledge regarding the unspoken reflections in the clinical meeting during the interviews with the PTs, which extended the insights provided by the observations. Each observation had a corresponding interview in which specific events from the observations were discussed, which required an easy-to-follow and structured system for storing the audio and video files. NVivo 11 (QSR International, 2016), a computer software program for organizing, transcribing, coding and analyzing qualitative data, was an irreplaceable tool in these processes.

My supervisors and I found it very valuable to interview the PTs immediately after the observations to discuss specific details and considerations regarding events from the recently conducted examinations and exercise sessions. This matter became particularly evident when the interviews were postponed for practical reasons. In such cases, it was difficult for the PT to remember events from the observation, which resulted in more general and hesitant discussions.

Saturation, commonly defined as a state achieved when adding more data does not affect the analysis, is an inconsistent term and a debated concept in the research literature (Green & Thorogood, 2018). Thus, and as suggested by Malterud, Siersma, and Guassora (2015), we considered our sample size in relation to our research questions, the specificity of our sample, our theoretical approach, the quality of our data and our analysis strategy. We found that the most important element in deciding how many observations and interviews to conduct was the method we used to collect material representing the variety of the six PTs and 40 patients. Although the research questions were specific and the participants were quite similar, we considered that the complexity of the group settings probably would affect the actions, interactions and course of the group encounters. Therefore, we decided to collect data from one examination and one group session for all 13 groups. This choice gave us rich material in which the variety and similarities were well represented while maintaining a manageable volume of data for analysis. We strived to optimize the quality of the data by reviewing the data throughout the research process. Through discussions with my experienced supervisors, we changed and adapted the observation and interview strategies and found that my data collection skills (particularly interviewing) improved during the research period.

I remained in the room with a hand-held video camera when I conducted the observations. I moved around in the room and used the zoom actively to get the best possible camera angles and capture both details and the overall picture, carefully striving to not be in the way or interrupt the participants. I did not actively participate in the clinical setting, but I acknowledge that my presence affected the PT and the patients. This is in accordance with the enactive views of interactional systems (De Jaegher & Di Paolo, 2007), in which my presence as a researcher probably affected the system even if I did not actively participate in the PTs' and patients' conversations and actions. I presume that both the PTs and the patients had a desire to appear in the best way possible (even if that desire was unconscious), which may have affected their natural actions and interactions.

The analyses of the empirical material in all three papers of this dissertation followed Malterud's (2012) systematic text condensation. Such a thematic cross-case strategy yields structured and systematic procedures in which each step of the analysis process is presented to the reader. I conducted the coding and analyses using the NVivo software, which gave a transparent and systematic overview of the great amount of data (in line with Welsh (2002)). The transcribed texts were the analytic units of the interviews, while the videos themselves were the analytic units of the observations. Interviews and videos shared working files and codes in NVivo. Although Heath et al. (2010) recommend techniques for transcribing selected sequences of video material, we considered it more useful to code the actual video images directly in the NVivo software because we found that meaning and details were lost when we attempted to transcribe the videos. Video sequences of varying length were coded, which provided an easy-to-follow overview of all the codes in the observations (Figure 5).

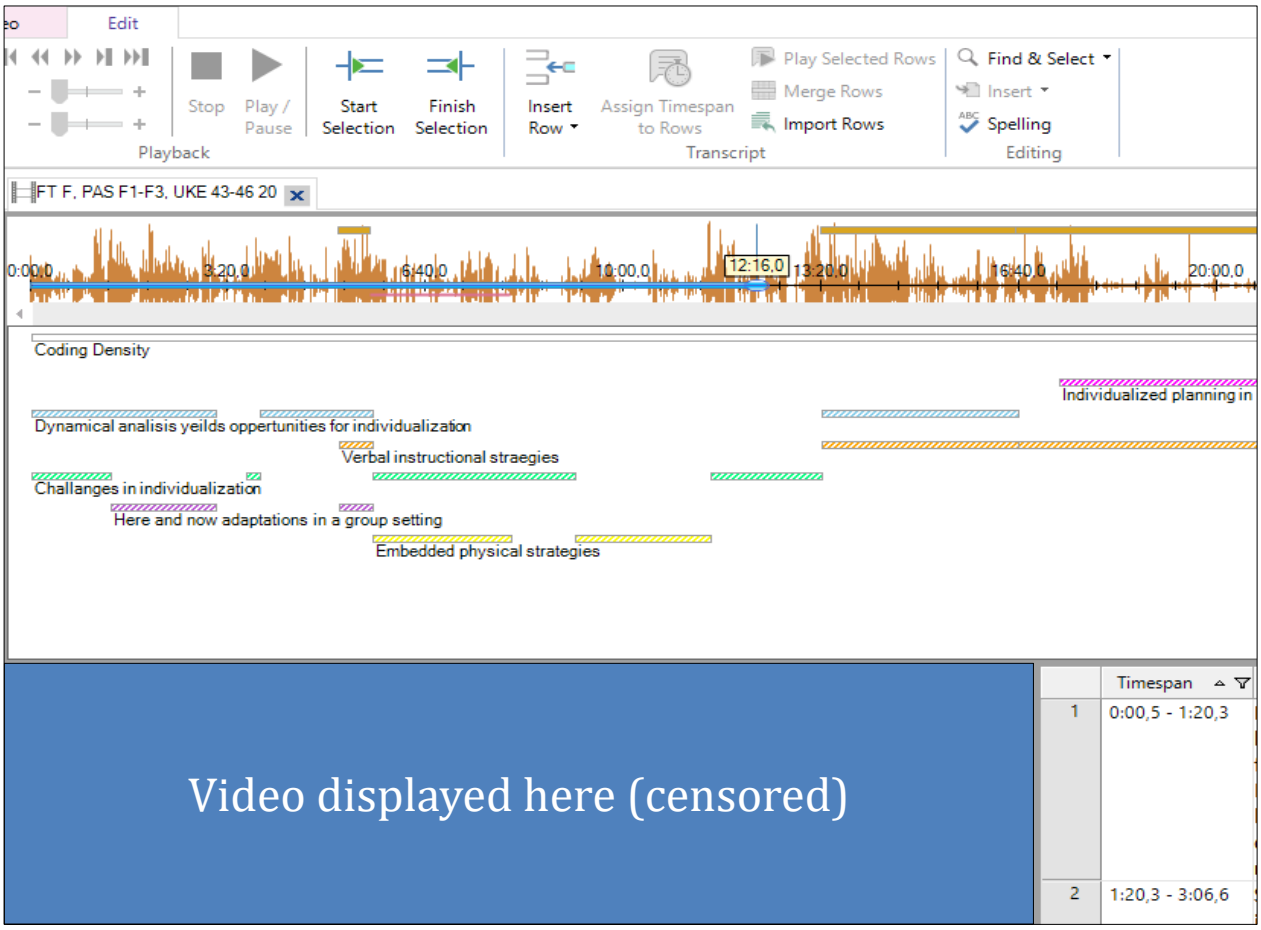

Figure 5 Screenshoot from NVivo 11

6.7.3 Interpretation

Thorough accounts of how researchers created meaning, e.g., how they interpreted the descriptions and experiences provided by the empirical data, are important elements in evaluating qualitative research (Stige et al., 2009). This item does not consider the stages of analysis in themselves but concentrates on the researchers' sense-making.

The hermeneutical principle of the context's influence was evident during the exploration of the empirical data of this dissertation, as our interpretations were affected by the clinical setting, our research questions and our theoretical approach. Thus, the research processes were not entirely inductive but followed a process in which explanations emerged from iterative fluctuations between empirical data and our theoretical perspectives and preconceptions. However, in the initial stages of the analysis process, we strived to look at the data with an open mind to establish openness to various perspectives. As we became aware of the significance of the characteristics of the interactions between the PTs and the patients who illuminated our research questions, we increasingly utilized the enactive approach in our search for theoretical underpinnings of how bodily interactions affected thought processes and sense-making. Throughout the analysis process, we actively used the theoretical perspective and the contextualized understanding of professional practice to investigate both strengths and weaknesses in the clinical encounters. In this way, we sought to provide a balanced interpretation when investigating this dissertation's research questions.

6.7.4 Critique

Researchers' abilities to consider of the strengths and weaknesses of their studies throughout the process and in retrospect are important elements of evaluating research (Stige et al., 2009). The critique item has two parts: self-critique, which concerns the researcher as instrument, and social critique, which involves evaluations of the research's influence in broader social and political contexts.

The researcher as an instrument and how his or her background and position affect the research process, *reflexivity* (Brinkmann & Kvale, 2015; Malterud, 2001), is a fundamental principle in qualitative research. My role as an interviewer is a particularly important issue as my clinical background affected the data development. Transparency is provided through the attached interview guide, but my preconceptions and theoretical interests probably affected

how the questions were asked and how answers were followed up. Other researchers may have emphasized other issues in the interviews and in the research process in general. Although I strived to make the interviewed PTs feel as comfortable as possible in the interview setting, I assume that some of them felt put on the spot and naturally tried to give the best possible impression of the intervention and their performances. However, most of the PTs also described their own considerations of the less-than-optimal aspects of their encounters in terms of both clinical strategies and intervention frameworks.

My background as a clinical PT may also be considered a strength as my understanding of the clinical field and the patients' movement problems may have facilitated the PTs' elaborations of their own clinical considerations. My clinical insights were beneficial during the data collection as insights and ideas for the interviews developed during the observations. As such, the content of the interviews would probably have been entirely different if the clinical encounter had been video recorded without my presence as a researcher.

6.7.5 Usefulness

The evaluation of usefulness concerns the study's value in relation to practical situations (Stige et al., 2009), e.g., whether the study is useful for patients, PTs and policy makers. As this doctoral project explores factors affecting opportunities and challenges in group-based and individualized encounters, PTs who read the papers or the dissertation can embrace relevant insights and consider whether findings from the project are suited for trial or implementation in their own clinical practice. As such, the project is also indirectly useful for patients as the findings may contribute to improve quality of physiotherapy services. Policy makers, e.g., those who plan the organization and content of physiotherapy services in municipalities, can include findings from this project in their decision-making processes. However, for the findings from this project to reach patients, clinicians and policy makers, strategic dissemination through clinical courses and education programs is needed. This is a general critique of traditional publication channels in medical research, in which large amounts of knowledge remain unknown to clinicians and the public.

As this doctoral project involves investigations of an intervention that can be implemented in an everyday clinical setting, new insights and knowledge may contribute to developing interpretations and opinions on how physiotherapy is delivered. This project investigates an

intervention that combines group organization and individualization, which opposes the general view of group-based and one-on-one interventions as mutually exclusive (Everett, 2010; Jones & Kulnik, 2018; Mason, 2013). As such, new knowledge from this project may contribute to the re-evaluation of present practices in group-based interventions and may be transferred to patient groups other than persons with MS.

6.7.6 Relevance

Relevance concerns how studies contribute to the development of the related discipline, e.g., how the studies fit within relevant literature and how they bring forth new pertinent knowledge (Stige et al., 2009). Elements of the findings of this dissertation can be recognized in other relevant literature regarding one-on-one clinical settings. However, the group context and the new knowledge regarding how the benefits of individualization can be combined with the benefits of being part of a group is novel and contributes to a new way of understanding interventions that involve more than one patient. The enactive theoretical approach contributes to this interpretative opportunity and develops the way we understand the bodily aspects of communication and sense-making in clinical meetings, which has rarely been emphasized in clinical research.

The intervention investigated in this doctoral project was conducted in Norway, which has one of the best health care systems and economies in the world (Schütte, Acevedo, & Flahault, 2018). The findings and interpretations must be considered in relation to its context, and I acknowledge that other countries and cultures may have other resources and priorities that affect the relevance of the findings. However, I believe that the significance of bodily perceptions as a source of sense-making, experience-sharing and support among members of a group may be transferable to other contexts and cultures, which increases the relevance of this project.

6.7.7 Ethics

Finally, study ethics is an important issue to address in all types of research (Stige et al., 2009). This doctoral project was approved by the Regional Committee for Medical and Health Research Ethics in Norway (REK South-East: 2014/1715-7) (appendix 7) and its conduct was consistent with the Helsinki Declaration (World Medical Association, 2013). All PTs and patients gave informed written consent and had ongoing opportunities to ask me (as

an observer and interviewer) about possible concerns. Additionally, I informed the participants about the study prior to each observation and held debriefs after each session. I emphasized the PTs' and patients' anonymity and the confidentiality of the video recordings, assuring that no one but my supervisors and I had access to the videos. None of the patients or PTs reported any negative experiences of participating in the project. All video and audio recordings were stored securely in a locked cabinet in a locked office on a password-protected external hard drive. I anonymized all transcripts, and no identifiable information is published in the papers.

Because only six PTs participated in the study, their expertise was defined and they were limited to a specific geographical area, it may be possible for other PTs in the north of Norway to determine their identities. Consequently, it was particularly important to represent the PTs in a respectful way in the published papers and in this dissertation. At several points, we illustrated how challenging situations and inexpedient clinical strategies reduced the optimization of the clinical encounter. However, these incidents did not arise from individual PT but were the result of the group composition, clinical situation and other contextual elements. We have made an effort to underscore these matters in the published papers to ensure the PTs' anonymity and limit their personal exposure to criticism.

During the interviews with the PTs, I focused on reflections and considerations regarding strategies and specific situations that had occurred within the observed examination or group session. I endeavored to not expose the PTs or make them feel inadequate when discussing challenging clinical situations. It was probably inevitable that some displeasure with their own performance would be raised in these discussions, but most of the PTs enthusiastically discussed how and why both positive and negative situations turned out the way they did. It was particularly the challenging situations that elucidated significant aspects of the data material and therefore were vital for developing new knowledge.

7 RESULTS

7.1 Paper I – Examination

Physiotherapy assessment of individuals with multiple sclerosis prior to a group intervention – A qualitative observational and interview study

7.1.1 Aim:

In the first paper, we focused on the mandatory individual examination prior to the group-based exercise sessions. The research questions were as follows:

> (1) What is the nature of the individual assessment of persons with MS prior to a group intervention, and (2) what are the PTs' reflections regarding conducting such assessments?

7.1.2 Methods

The first paper was based on 12 qualitative video observations of individual examinations conducted prior to GroupCoreDIST sessions, followed by in-depth interviews of the PTs. The data material were analyzed using systematic text condensation (Malterud, 2012), and findings were interpreted through the enactive concept of participatory sense-making (De Jaegher & Di Paolo, 2007; Fuchs & De Jaegher, 2009).

7.1.3 Results

The PTs used the individual examination as an arena for increasing the patients' expectations of the subsequent exercise period by linking principles of the intervention to the patients' individual problems. Some PTs presented these principles through verbal explanations, while others complemented their explanations with hands-on approaches and facilitation to provide patients with bodily experiences of improved function. Compared to the verbal explanation approach alone, the intertwined bodily approach appeared to increase the patients' engagement and their expectations of the forthcoming intervention. However, addressing bodily changes through verbal communication appeared to strengthen the patients' awareness of bodily perceptions. The PTs increased their insights into the patients' movement problems through specific movement analyses and explorations of how exercises affected movement

strategies, which in turn served as a basis for planning the subsequent group sessions and adapting exercises to the specific patient. These processes were complex, and some of the PTs found it challenging to link information from the examination to movement problems and options for adapting exercises.

7.1.4 Discussion and implications

The findings from paper I underpin the connections between bodily perceptions and sense-making and indicate that hands-on approaches and facilitation are vital elements of physiotherapy examination prior to group-based interventions. Hands-on approaches and facilitations presuppose that the PT has sufficient knowledge and skills and represent a continuous interactional and adapted professional process that does not follow a predetermined path. The patients' embodied and participatory role contributed to increasing the PTs' insights into the patients' movement problems, which accentuates the consequence of the PTs' interactional strategies in clinical encounters. PTs should use examination approaches that increase expectations and provide sufficient insights for planning individually adapted treatments. This is particularly important in examinations prior to group interventions, which offer limited possibilities of continuing the examination during exercise sessions.

Examination key findings

The patients' bodily perceptions of changes appear to be the most powerful source for increasing patient expectations.

The PTs' insights into movement problems increase when patients actively participate in the examination process.

Sufficient insight into the patient's movement problems through advanced movement analysis is required for individual adaptations and specificity in intervention planning.

7.2 Paper II – Individualization

A group-based, individualized physiotherapy intervention for people with multiple sclerosis – A qualitative study

7.2.1 Aim

In the second paper, we focused on individualization within the group-based exercise sessions. The research questions were as follows:

How do professional actions and interactions affect individual adaptations in a group-based intervention for people with MS, and what are the PTs' reflections regarding opportunities and challenges in group settings?

7.2.2 Methods

The empirical material for the second paper was collected through 13 qualitative video observations of the exercise sessions conducted for the RCT, followed by in-depth interviews with the PTs. The data were analyzed using systematic text condensation (Malterud, 2012), and findings were interpreted in light of the enactive concepts of autonomous interactional processes and embodied cognition (Di Paolo et al., 2010).

7.2.3 Results

The PTs combined information from the examination prior to the intervention with ongoing evaluations to adapt the exercises to each patient's needs. Responses to hands-on facilitation and mutual discussions with the patients were efficient strategies for obtaining valuable information for the further development and progression of the exercises. However, these processes were challenging, and some of the PTs found it particularly challenging to individualize the exercises when the patients' functional levels differed greatly. Consequently, they questioned whether this intervention suited all the participating patients. The individual adaptations (choice of exercises, variations and use of equipment) were mostly planned between the exercise sessions throughout the intervention period. In addition, real-time adaptations and instructions within the exercise sessions occurred. The PTs used different interaction strategies depending on whom they approached. Verbal reminders such as "activate your abdominals" and "lengthen your neck" were typically directed towards the entire group, while specific details and hands-on facilitations were necessary to enable individual patients to optimize their performance and perceive a change in movement quality.

7.2.4 Discussion and implications

The findings from paper II indicate that evaluations of bodily responses and the active participation of patients in group-based physiotherapy settings are vital elements of individualization. An emphasis on bodily perceptions of salient movement changes provides patients with a meaningful understanding of functioning. Continuous here-and-now

evaluations through hands-on approaches represent advanced professional performance and reflect the PTs' skills in adapting treatment in accordance with clinical reasoning regarding the patients' movement problems, needs and goals. The challenges of combining an individual and collective focus in the group sessions also point towards how different social system settings require matching interactional strategies. However, our findings imply that this combination is possible and awareness regarding potential hurdles seems vital to preserving the quality of group-based physiotherapy practice.

Individualization key findings

Preplanning and ongoing evaluations of patients' bodily responses throughout the exercise sessions are vital for adjusting and progressing the exercises.

High variance in patients' functional levels presents a challenge for individualization.

A bodily and individualized approach appears to provide patients with perceptions of improved movements and engagement.

The PTs' interactional strategies must be appropriate to their recipient – either the group or the individual patient.

7.3 Paper III – Group dynamics

Group dynamics in a group-based, individualized exercise physiotherapy intervention for people with multiple sclerosis
– A qualitative observational and interview study

7.3.1 Aim

In the third paper, we focused on group dynamics and the atmosphere within the group-based exercise sessions. The research questions were as follows:

> (1) What is the nature of group dynamics within an individualized and group-based intervention for people with MS, and (2) how do the actions and interactions between PTs and patients affect these dynamics?

7.3.2 Methods

The findings emerged from the same data material used for paper II, also using systematic text condensation (Malterud, 2012). The theoretical framework of paper III is the enactive notion of social interaction processes as autonomous systems (De Jaegher & Di Paolo, 2007; Di Paolo et al., 2010; Fuchs & De Jaegher, 2009).

7.3.3 Results

The video observations revealed that the patients became engaged and satisfied when their balance performance improved. Such signs of success at an individual level appeared to positively affect the atmosphere for the entire group. However, ensuring individual success for each patient was demanding, and it was not always achieved, particularly if the patients' functional levels differed greatly. A lack of individual success, e.g., frustration among patients who were unable to perform exercises that were too difficult, negatively affected the group atmosphere. To achieve individual success, the PTs' attention fluctuated among each individual and between individuals and the group as an entity. The PTs stated that although a specific focus on each individual patient was possible in most groups, it was demanding because they had to perform three clinical reasoning processes simultaneously *and* focus on the group as a whole. The PTs' strategic focus on encouraging the patients to share their experiences in introductory and recap "rounds" also had a positive effect on the group atmosphere. Discussions among the patients concerned detailed perceptions of each exercise and a general awareness of their own and others' functional improvements. Together, these strategies made the group a safe and enjoyable place and facilitated individual focus and progression.

7.3.4 Discussion and implications

Our study indicates that embodied perceptions and experience-sharing are powerful tools in physiotherapy, both at an individual level *and* as a prerequisite to achieving a positive group atmosphere. Providing patients with experiences of bodily improvement requires advanced hands-on skills and illustrates the significance of physical interactions as an aspect of successful sense-making processes in clinical encounters. Such sense-making in a group setting is also strengthened and expanded when patients learn from one another's movement experiences. Thus, PTs should aim to achieve success at both the individual and the collective

level in group settings. Our study shows that such fluctuations of attention among each individual and between individuals and the group as a whole are possible, which contradicts the traditional view of individualized and group-based interventions as mutually exclusive.

Group dynamics key findings

Patients' expressions of individual success and bodily improvements appear to affect the group atmosphere positively.

Individual success requires PTs who can handle the challenge of engaging in clinical reasoning processes for three different patients simultaneously.

PTs should encourage patients to share their experiences and be sure to divide their attention between the patients and the group.

7.4 Synthesis of the papers' findings

In this section, an overall synthesis of the papers' findings is presented (Table 3). The congruencies between the 10 key findings from the papers can be grouped into three categories:

- Movement changes
- PTs' insights and skills
- Intervention frameworks

Each category contains two *key factors* derived from the forthcoming discussion. As such, the synthesized findings and the discussions of this dissertation provide answers to the overarching research question: *What factors affect opportunities and challenges for achieving success during clinical encounters in a group-based and individualized physiotherapy intervention for persons with MS?*

Movement changes in terms of new, easier and lighter movements appeared to increase expectations and engagement throughout the intervention at an individual level and at a group level. In contrast, when movement changes and perceptions were absent or negative, expectations and individual engagement decreased, which negatively affected the group atmosphere. This synthesized overall finding illustrates the link between individual success and optimization of the group atmosphere in a group-based intervention. To achieve

individual success that optimizes the clinical encounter, the **PTs' insights and skills** in terms of clinical reasoning, hands-on and facilitation techniques and social interactions are essential. These aspects might seem well known in neurological physiotherapy. However, the studied clinical context and the innovative group-based and individualized intervention adds specific opportunities and challenges that can enhance and constrain the optimization of the clinical encounter. These specific group-related aspects are included in the **Intervention frameworks**, which make the studies of this dissertation unique and distinct from the findings of previous studies on traditional one-on-one physiotherapy. Together with the enactive interpretations of the findings, the group perspective of our study provides new and expanded insights into clinical physiotherapy for persons with MS.

Table 3 Synthesis of findings

	Key findings from the papers	Synthesis of the key findings answering the overall research question
Paper I	The patients' bodily perceptions of changes appear to be the most powerful source for increasing patient expectations.	Movement changes
	The PTs' insights into movement problems increase when patients actively participate in the examination process.	PTs' insights and skills
	Sufficient insight into the patient's movement problems through advanced movement analysis is required for individual adaptations and specificity in intervention planning.	Intervention frameworks
		PTs' insights and skills
Paper II	Preplanning and ongoing evaluations of patients' bodily responses throughout the exercise sessions are vital for adjusting and progressing the exercises.	PTs' insights and skills
		Movement changes
	High variance in patients' functional levels presents a challenge for individualization.	Intervention frameworks
	A bodily and individualized approach appears to provide patients with perceptions of improved movements and engagement.	Movement changes
	The PTs' interactional strategies must be appropriate to their recipient – either the group or the individual patient.	PTs' insights and skills
		Intervention frameworks
Paper III	Patients' expressions of individual success and bodily improvements appear to affect the group atmosphere positively.	Movement changes
	Individual success requires PTs who can handle the challenge of engaging in clinical reasoning processes for three different patients simultaneously.	PTs' insights and skills
	PTs should encourage patients to share their experiences and be sure to divide their attention between the patients and the group.	Intervention frameworks
		PTs' insights and skills

8 DISCUSSION

In the forthcoming sections, the synthesized categories *Movement changes*, *PTs' insights and skills* and *Intervention frameworks* are discussed. Each category serves as a level-two heading, and the discussions from the published papers are extended by an interpretation of the findings as a synthesized whole.

First, a summary of the synthesized category is presented along with a gray, right-aligned text box containing the associated key findings from the three papers. Second, the categories are abstracted and discussed in terms of how they affect opportunities and challenges for achieving success in the clinical encounter and how these factors relate to the enactive approach, the neurological physiotherapy literature and specific relevant studies. These discussions lead to the proposal of *key factors* formulated as specific suggestions for improving the optimization and success of individualized and group-based interventions. The key factors serve as third-level headings throughout the discussion and are listed in a gray, centered text box at the end of each discussed category.

As such, the discussion systematically answers the overarching research question of this thesis, *What factors affect opportunities and challenges for achieving success during clinical encounters in a group-based and individualized physiotherapy intervention for persons with MS?*, and actualizes the doctoral project's implications for neurological physiotherapy in general.

8.1 Movement changes

Movement changes – summary of key findings from the papers:

The patients' bodily perceptions of changes appear to be the most powerful source for increasing patient expectations.

Preplanning and ongoing evaluations of patients' bodily responses throughout the exercise sessions are vital for adjusting and progressing the exercises.

A bodily and individualized approach appears to provide patients with perceptions of improved movements and engagement.

Patients' expressions of individual success and bodily improvements appear to affect the group atmosphere positively.

8.1.1 Summary

Findings from the video observations in all three papers of this doctoral project demonstrate that bodily changes and improved movements were prerequisites to increasing the patients' expectations at the beginning of the intervention, maintaining engagement throughout the training period, and creating a positive atmosphere and positive group dynamics during the exercise sessions. The absence of such perceptions led to the opposite: few signs of expressed expectations for the forthcoming exercise period, a lack of engagement and focus during the exercise sessions, and group dynamics characterized by frustration and decreased group spirit. These findings indicate that patients' perceptions of changes and improvements are vital aspects of optimization in a group-based intervention. How and why perceptions of movement changes enhance and constrain the optimization of clinical practice is sparsely emphasized in the existing literature, which makes this discussion a valuable contribution to the research field.

8.1.2 Key factor 1: Movement changes through handling may increase perceptions of possibilities

A characteristic finding in the papers is that the patients' expressed expectations and engagement increased considerably when the PTs utilized facilitation and targeted hands-on approaches. Through such approaches, the PTs sought to provide the patients with an understanding of how the intervention could improve their balance and ADLs. Perceptions of possibilities for improvement and meaningfulness are among the main principles of experience-dependent neural plasticity in rehabilitation (Kleim & Jones, 2008), which underpins the relevance of facilitation and hands-on techniques in physiotherapy encounters.

The enactive understanding of cognition provides an extended view of how the patient experiences facilitation by emphasizing the relationship between thoughts and bodily perceptions in sense-making processes (De Jaegher & Di Paolo, 2007; Di Paolo et al., 2010).

This perspective of cognition implies that patients' reflections regarding the body and the body's capabilities are strengthened through perceptions of altered movements. This is in line with Normann et al. (2013), in which patients with MS stated that bodily perceptions expanded their knowledge of their own situation. It seems self-contradictory that bodily perceptions of increased possibilities can be achieved without an actual experience of change in the body. The "opposite" finding from the data material also underpins this statement: patients appeared unengaged and frustrated when improvements were absent or they failed to perform the exercises.

The PTs stated that their considerations of the patients' movement changes were valuable when planning and adapting exercises to the patients' specific needs, which is a well-known strategy in neurological physiotherapy (Gjelsvik & Syre, 2016; Normann, 2018; Raine, 2009). As such, movement changes also increased the PTs' perceptions of possibilities and illustrate how facilitation is beneficial for both patients and PTs.

Of particular interest, the findings presented in paper III indicate that movement changes affected the dynamics of the entire group, which naturally is an important success factor in a group-based intervention. Individual improvements in movement performance generated positivity that extended to the entire group, implying that success at the individual level contributes to success at the group level. The patients also noticed and acknowledged each other's changes, which appeared to be rewarding for all participants. Other qualitative studies of group interventions for persons with MS do not address such group processes but focus instead on the general benefits of being with others, such as "meeting people with the same problems" (Learmonth et al., 2013) and "having fun and developing friendships" (Dodd et al., 2006). Thus, the findings of this dissertation indicate that the benefits of individualization and being in a group strengthen each other, which contradicts the prevailing view of group interventions and individualization as mutually exclusive (Everett, 2010; Jones & Kulnik, 2018; Mason, 2013).

However, facilitation and the emphasis on movement changes as tools in physiotherapy are debated concepts, and critics argue that hands-on approaches may interfere with the patients' self-initiation of movements (Jackson, 2012). Such interferences were not observed in the data material of this doctoral project. Rather, the PTs facilitated each patient for a limited time

and also focused on providing movement strategies the patients could utilize on their own. The critics may associate facilitation with static support or a passive external application of movement that does not require activation of the patients' own nervous system. In this respect, a lack of consensus regarding the definition of facilitation (de Almeida et al., 2015) probably confuses the debate.

Nevertheless, the findings from the papers of this dissertation also illustrate the not-so-bright sides of emphasizing movement changes through facilitation in a group setting. Some of the interviewed PTs questioned whether the framework of the intervention was suitable for all patients in the exercise groups of the RCT. In some groups in which the patients' functional levels differed greatly, facilitation and specific adaptations of exercises became very challenging. As a result, the PTs chose a middle course of difficulty. Under this circumstance, patients with poor function seemed to get frustrated as they failed to perform the exercises, and patients with high functional levels seemed to lose engagement when the exercises were too easy for them. With these considerations in mind, the findings indicate that it may be expedient for PTs to determine the composition of the exercise groups *after* the clinical examinations. This issue illuminates the difference between the study design, in which all patients were divided into 13 groups before the examination, and real-life practice, in which PTs are likely to form groups of patients they think will fit well together.

8.1.3 Key factor 2: PTs should encourage patients to communicate their perceptions of movement changes and improvements – both individually and plenary

All three papers of this dissertation underpin that emphasizing awareness of movement changes was a powerful clinical tool. The empirical material also illustrates that such awareness was strengthened when the PTs addressed bodily perceptions and movement experiences in their verbal communication. The group organization of the intervention provided new opportunities to further promote awareness of movement change as the three participants shared their experiences and thereby participated in each other's improvements and progressions. The forthcoming sections discuss the PTs' strategies for encouraging the patients to communicate their movement experiences – both in individual interactions with the PT and in plenary. Addressing bodily perceptions in verbal communication provided opportunities to achieve success in the group-based clinical encounter.

An example of how words strengthened the patients' awareness of bodily changes is provided in paper I, which describes how the PTs frequently asked the patients to verbally express their perceptions of movement changes during the examination. In the interviews, the PTs stated that such strategies were intended to provide the patients with a conception of the intervention as meaningful, beneficial and capable of improving their functional abilities. In other words, the PTs invited the patients to discuss the bodily changes to cocreate meaningfulness. This phenomenon is recognized in Ajjawi and Higgs' (2012) study on the core components of communication in physiotherapy, in which the PTs aimed to construct communication that promoted the goal of the clinical encounter. In the empirical material from paper I, the PTs wanted to provide the patients with a view of the intervention as personally meaningful, both through hands-on approaches and through words.

Despite these considerations, previous studies on communication in physiotherapy mainly focus on conversations isolated from the domains of bodily perceptions (Opsommer & Schoeb, 2013; Roberts, Whittle, Cleland, & Wald, 2013) and primarily rely on cognitivist theories, such as self-determination theory (Lonsdale et al., 2012). It is particularly interesting that two large reviews on communication in patient-clinician interactions (Oliveira et al., 2012; Wijma et al., 2017) do not address verbal communication regarding bodily perceptions and changes and barely mention physical interactions. This is quite peculiar as body and movement are considered core elements in physiotherapy (WCPT, 2015). However, communication as a multimodal domain in one-on-one clinical practice has gained increased attention in recent years (Normann, 2012; Normann, 2018; Øberg et al., 2015). Accordingly, the papers of this dissertation contribute to broaden a scarcely investigated field of neurological physiotherapy and extend the discussions to include considerations of communication, body and movement in group-based settings.

Nevertheless, the group organization's influence on interactions provides the most novel findings regarding communication in this doctoral project. Particularly in paper III, the findings show that the patients discussed detailed perceptions of movement and experiences of improvements with one another. Through these discussions, the patients appeared to increase their awareness regarding their own and the other participants' improvements, and engaging positive comments generated a cheerful atmosphere in the group. Such sharing and

discussions were not entirely spontaneous but emerged as a result of encouragement from the PTs.

In such terms, it seems opportune to consider Kennedy's (2003, p. 1276) question: "Who is the best judge of a patient's interests?". In physiotherapy, the answer is of course two-sided – PTs may possess more knowledge regarding clinical matters, and the patients are naturally the experts on their own experiences. As such, inviting and encouraging patients to share their experiences with each other might be a clever strategy to place the patients' perspective in the lead. In light of the enactive concept of participatory sense-making (De Jaegher & Di Paolo, 2007; Fuchs & De Jaegher, 2009), patients' first-hand knowledge may evolve when combined and provide insights that would be inaccessible to each patient alone. Besides, these insights may also be inaccessible in one-on-one interactions with a PT who does not have lived experiences with the disease. Such specific and detailed experience-sharing and discussions extend general experience-sharing presented in previous qualitative studies on group-based interventions for persons with MS (Aubrey & Demain, 2012; Clarke & Coote, 2015; Dodd et al., 2006; Learmonth et al., 2013), and underpin a major potential of group organization in physiotherapy.

Key factors: Movement changes

1: Movement changes through handling may increase perceptions of possibilities.

2: PTs should encourage patients to communicate their perceptions of movement changes and improvements – both individually and plenary

8.2 PTs' insights and skills

8.2.1 Summary

As advanced clinical communication and handling were vital factors for success in the clinical encounter, it is relevant to consider how PTs' insights and skills affect these achievements. Additionally, findings from the papers of this dissertation illustrate that the PTs' insights into the patients' movement problems were prerequisites for suggesting exercises that were individually tailored to each patient. These insights required experienced and knowledgeable PTs with advanced movement analysis and handling skills *and* interactional skills that prioritized the body and mutual participation. These strategies were particularly demanding as each exercise group included three unique patients.

PTs' insights and skills – summary of key findings from the papers:

The PTs' insights into movement problems increase when patients actively participate in the examination process.

Sufficient insight into the patient's movement problems through advanced movement analysis is required for individual adaptations and specificity in intervention planning.

Preplanning and ongoing evaluations of patients' bodily responses throughout the exercise sessions are vital for adjusting and progressing the exercises.

The PTs' interactional strategies must be appropriate to their recipient – either the group or the individual patient.

Individual success requires PTs who can handle the challenge of engaging in clinical reasoning processes for three different patients simultaneously.

PTs should encourage patients to share their experiences and be sure to divide their attention between the patients and the group.

8.2.2 Key factor 3: Integrating bodily interactions into movement analyses and reasoning increases insights into movement problems

The comprehension of patients' movements through visual and tactile input is a fundamental skill for clinicians (Jensen et al., 2007) as movement analysis is integrated into clinical reasoning and constitutes a core element of neurological physiotherapy (Cassidy et al., 2018; Gjelsvik & Syre, 2016; Shumway-Cook & Woollacott, 2017). The empirical findings of the papers in this dissertation illustrate how the PTs actively analyzed the patients' movements through observations, considerations of how the patients responded to handling, and discussions of these elements with the patients. Such integration of multiple levels of knowledge and skills is in line with evidence-based physiotherapy, in which the PT combines high-quality clinical research with practical knowledge and the patients' preferences (Herbert

et al., 2011) enabling the PTs to reveal activity limitations, identify underlying impairments, and plan exercises that specifically address these movement problems. The findings illustrate the significance of the practical knowledge of clinical practice as hands-on approaches and physical touch were essential ingredients highlighted in the empirical material.

Hands-on approaches and physical touch are underemphasized in diagnostic clinical reasoning, which is the most common model presented in the physiotherapy literature (Edwards et al., 2004; Gjelsvik & Syre, 2016; Johnson, 2009; Lennon & Bassile, 2018; Shumway-Cook & Woollacott, 2017). Øberg et al. (2015) criticize the strategies emphasized in the diagnostic models for being "linguistic" and "in the head" of the therapist and suggest the new *embodied-enactive model*, in which dynamic and bodily interactions between the PT and the patient are embedded in the cognitive processes. As the findings in this dissertation illustrate that embodied interaction was a vital element of gaining insights into movement problems, the embodied-enactive model is a valuable contribution that extends the theoretical anchoring of clinical reasoning in neurological physiotherapy.

Changes in movement quality as part of the reasoning processes are particularly emphasized in the papers of this dissertation. The PTs stated that making a movement quality change informed their insights, which underpins the significance of physical PT-patient interactions and "doing" in the reasoning processes. Doing, or "exploration of potential for improvement" (Johnson, 2009, p. 49), is included in practical knowledge, which integrates intellectual and incorporated knowledge (Schön, 1991). The skilled actions of hands-on approaches represent such practical knowledge, which is sparsely addressed in traditional clinical reasoning models in physiotherapy. Emphasis on such practical skills in physiotherapy may have been disregarded in recent decades due to strict scientific demands in health research. This dissertation illustrates that the new and innovative enactive approaches to cognition contribute to interpreting vital aspects of "doing" in physiotherapy practice, which complies with Nicholls & Gibson's (2010) request for extended theoretical perspectives to develop clinical practice and research.

8.2.3 Key factor 4: Patient participation in the clinical reasoning process reveals insights inaccessible to the PTs alone

The patients' knowledge regarding their own situation was vital for developing the PTs' insights into the connection between activity limitations and impairments. Of course, the value of patient involvement is not a ground-breaking finding, as person-centered care is a well-known guiding principle in neurological rehabilitation (Lennon & Bassile, 2018) and is embedded in MS-specific guidelines (EMSP, 2012; NICE, 2014). However, this doctoral project illustrates that the PTs acknowledged that their insights and clinical decisions were dependent on the patients' contributions. The patients' specific knowledge and experiences from daily life and here-and-now perceptions of movements were both valuable aspects of the clinical reasoning process. Patient participation in the clinical reasoning process increased the PTs' knowledge regarding movement problems to a level the PTs could not have achieved on their own, a finding consistent with the concept of participatory sense-making (De Jaegher & Di Paolo, 2007; Fuchs & De Jaegher, 2009). The PTs actively combined their knowledge and clinical experience with the patients' unique knowledge and experiences to obtain the insights needed to suggest exercises that specifically targeted the individual patient's impairment. Such mutual knowledge acquisition has scarcely been investigated in previous studies on neurological rehabilitation, which accentuates the use of interactional strategies in the clinical setting to provide opportunities for success.

The PTs' encouragement of patients to participate in the reasoning processes during the examination and throughout the exercise sessions was a frequent finding in the papers of this dissertation. The PTs encouraged the patients to express their perceptions of changes as they worked with treatment techniques to improve movement quality. The PTs and the patients "took turns" confirming, rejecting, questioning and complimenting each other in an interactional dyad characterized by fluency and in which both participants actively contributed in the interaction. The PT, who is responsible for leading the interaction in the right direction, *tuned into* the patients' verbally and bodily expressed needs and suggested solutions through verbal explanations and hands-on facilitation. Such *coordination with* interactions and *joint sense-making* processes (Fuchs & De Jaegher, 2009) succeeded when the PTs were able to capture the patients' attention and ensure salience. The significance of tuning into patients' needs is discussed in previous papers regarding pediatric physiotherapy (Håkstad et al., 2017; Øberg, Blanchard, & Obstfelder, 2014), in which attracting attention is

particularly vital due to infants' natural behavior. The contrasting conditions of *coordination to* interaction and *individual sense-making* were rarely noted during the video observations. However, when they did, the significance was striking: The PTs who merely observed and instructed the patients in various activities and omitted to include the patients in their clinical reasoning found it very challenging to present possible connections between impairments and activity limitations, and were not able to suggest exercises that addressed these impairments. As such, insights that were vital for achieving success in the clinical encounter were not inherent to the skilled and experienced PT but emerged through interactions with the patient.

Interaction in a clinical encounter is naturally challenging, and misinterpretations and conflicting intentions may lead to decreased sense-making or breakdowns (De Jaegher & Di Paolo, 2007). The group context complicated such interactional processes as the PTs had to perform three separate reasoning processes simultaneously due to the presence of three unique individuals with different movement problems and needs. Occasionally, the PTs were unable to attend to all three patients' expressions and responses to the exercises. If the exercise variations were too easy or too difficult and failed to address individual impairments or needs, frustration and interactional breakdowns could occur. Consequently, interactional and practical skills appear tightly intertwined with the PTs' theoretical knowledge, and together, these factors are essential for fruitful communication processes. Fuchs and De Jaegher (2009) claim that skillful interactions are characterized by fluency and flexibility and refer to the term *implicit relational learning*, suggested by Lyons-Ruth et al. (1998). Implicit relational learning means that interactions are shaped by prereflective knowledge of how to interact with others, which naturally requires specific professional knowledge and skills. As such, professional expertise in the group-based clinical encounter seems to depend on both interactional skills *and* specific knowledge and skills associated with physiotherapy for persons with MS.

Key factors: PT's insights and skills

3: Integrating bodily interactions into movement analyses and reasoning increases insights into movement problems.

4: Patient participation in the clinical reasoning process reveals insights inaccessible to the PTs alone.

8.3 Intervention frameworks

8.3.1 Summary

This doctoral project investigated a group-based intervention with specific and fundamental frameworks, such as group size of three patients, individual examinations and tailoring, predefined balance exercises with difficulty variations and exercise sessions with a structured composition. In the synthesis of the three papers, an apparent relationship between success and the frameworks of the intervention emerged. Both challenges and opportunities were revealed and contribute to valuable knowledge in the further development of group-based neurological physiotherapy. Frameworks that emphasize individualization and utilization of the benefits of being part of a group stand out as significant factors for success.

Intervention frameworks – summary of key finding from the papers:

Sufficient insight into the patient's movement problems through advanced movement analysis is required for individual adaptations and specificity in intervention planning.

High variance in patients' functional levels presents a challenge for individualization.

The PTs' interactional strategies must be appropriate to their recipient – either the group or the individual patient.

PTs should encourage patients to share their experiences and be sure to divide their attention between the patients and the group.

8.3.2 Key factor 5: Individualization is obtained through sufficient individual examinations and opportunities to specifically adapt exercises that are meaningful

A main framework of the GroupCoreDIST intervention is individual examination. A few days before the group sessions began, the PT responsible for delivering the intervention examined the three patients in the group (Normann, Zanaboni, et al., 2016). The results from paper I indicate that the PTs depended on the insights gained from these examinations to individualize the intervention. When the examinations failed to provide sufficient insights, the PTs found it challenging to determine possible explanations for the patients' functional limitations and were thus unable to suggest exercises that addressed the patients' specific needs. When the PTs possessed sufficient comprehension of the patients' movement problem, they continued their evaluations throughout the intervention period and were able to adapt and progress the exercises in accordance with the patients' improvement.

The strong position of the examination in physiotherapy makes it paradoxical that other studies of group-based interventions for persons with MS lack descriptions of how (and

whether) examination and individualization were conducted (Carter et al., 2014; Forsberg et al., 2016; Hogan et al., 2014; Learmonth et al., 2012; Tarakci et al., 2013; Taylor et al., 2006). Qualitative studies (Aubrey & Demain, 2012; Dodd et al., 2006; Learmonth et al., 2013) and the educational literature (Everett, 2010; Jones & Kulnik, 2018; Mason, 2013) also do not emphasize the characteristics of examinations prior to group-based interventions. Does this mean that examination is considered unnecessary prior to group-based interventions? Hopefully and probably not. It seems reasonable that the rigid requirements to enable replicability in RCTs constrict individualization and thus the need for thorough clinical examinations. In contrast, all previous qualitative studies considered the patient perspective, which probably reduced the prominence of the examination in the studies' focus. Regardless of these methodological challenges, it is unfavorable that the field lacks studies that reflect everyday clinical practice and prevailing professional principles. As such, the findings in the papers of this dissertation, despite originating from an RCT that did not entirely reflect real-life practice, provide valuable knowledge regarding the significance of examinations prior to group-based interventions.

Importantly, individualized interventions require exercises and treatment techniques that are "individualizable". Each of the 33 predefined exercises of the GroupCoreDIST intervention has five levels of difficulty, which offer a wide range of opportunities to adapt the exercises individually. As the participants had various activity limitations and impairments and were supposed to perform the same exercise simultaneously, the possibility for adaptation by choosing among five levels of difficulty was an absolute necessity. An illustrative example is presented in paper II, in which two very different patients, one agile woman and one man with ataxia and severely reduced balance, appear to be suitably challenged by the same exercise, but at difficulty levels 5 and 1, respectively. An opposite example also illustrates the significance of the intervention's framework of adapting variations, as the PTs claimed that they worried that some of the patients did not gain any benefits if the level of difficulty could not be adapted sufficiently.

In GroupCoreDIST, three patients participated in each group. Although the findings indicate that tailoring for three patients with differing functional levels could be challenging, the number of participants was manageable in most groups. Other studies investigating group interventions for persons with MS have typically included larger numbers of participants in

each group: e.g., Forsberg et al. (2016) had 4-7, Learmonth et al. (2012) had 8-12, Tarakci et al. (2013) had 6-7, and Taylor et al. (2006) had 8. Such larger group sizes may help explain why individualization was omitted from these previous studies. It seems very challenging to apply the individualization strategies illustrated in the papers of this dissertation in groups of more than six persons. However, the maximum number of participants in individualized group-based interventions is unknown, nor is it known how the challenges of individualization can be handled in groups of more than three patients.

The balance-improving intention of the exercises of GroupCoreDIST may also have contributed to success in the clinical encounters. The 33 predefined exercises are designed to target the underlying impairments affecting balance limitations, and the findings from the papers of this dissertation and the RCT investigating GroupCoreDIST (Arntzen et al., 2019) imply that the exercises resulted in meaningful and important improvements for the participants. However, previous effect studies do not provide compelling evidence indicating the superiority of any specific intervention for improving balance (Cattaneo et al., 2007; Davies et al., 2016; Fox et al., 2016; Gandolfi et al., 2015; Kalron et al., 2017), which underpins that these implications should be considered with caution.

8.3.3 Key factor 6: A positive atmosphere is obtained through plenary experience-sharing and a balance between individuality and collectivity

Plenary experience-sharing in introductory rounds (“how has it been since the last session?”) and recap rounds (“how do you think this session went?”) are fixed elements of the GroupCoreDIST intervention that the PTs used in all the observed exercise sessions. These rounds of experience-sharing made the participants aware of one another’s improvements, and situations in which the participants expressed true pleasure in others’ improvements were common. Several previous qualitative studies based on patient interviews indicate that peer-supported camaraderie, experience-sharing and simply being part of a group are highly appreciated (Aubrey & Demain, 2012; Clarke & Coote, 2015; Dodd et al., 2006; Hogan et al., 2014; Learmonth et al., 2013). However, no studies address how these components can be achieved in clinical practice. Consequently, the results of this dissertation are valuable because they add new knowledge to the field of group-based interventions in neurological physiotherapy.

In paper III, the PTs stated that they strategically encouraged the patients to share their perceptions and thoughts regarding specific movement problems and improvements. These strategies facilitated group discussions regarding relationships between functional limitations and impairments. As such, the PT's interactional strategies induced mutual thought processes based on shared bodily perceptions in the group. The inclusion of the discussion rounds as a set framework of GroupCoreDIST seems to be a prerequisite for successful experience-sharing and should be considered for other group interventions as well.

The framework of the intervention required the PTs to shift their focus among each individual in the group and the group as an entity. The findings from papers II and III indicate that this was a manageable challenge in most of the groups, and the PTs preserved the benefits of individualization *and* being part of a group for the patients. However, in some groups, for example, those in which the functional levels of the patients differed greatly, focusing on three unique patients' specific needs simultaneously *and* attending to the group dynamics became too challenging and was thus neglected.

From an enactive view of interactional systems (Di Paolo et al., 2010), the group session consists of several autonomous systems, for example, the PT←→group, PT←→(each) individual, and group←→group (Figure 6).

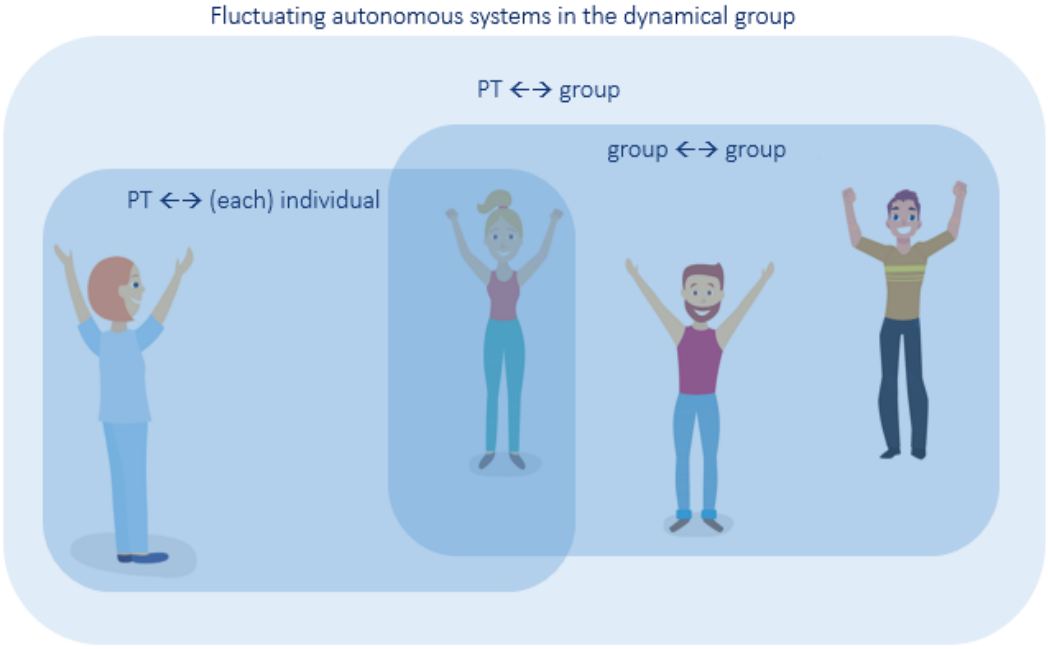

Figure 6 Interaction systems

The different systems consist of numerous complex and embodied processes that affect the systems' identities. The identity of the PT←→group, for example, is characterized by verbal and humorous messages that are intended to keep spirits high within the group, while the PT←→(each) individual system is characterized by specific embodied facilitations intended to improve movement quality. The systems are precarious and can break down if there are conditions that intrude on their identity. The PT←→group system, for example, can break down if the PT spends more time with one individual in the group than the others, and the PT←→(each) individual system can break down if there are conditions within the group that constrain the PT from being able to individually adapt the exercises.

Consequently, the success of the encounter may be challenged by the different interactional systems of GroupCoreDIST. However, the findings from the studies of this dissertation mainly illustrate a latent potential in which the product of individualization and being part of a group led to success. These findings contradict the prevailing view that group-based and one-on-one interventions are mutually exclusive, in which group-based interventions are considered cost effective, motivating and socially supportive, while one-on-one interventions are required when tailoring to individual needs is the aim (Everett, 2010; Jones & Kulnik, 2018; Mason, 2013). Thus, the results of this dissertation imply that individualization within a group-based intervention is possible and may lead to success.

Key factors: Intervention frameworks

5: Individualization is obtained through sufficient individual examinations and opportunities to specifically adapt exercises that are meaningful.

6: A positive atmosphere is obtained through plenary experience-sharing and a balance between individuality and collectivity.

9 CONCLUSION

In this dissertation, I have presented and discussed a synthesis of the findings from my doctoral project investigating the clinical practice of a group-based and individualized physiotherapy intervention for persons with MS in the municipality health care services in Norway. Through an extended synthesis and discussion of the findings from the project's three papers, I have identified six key factors concerning professional practice that affect opportunities and challenges for achieving success in the clinical encounter. The enactive theoretical framework has contributed to illuminate the significance of bodily interactions in clinical sense-making processes. The synthesis includes discussions that integrate practical knowledge, theoretical knowledge and interactional and communicative strategies. Such integrations have not been addressed in previous research on group-based interventions in physiotherapy and underpin the usefulness and relevance of this doctoral project's contribution to the field of clinical practice, research and education.

Targeted handling and facilitation, patient participation, and group discussions regarding experiences of bodily changes were characteristic factors that gave opportunities to engage the patients and improve the individuals' movement quality within exercises and functional activities. To succeed with such clinical strategies, the PTs' integration of theoretical knowledge with practical skills regarding body and movements were necessary to enable flexible and adapted approaches. Practical skills were particularly essential to fluctuate between interactional strategies adapted towards the individual patient or the group as an entity. Individual interaction strategies were characterized by enhancing each patients' perceptions of movement changes, while encouragements for mutual discussions and reflections regarding these changes characterized the approach towards the group as an entity. The patient as an active participant contributed to increased insights in the PT's clinical reasoning processes *and* brought forth the dynamic group processes in which the patients shared their perceptions of improvements. Together, the findings illustrate how embodied interactional approaches give opportunities for achieving success in neurological physiotherapy.

However, the complex factors that yielded opportunities in the group-based encounters also presented challenges in the investigated intervention. If the exercises were too difficult or too

easy relative to the patients' functional level, the patients' frustration put a damper on the group atmosphere. As such, examinations and the continuous evaluation of progress were essential for planning exercises adapted to the individuals' specific needs and were a prerequisite for achieving success at the individual and group levels. These findings show that examinations prior to group interventions are as important as examinations prior to one-on-one interventions.

With that, the findings of this doctoral project imply that group interventions in neurological physiotherapy involve both opportunities and challenges for achieving success in the clinical encounter. The investigated intervention suggest that it is possible to combine the benefits of individualization and being part of a group. Thus, the findings of this doctoral project contradict the prevailing view of individualization and group organization as mutually exclusive, and suggest the value of further developing and investigating the content and organization of group-based interventions in neurological physiotherapy.

9.1 Future studies

Although practical knowledge is essential in evidence-based physiotherapy (Herbert et al., 2011), very few studies in physiotherapy research emphasize this aspect, particularly in investigations of group-based interventions. In this dissertation, the enactive theoretical approach, which is new and innovative in physiotherapy research, provides a methodological opening for focusing on how the domains of body, movement, touch, communication and sense-making are integrated in the encounter between PTs and patients in a group setting. Analyses of the empirical data from an enactive perspective have proven fruitful for investigating how interactional aspects of the clinical encounter affect professional work. To further expand and strengthen research into clinical physiotherapy practice, future studies should consider interpreting empirical findings through the lens of enactive approaches or other theoretical perspectives that embrace the significance of embodied interactions and mutual sense-making in clinical encounters.

Another aspect emphasized in this dissertation is the possibility of combining the benefits of individualization and being part of a group in the same intervention. Such a combination was possible in the investigated intervention, which included three participants in each group; however, it was not always uncomplicated. Future studies with higher numbers of participants

should be investigated to explore how group size affects the possibility of including individualization in a group setting and how group size affects the professional strategies used in the encounter.

Finally, the background and discussions of this dissertation bear the marks of insufficient research evidence regarding the effect of organization and specific characteristics of physiotherapy interventions for persons with MS. Many clinical trials lack precision in their descriptions of content, which consequently makes it challenging for clinicians to use such studies to obtain inspiration and develop their clinical strategies in daily practical work. Future effect studies are needed to determine what actually works, and such studies should strive to provide thorough descriptions of interventions that can be transferred to clinical practice. However, as this dissertation explicitly emphasizes, the principle of individualization has a strong position in physiotherapy practice and should be implemented in clinical trials. Such studies will be better able to reflect real-life clinical practice.

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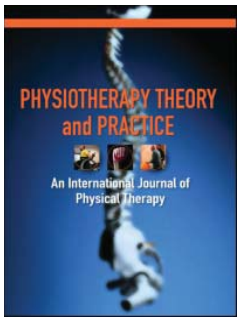
PAPER I

Lahelle, A. F., Øberg, G.K. & Normann, B. (2018). Physiotherapy assessment of individuals with multiple sclerosis prior to a group intervention – a qualitative observational and interview study. *Physiotherapy Theory and Practice,* doi:10.1080/09593985.2018.1488022



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REPORT

Physiotherapy assessment of individuals with multiple sclerosis prior to a group intervention – A qualitative observational and interview study

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ABSTRACT

Assessment prior to both individual and group interventions is fundamental to neurological physiotherapy practice. However, knowledge is limited regarding how assessments are carried out, particularly assessments conducted prior to group interventions, which have recently gained increasing attention in clinical research. In this qualitative study, we investigated how physiotherapy assessments of patients with multiple sclerosis prior to a group exercise intervention were carried out and what physiotherapists considered vital elements in the assessment process. Data were gathered through 12 qualitative non-participatory video observations followed by in-depth interviews of physiotherapists. Systematic text condensation analysis was conducted within an enactive theoretical framework of participatory sense making. In the assessments, patients' bodily perceptions of movement changes appeared to be vital in establishing patient expectations for the forthcoming intervention. The extent of patient participation and an embodied approach to communication influenced both the physiotherapists' and patients' insights into the patients' movement problems, which were further utilized in the initial intervention planning. Significant differences in context from the assessment to the intervention require a systematic completion of the assessments in the course of the first clinical meeting, which should be considered in the further development of research and clinical practices.

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Assessment; examination; neurological physiotherapy; multiple sclerosis; group intervention; interaction; embodiment

Introduction

Background

Assessment is fundamental for professional practice in physiotherapy, and "the quality of care given can only be as good as the assessment on which it is based" (Johnson and Thompson, 1996, (p. 304)). Comprehensive individual assessments are required prior to both individual and group interventions (Norwegian Physiotherapist Association, 2015), for which the main goals are formulating a diagnosis and prognosis and gaining sufficient insight into patients' movement problems to enable individualized intervention planning (World Confederation for Physical Therapy, 2015). In the field of neurological physiotherapy, assessment is particularly complex and involves systematic processes of choices addressing participation, activities, body functions and structures, and is complemented by standardized outcome measures (Gjelsvik and Syre, 2016; Shumway-Cook and Woollacott, 2017). However, these descriptions of neurological physiotherapy assessments are limited to a general instrumental level, revealing a need for studies on how emerging interactional elements of physiotherapist (PT) and patient encounters influence systematic clinical processes.

Assessment in neurological physiotherapy, particularly for people with multiple sclerosis (MS) (Campbell et al, 2016; Paltamaa, Sjogren, Peurala, and Heinonen, 2012), is defined as a clinical encounter prior to an individual follow up. Recently, group interventions for people with MS have gained increased attention in the research field, and several effect studies have indicated promising results (Forsberg, Von Koch, and Nilsagård, 2016; Tarakci et al., 2013; Taylor, Dodd, Prasad, and Denisenko, 2006). However, these group-based studies lack descriptions of how the assessments are carried out and, particularly, how individualized adaptations were conducted. These missing elements underpin the need for expanding upon existing knowledge regarding assessments prior to group interventions.

Establishment of high-quality communication is essential for long-term clinical settings in physical rehabilitation (Ferreira et al., 2013; Hall et al., 2010). In a physiotherapy assessment, communication involves both

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verbal and bodily interactions and affects how meaning, expectations and insights develop during the first clinical encounter (Thornquist, 1990, 2006). Communication is commonly divided into verbal dialogue and non-verbal communication, namely, gestures, facial expressions and body positioning. However, Øberg, Normann, and Gallagher (2015) argue that communication in physiotherapy settings is an embodied process in which words, gestures and physical interactions are equivalently embedded, implying that hands-on techniques and touch are a part of communication in clinical encounters. According to Nicholls and Gibson (2010), further development of professional practice in physiotherapy requires extensions of the theoretical approaches in clinical research and emphasizes embodied views that integrate the dimensions of objective reality, subjective meaning and experience, and social considerations of bodily experience and behavior. Nevertheless, to our knowledge, no clinical studies on neurological physiotherapy have investigated the significance of the multidimensional interactions between the patient and the PT, which illustrates a need for qualitative studies on how bodily aspects of communication affect clinical encounters.

Theoretical framework

To investigate physiotherapy assessment as a clinical encounter consisting of embodied processes of actions and interactions, we chose an enactive approach for the theoretical framework of our study. The enactive approach emphasizes that the experienced world and understanding of others crucially depend on the experienced and moving body, where cognition emerges through interactions between people and their environments (Di Paolo and Thompson, 2014; Fuchs and De Jaegher, 2009). The emphasis on the experienced moving body is inspired by the phenomenology of the body, where the subjective body as a center of experience and expression is given primacy to the simultaneously objective body as a biological organism (Merleau-Ponty, 1962). Furthermore, the emergent situated interactions rely on dynamic systems where development at numerous levels from molecules to cultures is self-organized and dependent on both living organisms and their environments (Thelen, 2005). Both dynamic systems and phenomenology of the body are commonly utilized when theorizing physiotherapy (Chowdhury and Bjorbækmo, 2017; Øberg, Normann, and Gallagher, 2015; Shumway-Cook and Woollacott, 2017). The merging of these theoretical perspectives in the new enactive approach contributes to the evolvement of a more holistic and social view of embodied cognitive life, thus creating an adequate framework in clinical physiotherapy research.

From an enactive view, the cell, the living body, and social interactions are examples of autonomous systems that include numerous active processes generating and maintaining the systems' identities. These systems consist of and are affected by internal and external processes and can come to an end or change their identities if conditions are altered (Di Paolo and Thompson, 2014). When investigating physiotherapy assessments as autonomous systems affected by multiple processes, the enactive framework contributes to elucidating vital elements of the encounters' identities, together with the embodied aspects of interaction.

More specifically, the enactive concept of participatory sense making elaborates how individuals' meaning generation of other people, situations and the world emerge through active and embodied processes of interaction, which involve several forms of communication: words, gestures and physical interactions (De Jaegher and Di Paolo, 2007; Fuchs and De Jaegher, 2009). Participatory sense making is thus applicable in analyzing physiotherapy assessments where the essential concept is interpretation of verbally and bodily expressed meanings of abilities and disabilities. Sense making is not restricted to one individual's insights alone; in social encounters, individuals coordinate their sense making and participate in each other's interpretations of situations (De Jaegher and Di Paolo, 2007). The interaction and sensemaking activity is a dynamic process of coordination between subjects and is termed coordination to when one individual follows another's lead, while coordination with is achieved through mutual regulation of the individuals' actions (Fuchs and De Jaegher, 2009). The interactional coordination fluctuates in synchrony, when tuning in to each other is necessary for meaning generation. The level of sense making moves on a dynamic spectrum from individual sense making to optimal participatory joint sense making. In joint sense making, new meaningful insights can emerge for all parts of the social encounter that would otherwise not be available to each individual alone (De Jaegher and Di Paolo, 2007). With respect to the physiotherapy assessment, interpretation of the clinical encounter through the concept of participatory sense making provides an analytical tool whereby new emerging insights can contribute to guiding clinical practice in group-based interventions.

Aims and research questions

The aims of this study are to generate new knowledge regarding physiotherapy assessment prior to group-based interventions and to investigate how actions and interactions between PTs and patients affect the

emerging processes of the assessment and insights into patients' movement problems. The research questions are as follows: (1) What is the nature of the individual assessment of persons with MS prior to a group intervention; and (2) what are the PTs' reflections regarding conducting such assessments?

Methods

Study design

As qualitative research methods target interpretations of described human experiences and actions (Creswell, 2013), we used non-participatory video observations and in-depth interviews to address our research questions. The video observations served as the main data source for capturing the vital essence of actions and interactions and were complemented by interviews to elucidate the PTs' unspoken reflections and considerations regarding the assessment.

Context of the study

The data collection of this study was simultaneously conducted with the implementation of a randomized controlled trial (RCT) (n = 80) investigating the effect of a new individualized, group-based intervention for people with MS: GroupCoreDIST[1](Normann, Zanaboni, Arntzen, and Øberg, 2016). GroupCoreDIST is an intensive, 6-week group-based intervention with 33 predefined core stability exercises. Each exercise has five levels of difficulty to enable individual adaptations, and the exercises were designed to improve balance, walking, activities of daily living (ADL), physical activity, and quality of life. From September 2015 to March 2016, six primary healthcare PTs with expertise in neurological physiotherapy conducted 13 training groups with three patients each at their local workplaces. The PTs attended a 5-day practical and theoretical training session prior to the start of the intervention. Forty patients from six municipalities in Norway (population 1,000–50,000) participated in the intervention and were individually assessed by the conducting PTs prior to the exercise period to enable individualization.

Participant selection and sample

One patient from each group (13 out of 40) and 6 (out of 6) PTs were strategically nested from the RCT. Additionally, to provide depth and variety (Brinkmann and Kvale, 2015), the characteristics of the participants differed in the sample (Table 1). Patients and PTs signed written informed consent forms prior to the observations. The study was conducted according to the Deceleration of Helsinki and approved by The Regional Committee for Medical Research Ethics (REK South-East: 2014/1715–7).

Data collection

The first author conducted non-participatory video observations of 12 assessments, with a total time of 15 hours and 34 minutes. One of the planned observations was cancelled due to pragmatic circumstances. The assessments occurred in the PTs' workplace. An observation guide was established, and the observer remained in the assessment room using a hand-held

Table 1. Participant characteristics.

Patients (n = 13)	n
Age	
<40 years	3
40–60 years	7
>60 years	3
Gender	
Male	5
Female	8
Type of MS	
RRMS	10
SPMS	1
PPMS	2
Years of MS	
<5 years	4
5–10 years	4
11–15 years	2
>15 years	3
EDSS[2]	
1–2	7
3–4	2
5–6	4
Physiotherapists (n = 6)	**n**
Gender	
Male	1
Female	5
Years since graduation	
0– 5	0
6–10	2
>10	4
Postgraduate courses	6
Masters degree	2
Years experience with neurological conditions	
0–5	1
6–10	1
>10	4
Experience with group interventions	6
Workplace	
Primary health care with operating grant[a]	3
Primary health care	3

[a]In Norway, PTs working in public primary healthcare are classified as private practice, or as fixed salary. The PT can run his or her own practice, in which the PT receives an operating grant combined with a preset fee per patient from the government health financial management plus co-payment from the patient. The PT can also be a public-sector employee with a fixed salary from the municipality.

[1]Originally, the intervention was named GroupCoreSIT but was renamed GroupCoreDIST after further development and analysis of the RCT.

[2]EDSS – a widely used measure in clinical trials and the assessment of people with MS for quantifying disability and monitoring changes in disability over time. 1.0 – walking independently; 6.5 – able to walk 20 m with two crutches (Kurtzke, 1983).

video camera. For practical reasons, two of the observations were video recorded using a fixed tripod without the researcher present. The PTs and patients were debriefed after the observations and given opportunities to ask questions and share their reflections regarding being observed.

The first author conducted 13 interviews of the PTs, with a total time of 13 hours and 12 minutes. One PT was interviewed regarding an assessment without a video observation in advance. The remaining 12 interviews were conducted immediately after the video observed assessments, except for the two interviews from the assessments that were video recorded using a fixed tripod. These interviews were conducted 1 and 7 days later. The audio recorded interviews were conducted in the PTs' undisturbed offices. A theme-based interview guide was followed, with open-ended questions regarding history taking and physical examinations, reflections regarding the patients' disabilities, and plans for the forthcoming intervention. Additionally, specific events from the observations were brought up in the interviews to obtain expanded insights into reflections regarding actions and interactions from the assessments.

Analysis

Systematic text condensation (Malterud, 2012) was used as the analysis strategy. Observations and interviews were imported, transcribed, and organized with the QSR international NVivo 11 computer software. To obtain an initial overview of the material, the first author repeatedly watched and read through all video recordings and transcripts. As a basis for the next steps of the analysis process, the third author watched and read considerable portions of the material in its entirety, while the second author was presented with excerpts of the material. In the initial stages of the analysis process, we identified several salient elements from the video observations, and accordingly sought out where in the interviews these elements were discussed. The enactive framework (De Jaegher and Di Paolo, 2007; Fuchs and De Jaegher, 2009) contributed to guiding the analysis toward embodied aspects of communication and interaction. This also indicates that the analysis process started immediately after the observations, where events from the assessments guided topics discussed in the interviews. Preliminary themes emerged through negotiations, prior to a process of de-contextualization by identifying meaning units. Meaning units were coded into groups and subsequently sorted into more specific subgroups. Meaning units from the observations and interviews were grouped under the same codes and further analyzed as units belonging to each other. The contained meaning units of each subgroup were systematically abstracted by rewriting condensed versions of the observations and interviews while preserving the main

Table 2. Overview of categories, subgroups and theoretical perspectives.

Category	Assessment as expectation building		Ways to make sense of movement problems		Foundations for early intervention planning	
Subgroup	Expectation building with words	Expectation building through embedded bodily perceptions	Making sense together	Making sense "alone"	General pragmatic	Specific exploration
Enactive theoretical perspective	Communication as several forms: words, gestures and physical touch (Fuchs and De Jaegher, 2009)		Participatory sense making (De Jaegher and Di Paolo, 2007)		Social autonomous systems (Di Paolo and Thompson, 2014)	

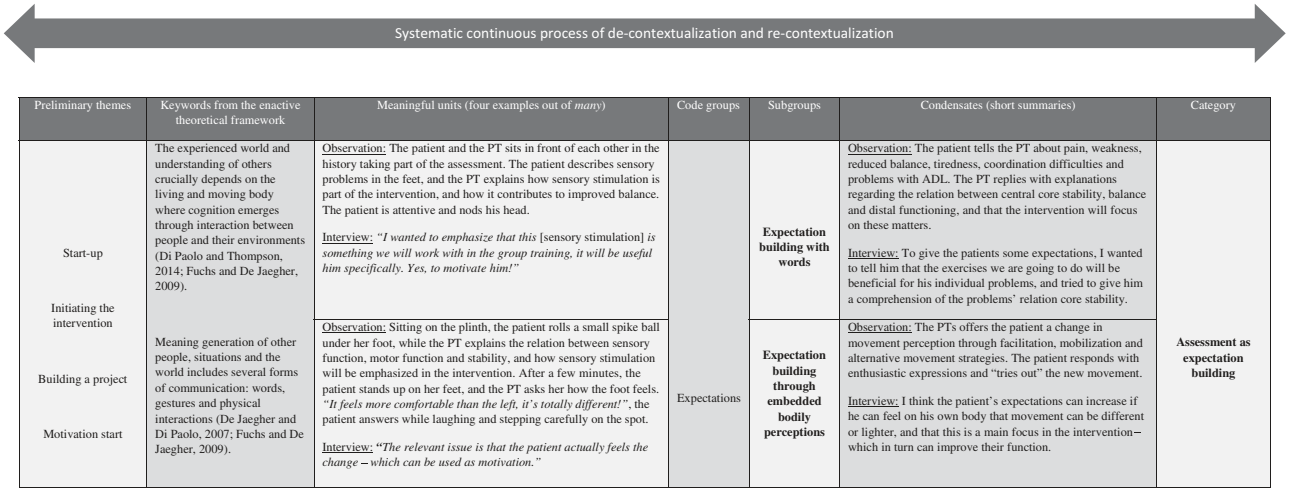

Figure 1. Analytic process, example category 1: Assessment as expectation building.

meaning. The condensed versions were finally re-contextualized and organized into three categories, each containing two subgroups (Table 2). An example of the analysis process is presented in Figure 1. Several meetings between all three authors were held to negotiate the emerging final categories and subgroups, which are presented according to Malterud (2012) in the results section as analytic texts from the observations, complemented by analytic interview texts and pertinent illustrative quotations.

Research team and reflexivity

All three authors are neurological PTs with experience in primary and secondary healthcare. The first and third authors have clinical experience with adults with MS, while the second author has a background in pediatrics. The second and third authors are experienced qualitative researchers and have previously published papers addressing enactive theoretical frameworks. All authors share an interest in how interaction affects clinical encounters and consider embodied approaches to be an adequate framework for studying physiotherapy. Such shared interest and knowledge in theoretical frameworks and proximity to the clinical field is presumed to impact preconceptions in all phases of the research process (Creswell, 2013). However, to improve our study's quality and trustworthiness, we continuously challenged and questioned established assumptions and positions throughout the research period.

Results

Assessment as expectation building

The PTs attempted to build expectations for the subsequent six weeks of exercise by presenting purposes and benefits of the intervention and linking the fundamental principles of GroupCoreDIST to the patients' dysfunctions. All PTs approached the patients with verbal explanations to build expectations through cognitive processes. Some PTs complemented their verbal explanations with hands-on techniques, which led to increased expectations through bodily perceptions of easier and lighter movements.

Expectation building with words

The PTs largely dedicated the first 10–20 minutes of the assessments to history taking, during which they gained information regarding social and family aspects, work, present and prior medical situations, needs and expectations. Several of the PTs continued this conversation with an introduction of GroupCoreDIST – both its general organization and specific explanations regarding how core activation and strengthening exercises address symptoms such as reduced balance. The patients paid attention to the explanations, but analyses of the video material demonstrated that the verbal explanations of these matters often led to taciturn and unengaged patients indicated by indifferent nods, gestures and facial expressions. During the interviews, however, the PTs claimed that explanations of core stability and the purpose of the intervention were important for the patients' expectations and were believed to be a prerequisite for the patients' understanding of how the intervention could improve their function.

> *Can you give a specific example of elements that you found important to explain to the patient?*
>
> Yes… I told the patient that we are not going to work with gait directly, but we are going to work with exercises that influences the ability and the endurance for walking. So, regarding his expectations to participate in the group training, I told him that it is very important to work on the core muscles to improve gait endurance and quality.

The PTs' intentions regarding verbal strategies as part of expectation building differed from the observed patient responses. Together with our next sub-group, this finding reveals that communication in a physiotherapy encounter encompasses more than words alone.

Expectation building through embedded bodily perceptions

At later stages in the assessment, during the physical examination, the PTs continued building expectations by complementing verbal explanations with physical touch to provide the patients' with bodily perceptions of easier and lighter movements. An example was a PT who placed his hands on the lower back and abdomen of a patient while walking across the room. The "flow" of the patient's gait improved, his self-confidence lit up, and his reliance on reactive stepping strategies ceased. In this, as well as other examples where movement changes occurred, the PTs often requested the patients to express their here-and-now perceptions. Surprised statements, such as "It feels easier!," fixed stares to an arm or a leg, and enthusiastic facial looks were typical. Enthusiasm and engagement were also expressed by the PTs who encouragingly confirmed the patients' statements: *"Yes, that's great, it also looks easier!"* The PTs who integrated these elements claimed that bodily experience was the most powerful source for building expectations. One of the PTs re-narrated how her patient increased his ability to move his right arm and hand due to facilitation and handling, and how he enjoyed this "new" feeling.

How do you think such improvements matter to him concerning the subsequent intervention?

I hope that it gives him the perception of… (pause) …that it will motivate him and give him a bodily feeling that this can actually mean something for his functional abilities. Maybe already now he can get the impression of the intervention's benefits, yes, that it matters for him specifically.

Such observations and statements indicate that thoughts regarding the body are easier to affect through the body than through a cognitive "route" and accentuate the connection between perceptions and thoughts in communication.

Ways to make sense of movement problems

The primary concern of the PTs was gaining insight into the patients' movement problems. These insights were affected by the characteristics of the interaction between the PTs and the patients, particularly the patients' extent of participation in the assessment process. Two approaches were observed in the material.

Making sense together

The majority of the PTs continuously uttered their considerations regarding specific movement problems and findings throughout the examination. The PTs took charge of organizing content and focus during the examination, and concurrently, they invited the patients to actively participate in discussions regarding movement problems and how they affected various activities. For example, in a stability challenging one-legged stance, a PT presented her considerations regarding how the patient's reduced hip control probably influenced balance and control in walking. The patient paid close attention to the PT's rationale and complemented the line of reasoning with her own descriptions of how she frequently experiences tiredness and pain in the hip region during prolonged upright activities. In such discussions, both PTs and patients expressed unraveling comprehensions of various movement problems:

"maybe that's why I feel pain when I…?" (patient), "… so this is also affecting you when you stand still?" (PT).

In the interviews, the PTs stated that the patients' participation was a vital contribution for both the PTs' and patients' insights into how findings from the examination affected the patients' daily lives. One of the PTs explained how she combined her professional knowledge with the patient's experience of a movement problem to gain insights.

It is apparent that you invited her (the patient) *to express how she experienced her hip problem in her daily life. Yes, can you tell me a little bit more about why you chose to do it like that?*

For me as a PT, it is important to really cooperate with the patient. We are almost like two equal parts. Of course, we have different starting points – I have my professional knowledge, but she is the expert on her own body and her own life. Then, we can, we can sort of gain insights of her problems together.

These findings illustrate how the PTs systematically and deliberately invited the patients to mutually participate in discussions regarding the movement problems in order to gain better insights. Its significance seems even clearer in the next sub-group where patient participation was rather sparse.

Making sense "alone"

Not all PTs discussed their professional considerations with their patients, and some examinations were merely characterized by PTs who instructed and observed the patients performing various activities. When PTs refrained from inviting patients to participate as active contributors, ongoing discussions regarding the causes of underlying impairments and relationships between findings from the examination and experiences from daily life were absent. Additionally, the patients played a rather passive role in the assessment, and engaging surprises rarely occurred. Findings, particularly causes of underlying impairments, from the examination were discussed in the interviews following the assessments. PTs who performed the physical examination as making sense "alone" found it challenging to relate findings from the examination to the patients' movement strategies and balance problems. In one particular interview, the PT was asked to elaborate her reasoning regarding the patient's gait but did not quiet manage to express how his hip problem was related to his gait strategy.

What are your thoughts regarding his hip and his walking challenges that he told you about?

I can see it when he is walking, there is something in his hip. I do not know what the cause is. I really do not know… But I… but his musculature is very tight and I, no… …His movement quality in walking is by far aggravated; he has put on some strategies.

These observations and the subsequent interviews indicate that challenges in relating underlying impairments to activity limitations might be connected to the level of patient participation in the assessment. Such insights turned out to be an important foundation in the early processes of planning the intervention.

Foundations for early intervention planning

The PTs already started the intervention planning process in the course of the assessments by suggesting exercises from GroupCoreDIST to the patients. The relationship between these suggestions and the patients' movement problems depended on the acquired insights from earlier stages in the assessment.

General pragmatic

Throughout the course of the assessment, the PTs presented exercise suggestions for the patients regarding general and pragmatic adaptations for the training period. The PTs could suggest exercises in sitting or standing positions with support if reduced balance was a main finding in the assessment, or they could suggest avoiding exercises in kneeling positions if knee pain was revealed. Mainly, these suggestions were based on knowledge regarding general abilities and disabilities that were acquired throughout the assessment. In the interviews, the PTs were asked to explain how they utilized information from the assessments in the initial planning of the group sessions. Clarification of pragmatic dimensions and forming a general view of the patents' abilities to cope with various exercises were considered vital. Additionally, the PTs felt a need to finish the assessment prior to the intervention period due to an expected lack of opportunities for such considerations later in the group sessions.

> *What type of information from the assessment do you find important to use when you start the process of planning the organization of the intervention?*
>
> When you are starting a group, it is important to know something about how the participants deal with the exercises. Maybe there are some exercises that it is obvious that the patient cannot perform. Because I have to prepare on the equipment, find out suitable plinth height and such, and I think it is important to be ready when the intervention starts, and the time matters.

The emphasis on clarifying pragmatic concerns and the need to finish the assessments prior to the training period illustrate how clinical contexts affect professional choices and accentuate how assessments prior to group interventions might diverge from assessments prior to one-to-one follow ups.

Specific exploration

The majority of the PTs complemented the general and pragmatic dimensions with specific explorations of how underlying impairments affected activity limitations. In one of the observed assessments where the patient's gait was characterized by a considerable hip drop and knee hyperextension, the PT explained to the patient that they could try out a bridging exercise to determine if hip muscle activation could improve her movement quality in gait. The PT guided and facilitated the patient doing the exercise for about 5 minutes, followed by a gait re-test where hip drop and hyperextension were reduced, and the patient happily expressed that she felt steadier. The PT confirmed the patient's statement and told her; "*we will naturally integrate hip activation exercises in the training period*"! When discussed in the interviews, the PTs stated that such hypothesis testing of how impairments affected an activity was a vital part of the assessment. If addressing the underlying impairment improved movement quality, for example, by increasing knee control, these elements were included when planning and choosing suitable exercises for the training period.

> *Can you tell me a little bit more about why you wanted to find out these things, how you used the information to start up the group training, so to speak?*
>
> The assessment is all about formulating a hypothesis about the main movement problem, and then, you have to try to make a change. And the exercises you implement need to affect the movements you find poor or hard for the patient. You want the quality of the movement to improve, and the better understanding regarding the movement problem, the easier it is to choose exercises adequately.

These findings illustrate that the PTs' processes of exploring how underlying impairments affect movement quality were systematic and adapted to the specific patient and further contributed significantly in choosing appropriate exercises.

Discussion

The main aim of our study was to investigate how interactions between PTs and patients with MS affect the assessment process prior to a group intervention. Our analysis indicates that emphasis on bodily perceptions and movement changes increase the patients' expectations of the subsequent intervention period and that patients' active and embodied participation in the assessment process affect the emerging movement problem insights. Further, our analysis indicates that these insights guide the initial planning of exercises in the forthcoming training period.

How interaction affects expectations and insights

Our empirical findings indicate that patients who perceived bodily changes throughout the assessments were

more engaged than patients who received verbal explanations alone. The utterance *"It feels easier"!* exemplifies that awareness-raising of pre-reflective perceptions of the body are achieved through movement and hands-on approaches, while cognitive construction through conversation regarding how the body might change in the future appears to be less effective. These findings are in line with an enactive approach to social cognition, where meaningfulness emerges not through words alone, but in its entirety through utterances, gestures, facial expressions, bodily movements and perception of movements (De Jaegher and Di Paolo, 2007; Fuchs and De Jaegher, 2009). Our PTs' systematic, deliberate, and embodied interaction strategies illustrate how here-and-now perceptions of changes in the body contribute to strengthening the patients' new meaningful thought processes regarding movement function during activities, and enhance their expectations for the subsequent training period. Such positive outcomes underpin the significance of connections between bodily perceptions and thoughts in clinical encounters, which are consistent with other physiotherapy studies (Bjorbækmo and Mengshoel, 2016; Normann, Sorgaard, Salvesen, and Moe, 2013; Olsson, Skär, and Söderberg, 2011). We do not consider these findings as condition specific, which points toward transferability to other patient populations where facilitation, hands-on approaches and bodily changes are appropriate and obtainable.

Further analyses of interaction characteristics indicate that the level of patient participation affected insights into the patients' movement problems. When the PTs invited patients into discussions regarding movement problems and their underlying causes, their mutual sense making contributed to unraveling situations, through which both parties appeared to gain deeper insights. The PTs were the responsible party who led the assessment, as they concurrently and deliberately integrated decisive information from the patients' bodily here-and-now perceptions and associated ADL experiences. As a result, the PTs and the patients together reached insights that were otherwise inaccessible to either of them alone (i.e. achieving a state of joint sense making) (De Jaegher and Di Paolo, 2007). In these processes of joint sense making, the PTs and the patients mutually regulated their actions in coordination with each other, where verbal discussions of movement problems were combined with concurrent perceptions of movement changes. Conversely, when the PTs did not invite their patients to participate in these discussions, the patients' actions simply followed and coordinated to the PTs' instructions, and expressions of new emerging insights lacked. Such low levels of sense making, individual sense making (De Jaegher and Di Paolo, 2007), demonstrated its significance when underlying causes of movement problems were discussed with the PTs in the interviews: The PTs who were making sense "alone" could not relate findings from their examinations to the patients' movement and balance problems in daily activities. These findings seem reasonable to propose as relevant for all physiotherapy assessments where insights into patients' movement problems are included as a main goal and are naturally consequential for sufficient comprehension of impairments, activity limitations and participation restrictions to guide individually adapted intervention planning (World Confederation for Physical Therapy, 2015).

How assessment insights guide intervention planning

Our empirical findings indicate that the PTs initiated the intervention planning in the course of the assessment, where the majority of the PTs complemented a general and pragmatic strategy with a more specific approach. Explorations of how underlying impairments affected movement quality were key to both gaining insights into the movement problem and a prerequisite for planning and choosing individualized exercises for the subsequent training period. Active participatory patients, facilitation and hands-on approaches were vital aspects of these explorations and illustrate the significance of integrated embodied interactions as part of the systematic examination. A specific explorative approach for examination is in line with the proposed model of embodied and enactive clinical reasoning (Øberg, Normann, and Gallagher, 2015), where bodily aspects of communication are embedded in the clinical encounter and contribute to insights inaccessible through cognitive processes alone. Such explorative examinations accentuate the advantages of implementing treatment in the assessment setting (Gjelsvik and Syre, 2016; Johnson, 2009), and yield sufficient insights for accomplishing the prevailing principle of individualization (World Confederation for Physical Therapy, 2015). However, emphasis on exploration and sufficient insights into patients' movement problems as a basis for individualized treatment are rarely accounted for in clinical studies, which elucidates the paradox of typical physiotherapy trials where interventions are based on standardized protocols and not adapted to the specific patient needs.

Differences in the social system between the one-to-one assessment and the forthcoming PT-to-three patients group session also appeared to affect how the

examination prior to the intervention was conducted. In our interviews, the PTs expressed a desire to complete the assessment in the first clinical encounter, as they expected a lack of opportunities to continue the assessment throughout the group sessions. This is a rather contrary situation to what is commonly described in the literature, where examination and treatment are considered interwoven evaluation processes (Gjelsvik and Syre, 2016; Johnson, 2009). In an enactive notion of living social systems (Di Paolo and Thompson, 2014), the autonomous identity of the assessment and the group session systems differs to such an extent that the PTs cannot envisage to continue the examination in the next meeting. The processes of the systems, for example, a PT who instructs a heel-rise exercise for three patients in a group session or a PT and one patient who explore how foot mobility affects adaptations to the floor, include actions and interactions that identify the respective encounter and might disturb each other's identity if commingled. When the assessment is restricted to the first clinical meeting, the emphasis on thorough individual examination prior to group interventions appears even more vital and justifies a critique of other MS group intervention studies in which individual examinations are omitted (Forsberg, Von Koch, and Nilsagård, 2016; Learmonth et al., 2012; Taylor, Dodd, Prasad, and Denisenko, 2006). Additionally, the preset conditions of GroupCoreDIST appeared to influence the PTs' professional choices, such as trying out core stability exercises and their suitability for continuation in the training period. Thus, we consider these findings as exclusively applicable for assessment where the forthcoming intervention is similar to GroupCoreDIST's organization and content and is probably highly divergent from assessments prior to other group interventions and one-to-one follow ups.

Methodical considerations

Video observations complemented by in-depth interviews, together with the multitude of characteristics of both the participating patients and PTs, generated a rich dataset. Observations, which provide direct documentation of actions and interactions (Heath, Luff, and Svensson, 2007), combined with interviews, which provide descriptions of the subjects' experiences of events (Brinkmann and Kvale, 2015), strengthen the trustworthiness of our complex analysis. The participants of our study originated from a geographically constricted area and from one single intervention, which we consider limitations to the transferability of these results to patients participating in other interventions and from other areas. The missing patient perspective might be considered a weakness but deviates from our research questions. As our main findings elucidate aspects that are not condition specific, such as increased expectations and insights through embodied interactions, transferability to other conditions in addition to MS seems reasonable. However, transferability is probably dependent on patient populations where movement changes are obtainable and relevant. Our study's findings indicate that the PTs' and the patients' perceptions of bodily changes were vital to build expectations, gain insights, and plan initial interventions, and it thus seems unlikely that these findings are transferable to patient populations and interventions where movement changes are unobtainable or irrelevant. Additionally, specific characteristics and framework conditions of the subsequent intervention are considered to constrain transferability to assessments prior to other interventions, besides group-based follow-ups similar to GroupCoreDIST. Validity and reliability were ensured in a manner consistent with the principles of qualitative research (Brinkmann and Kvale, 2015) via thorough descriptions of the study design, the selection and sampling method, the data collection, and the analysis. Notably, the design of this study enables the generation of knowledge regarding how actions and interactions affect assessments, but it remains unclear how insights from assessments are utilized in subsequent interventions.

Clinical implications and future studies

Our study's findings actualize how different interaction approaches and an emphasis on embodied communication throughout the assessments affect expectations and movement problem insights as a basis for specific and individualized intervention planning prior to a group intervention. These findings indicate that PTs should possess embodied interaction strategies to gain such expectations and insights to enable individually adapted treatments. However, future studies with different samples, different contexts, and other perspectives are required to further develop knowledge regarding assessments in neurological physiotherapy prior to group interventions. Patient perspectives and observational studies of how findings from assessments are utilized and followed up in forthcoming group interventions are of current interest.

Conclusion

The extent of addressing the patients' perceptions of bodily movements and changes are vital in the assessment setting, as increasing expectations to the forthcoming training

period are expressed when PTs introduce the intervention by giving patients here-and-now experiences of how the intervention can contribute to functional improvements. Patient participation and embodied approaches to communication additionally influence both the PTs' and the patients' insights into movement problems and further affect how the PTs initially plan and individualize exercises for the subsequent intervention. The prominent situational differences between the assessment setting and the forthcoming treatment setting are probably greater in group interventions than in individual follow-up interventions, and direct the PTs of our study to complete the assessment during the first clinical encounter. Together, these findings illustrate the importance of sufficient assessment with an emphasis on bodily perception of movement changes and patient participation prior to group interventions.

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Declaration of Interest

The authors report no declaration of interest.

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PAPER II

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RESEARCH ARTICLE

WILEY

A group-based, individualized physiotherapy intervention for people with multiple sclerosis—A qualitative study

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Abstract

Background and purpose: Group-based interventions for people with multiple sclerosis (MS) have gained increased attention in the field of physiotherapy research. However, no studies have investigated whether or how the prevailing principle of individualization is embedded in such interventions. The purpose of this study was to investigate how professional actions and interactions affect individualized exercise adaptations in a group intervention for people with MS.

Methods: This study had a qualitative design and investigated and analysed the actions and interactions of six different physiotherapists (PTs) with expertise in neurology and 40 patients (27 female and 13 male, mean age 52.2 years, mean Expanded Disability Status Scale 2.45) in a group-based exercise intervention (GroupCoreDIST) for people with MS. We performed nonparticipatory video observations of 13 group exercise sessions, each consisting of three patients, followed by 13 semistructured in-depth interviews with the PTs. Systematic text condensation analysis was conducted within an enactive theoretical framework.

Results: The results of our study indicated that the extent of embodied interaction and patient participation affect the possibilities and challenges regarding individualization within a group intervention. Handling, facilitation, emphasis on movement quality, and PTs who invited their patients to play an active role in the encounter enriched the reasoning and decision-making processes and yielded opportunities to adapt exercises to the specific patient's impairments. However, the combination of individuality and collectivity within a group context brings forth challenges in which the PTs are obligated to both preserve the benefits of being in a group and simultaneously attend to individual patients.

Conclusions: Our study indicates that despite challenges, the PTs' integration of embodied interaction and mutual participation enables the patients to concurrently benefit from individualization *and* being in a group. These findings contribute to the question regarding the significance of individual adaptations in group interventions and point toward a need for future effect studies that compare standardized and individualized exercise protocols.

KEYWORDS

exercise therapy, multiple sclerosis, physical therapy modalities, qualitative research

1 | INTRODUCTION

1.1 | Background

Group-based interventions for people with multiple sclerosis (MS) have gained increased attention in the research field in recent years, and several effect studies indicate promising results (Forsberg, von Koch, & Nilsagård, 2016; Tarakci, Yeldan, Huseyinsinoglu, Zenginler, & Eraksoy, 2013; Taylor, Dodd, Prasad, & Denisenko, 2006). These studies describe standardized intervention protocols that omit clinical examinations and associated reasoning processes, thus deviating from the MS guidelines, in which the principle of individualization prevails (European Multiple Sclerosis Platform [EMSP], 2012; National Institute for Health and Care Excellence, 2014). Individually adapted interventions based on complex clinical examination and reasoning processes are prerequisites for addressing patients' underlying impairments, activity limitations, and participation restrictions and are commonly described in regard to one-to-one follow-ups (Gjelsvik & Syre, 2016; Johnson, 2009; Normann, Sorgaard, Salvesen, & Moe, 2014; Shumway-Cook & Woollacott, 2017). Individual adaptations in group-based interventions, however, are sparingly emphasized in the literature and are even considered mutually exclusive (Plow, Mathiowetz, & Lowe, 2009). Thus, it remains unclear whether and how individualization is obtainable in group-based interventions, indicating a need for qualitative studies to extend the knowledge base in the field of physiotherapy for people with MS.

Individualization is a widely used term in physiotherapy interventions for people with MS (Brichetto, Piccardo, Pedulla, Battaglia, & Tacchino, 2015; Plow et al., 2009) that entails treatments that are adapted to specific patients' needs. These adaptations are particularly demanding owing to heterogeneous pathology that leads to complex symptoms affecting balance and activities of daily living (Kister et al., 2013; Larocca, 2011). The principle of individualization implicitly prerequires decision-making processes based on examination and continuous clinical reasoning and evaluations, which apply in both individual *and* group-based follow-ups (Norwegian Physiotherapist Association, 2015; World Confederation for Physical Therapy, 2015). Clinical reasoning includes the physiotherapist's (PT's) theoretical knowledge, clinical experience, and interactions with patients and guides the embedded processes of management strategies, goals, and the patients' perception of meaning (Higgs & Jones, 2008). Communication and interaction constitute an emphasized aspect of the reasoning process, in which narratives of first-person experiences inform the PT's understanding of the patient's health situation (Edwards, Jones, Carr, Braunack-Mayer, & Jensen, 2004). Øberg, Normann, and Gallagher (2015) argue that these established models of clinical reasoning predominantly focus on mental and linguistic interactions in which the body is presented as biological and that they do not sufficiently consider the emerging and embodied interactions in the clinical encounter. The embodied framework in physiotherapy practice integrates dimensions of objective reality, subjective meaning and experience, and social considerations of bodily experience and behaviour (Nicholls & Gibson, 2010) and appears expedient in the reasoning processes involved in neurological physiotherapy, in which evaluation of touch, handling, and facilitation are merged with observations of movement strategies and history taking (Gjelsvik & Syre, 2016; Johnson, 2009). However, empirical investigations of how embodied aspects of interactions affect the clinical encounter in neurological physiotherapy are sparse in general and, to our knowledge, completely absent from group-based interventions for people with MS.

1.2 | Theoretical framework

To investigate how individualization is conducted in a group-based physiotherapy intervention for people with MS and how embodied interactions affect these processes, we chose an *enactive* theoretical approach. Enactive theories emphasize that the experienced world and making sense of others depend on the lived and moving body, in which cognition emerges through multimodal interactions, such as touch, gaze, words, and gesture (Di Paolo & Thompson, 2014; Fuchs & De Jaegher, 2009). The enactive approach is an adequate framework in physiotherapy research because it derives its inspiration from the *phenomenology of the body*, in which the subjective body is given primacy as the centre of experience and expression (Merleau-Ponty, 1962), and *dynamic system theories*, in which development emerges through a connection between living organisms and their environments (Thelen, 2005). A fundamental concept of enactive theories is that the extent and depth of sense-making in an encounter depend on the degrees of participation by the parties (De Jaegher & Di Paolo, 2007). The significance of participation in interaction suggests the benefits of an active patient in physiotherapy settings where clinical reasoning and continuous evaluations of the patients' verbally and bodily expressed meanings form the foundation for individual adaptations. These processes of sense-making emerge within a situational context and include numerous active processes that generate and maintain the identities of the situation (Di Paolo & Thompson, 2014). The identity of a physiotherapy setting can, for example, include elements such as “exercises to improve balance,” “one-on-one guidance from a PT,” and “PT enthusiastically teaching exercises to the group,” among others. Challenges in combining the somewhat contradictory processes of *group participation* and *individual adaptations* might change or even break down the identity of a group setting and presumably require certain interactional adjustments to achieve success. Thus, the enactive interpretation of the identities and inherent processes of situational contexts, and the emphasis on embodied elements of interaction and cognition, provide an analytical tool that allows new emerging insights to help guide clinical practice in group-based interventions for people with MS.

1.3 | Aims and research question

The aim of this study was to generate new knowledge in the field of neurologic physiotherapy regarding the essential characteristics of individualization within group settings. The research questions were as follows: How do professional actions and interactions affect individual adaptations in a group-based intervention for people with MS, and what are the PTs' reflections regarding opportunities and challenges in group settings?

2 | METHODS

2.1 | Study design

As qualitative research methods target hermeneutical and phenomenological interpretations of described human experiences and actions (Malterud, 2016), we chose nonparticipatory video observations and in-depth interviews to address our research questions. The video observations served as the main data source to capture the essences of actions and interactions and were complemented by interviews to elucidate the PTs' considerations and reflections regarding choices and decision making in a group intervention.

2.2 | Context of the study

The data collection in this study was conducted simultaneously with a randomized controlled trial (RCT; *n* = 80) investigating the effect of GroupCoreDIST,[1] a new group-based, individualized 6-week exercise intervention for people with MS (Normann, Zanaboni, Arntzen, & Øberg, 2016). From September 2015 to March 2016, six primary healthcare PTs with expertise[2] in neurological physiotherapy conducted 13 training groups with three patients each (one group of four patients) at their local workplaces. The intervention combines the following principles: optimal alignment of body parts and adaptation to base of support (Raine, Meadows, & Lynch-Ellerington, 2009; Shumway-Cook & Woollacott, 2017), coordination of proximal stability and distal movement (Freeman, Fox, Gear, & Hough, 2012; Kibler, Press, & Sciascia, 2006), somatosensory stimulation of hands and feet (Brodal, 2010; Raine et al., 2009; Shumway-Cook & Woollacott, 2017), high-intensity training (Dalgas, Ingemann-Hansen, & Stenager, 2009), and teaching of self-management (EMSP, 2012). The PTs attended a 5-day practical and theoretical training session prior to the intervention. To include the benefits of being in a group *and* specific individual adaptations, the PTs individually examined the patients and thereafter chose options from among 33 predefined core stability exercises, each consisting of five levels of difficulty. According to the instructions of the GroupCoreDIST, all patients performed the same exercise simultaneously but at different difficulty levels according to their impairments. The intervention consisted of three 60-min supervised sessions and two 30-min unsupervised home sessions per week. A manual with instructions and detailed descriptions and pictures of the exercises was developed and given to the participants in the study.

2.3 | Participant selection and sample

A purposive sample of all 13 groups (patients *n* = 40, PTs *n* = 6) in the RCT was selected and observed at various points in the intervention period to provide variety in the material. Patients and PTs originated from six municipalities in Norway (population 1,000–50,000). The characteristics of the participants are presented in Table 1. Patients and PTs were invited to participate by the project leader (last author) by mail and signed written informed consent documents. None of the invited participants refused to participate or dropped out.

TABLE 1 Participant characteristics

Patients (*n* = 40)	
Age at intervention, mean (*SD*) range	52.2 (13) 24–77
Gender	
Male, *n* (%)	27 (67.5)
Female, *n* (%)	13 (32.5)
Type of MS	
RRMS, *n* (%)	33 (82.5)
SPMS, *n* (%)	5 (12.5)
PPMS, *n* (%)	2 (5)
Years of MS, mean (*SD*) range	10.2 (7.9) 0.5–33.0
EDSS,[a] mean (*SD*) range	2.4 (1.7) 1.0–6.5
Physiotherapists (*n* = 6)	***n***
Gender	
Male	1
Female	5
Years since graduation	
0–5	0
6–10	2
>10	4
Number of PTs with a master's degree	2
Years of experience with neurological conditions	
0–5	1
6–10	1
>10	4
Experience with group interventions	6
Workplace[b]	
Primary health-care with operating grant	3
Primary health-care	3

Note. MS: multiple sclerosis; RRMS: relapsing-remitting MS; SPMS: secondary progressive MS; PPMS: primary progressive MS; PT: physiotherapist.

[a]EDSS: Expanded Disability Status Scale—a measure widely used in clinical trials and the assessment of people with MS for quantifying disability and monitoring changes in disability over time. 1.0 = walking independently; 6.5 = able to walk 20 m with two crutches (Kurtzke, 1983).

[b]In Norway, PTs working in public primary health-care work in a private practice or have a fixed salary. A PT can run his or her own practice, in which he or she receives an operating grant combined with a preset fee per patient from the government health financial management programme plus a copayment from the patient. The PT can also be a public-sector employee with a fixed salary from the municipality.

2.4 | Data collection

The first author conducted nonparticipatory video observations of 13 group sessions over a total time of 14 hr 38 min. An observation guide was established (Appendix A), and the observer remained in the room using a handheld video camera.[3] One group session was video

[1]The intervention was originally named GroupCoreSIT, but the letter D (DIST) was added after further development and analysis of the RCT. D: dose, dual task; I: individualized, intensive, insights; S: selective movements, specificity, stability, somatosensory activation; T: training, teaching, task oriented.

[2]Criteria for expertise in neurological physiotherapy were the ability to assess and treat people with neurological diseases and lesions, in addition to completion of substantial and relevant clinical courses.

[3]Canon Legria HFG30, with ×20 zoom to enable fluctuation between the situational context and specific details.

recorded from a tripod due to pragmatic circumstances. The first author conducted 11 interviews with the six PTs immediately after the observations, and two interviews were postponed due to pragmatic reasons. Two PTs conducted one group and were interviewed once, one PT conducted two groups and was interviewed twice, and three PTs conducted three groups and were interviewed three times. The audio-recorded interviews were conducted in the PTs' undisturbed offices, over a total time of 12 hr 37 min. The interview guide (Appendix B) was theme based, consisted of open-ended questions, and had been pilot tested. Specific events from the observations were brought up in the interviews to obtain expanded insights into reflections regarding actions and interactions during the group sessions. All authors agreed that data saturation was reached after 13 observations and interviews. There was no personal or professional relationship between the first author and the participants. The patients and PTs were briefly informed regarding the study's aim and the researchers' profession and role in the project. Field notes and summaries were made during and after the data collection.

2.5 | Analysis

Observations and interviews were imported, transcribed verbatim, and organized with NVivo 11 software (QSR International, 2016), after which they were analysed using Malterud's (2012) systematic text condensation (example in Figure 1). The recordings were of high quality, and it was therefore considered unnecessary to return the transcripts to the participants for comments and/or corrections. To obtain an initial overview of the material, the first author reviewed the entire set of material several times, the last author watched and read considerable portions of the material, and the second author was presented with excerpts. Preliminary themes emerged through negotiations between the three authors. The first author then proceeded with a decontextualization process in which meaning units were identified, coded into groups, and subsequently organized in specific subgroups. The contained meaning units of each subgroup were abstracted systematically by rewriting condensed versions. The condensates were then recontextualized into analytic texts and compared with the transcripts to validate the original context. Finally, two categories, each containing two subgroups (Table 2), were named and served as headings in the results section. Several meetings between the authors were held throughout the analysis process, which was theoretically informed by the enactive framework of social cognition and sense-making (De Jaegher & Di Paolo, 2007; Di Paolo & Thompson, 2014; Fuchs & De Jaegher, 2009). Participant checking (Tong, Sainsbury, & Craig, 2007) was omitted to retain anonymity.

2.6 | Research team and reflexivity

The authors are neurological PTs with experience in primary and secondary health-care. The first (male) and last (female) authors have clinical experience with adults with MS, and the second author (female) has a background in paediatrics. The second and last authors are experienced qualitative researchers and have previously published papers addressing enactive theoretical frameworks. All authors share an interest in how interaction affects clinical encounters and consider embodied approaches to be an adequate framework for studying physiotherapy. Proximity to a clinical field and shared interest and knowledge in theoretical frameworks influence preconceptions in all phases of the research process (Malterud, 2001). However, to improve our study's quality and trustworthiness, we continuously challenged and questioned established assumptions and positions throughout the research period.

2.7 | Ethical considerations

The study was conducted according to the Declaration of Helsinki and approved by the appropriate Regional Committee for Medical Research Ethics.

3 | RESULTS

Our empirical findings are presented as analytic texts from the observations and were complemented by analytic interview texts and illustrative quotations.

3.1 | Individualized planning in a group setting

When planning the intervention period for each specific patient and choosing among the predefined exercises, the PTs dynamically combined professional knowledge and clinical experience with

Systematic continuous process of decontextualization and recontextualization

Negotiated preliminary themes	Enactive theoretical framework - keywords	Meaningful units - four (shortened) examples out of *many*	Code group	Subgroups	Condensates (short summaries)	Category
Embodied interaction Verbal interaction Cognitive reminders Instructions through words Instructions through hands Verbal specific Bodily specific	The experienced world and making sense of others depend on the living and moving body where cognition emerges through multimodal interactions, for example touch, gaze, words and gesture (Di Paolo & Thompson, 2014; Fuchs & De Jaegher, 2009).	Observation: The patients are sitting on the plinth as the PT notice that one of the patients are in an asymmetrical seated position. The PT approaches the patient, and places her facilitating hands on the patient's pelvis and trunk. "I feel crooked", the patient states. The PT continues the facilitation and after a short while, the patient achieves a more symmetrical position and comments that it feels "right". Interview: *It is sort of as if* (pause), *when you are actually there, when you use your hand, when you touch the patient, you give them an opportunity to find something, to perceive something new.*	Interaction strategies	**Embedded physical strategies**	The PTs use hands-on facilitation to improve movement quality in the exercises. PTs and patients simultaneously discuss the benefits and purposes of the exercises and the patients appear focused, engaged and express perceptions of change. PTs states that the patients' physical perception of the exercises' benefits are vital for their understanding, and that individualization is a prerequisite for such perceptions.	**Here-and-now adaptations in a group setting**
		Observation: The patients are supine lying on the plinth as the PT verbally instructs the patients to "activate your abdominal muscles, push our lower back down in the plinth and raise the lateral side of your feet". The instructions are thorough, but only one of the patients actually handles the movements. The other patient needs hands-on facilitations, which the PT immediately provides. Interview: *When I introduce new exercises, I am more hands on, but after a while, the patients know what to do and the verbal instructions are enough.*		**Verbal instructional strategies**	The PTs often provide verbal instructions to the entire group, but sometimes the instructions alone do not lead to the intended movements. However, when the patients are familiar with the exercises on beforehand, the verbal instructions are effective. The PTs states that verbal instructions are supposed to remind the patients of previous learned movement patterns.	

FIGURE 1 Analytic process, Example Category 2: Here-and-now adaptations in a group setting

TABLE 2 Overview of categories and subgroups

Category	Individualized planning in a group setting		Here-and-now adaptations in a group setting	
Subgroup	Dynamical analysis yields opportunities for individualization	Challenges in individualization	Embedded physical strategies	Verbal instructional strategies

recently acquired knowledge from the individual examinations to adapt the exercise levels to the patients' impairments. Sometimes, however, the PTs found these planning processes challenging as a result of the particular characteristics of the group setting.

3.1.1 | Dynamical analysis yields opportunities for individualization

In most of the group sessions, all three patients performed the same exercise simultaneously but deviated into different variations of the exercise according to their own specific impairments. An example is a forward-leaning exercise called: *the bear squat*. One patient, a man with severely reduced balance and ataxic gait, supported his hands against a 50-cm-high stool with both his feet on the floor, while a very agile woman leaned forward with her hands on the floor in a single-legged stance (illustrated in Figure 2).

In the interviews, the PTs explained how they planned exercises that addressed a mutual movement problem within the group *and* adapted the exercise with variations suitable for the individual patients' specific impairments. These reasoning processes included analyses of movement problems through evaluation of the patient's responses to facilitation or alternative movement strategies combined with knowledge regarding specific characteristics of the GroupCoreDIST exercises. Analyses of movement problems were based mainly on an individual examination prior to the exercise period but were also integrated as an extended evaluation process throughout the course of the exercise period. When PTs and patients together gained insights into how underlying impairments affected activity limitations, a basis for exercises suitable to the intervention period was established. During these processes, responses to hands-on facilitation, patient participation, and the patients' perceptions of easier and lighter movements were emphasized as vital elements.

> *… when she is in good alignment, her abdominal muscles are apparently more activated, and her control and coordination of her foot is much better. In addition then we tried to transfer these elements to her gait and balance because there is probably a relationship between "hip drop" and her reduced activity in her abdominal muscles. Therefore, I tried to facilitate her abdominals in the stance phase … and she noticed that it became better and easier. … Therefore, some of the exercises we chose addressed the ability to be stable in her hips, abdominals and back, and this formed a solid basis for the stance phase.*

3.1.2 | Challenges in individualization

Individualization appeared challenging in some groups as the exercises did not suit the participants' activity restrictions or impairments. In one group in which the patients' functional abilities differed largely, all patients performed the same variations of the same exercises. When this strategy was discussed in the interview, the PT stated that she omitted individualization and selected exercises and variations that addressed the overall group. Even if it did not always lead to omitting individualization, this issue was a prevalent challenge in conducting the intervention. The PTs claimed that extended one-on-one attentiveness to a specific patient could threaten the group dynamic, while acknowledging the considerable downsides of offering excessively easy or difficult exercises that do not address the specific needs of the individual patient.

> *It is difficult to choose exercises and create good dynamics in the group when their starting points differs so much. Choosing exercises that are going to give all participants a challenge …. Yes, unfortunately, I think that the woman with the highest functional level in this group, she was very agile to begin with, I do not think she felt that she has gained so much in this group.*

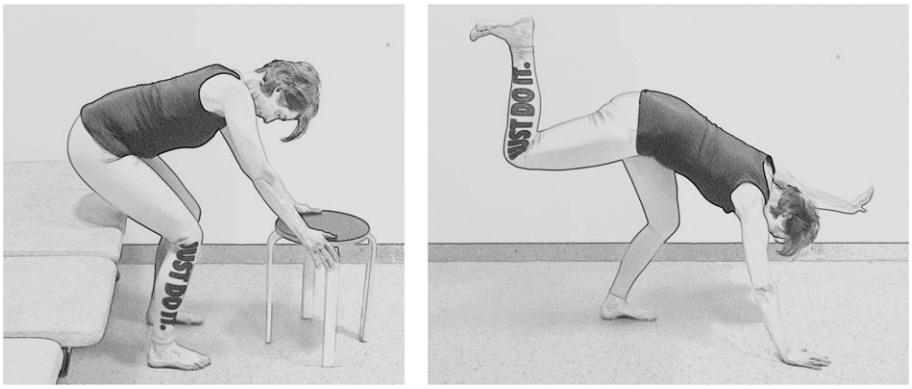

FIGURE 2 The bear squat: Easiest and hardest variations (edited/anonymized photo from the GroupCoreDIST manual)

3.2 | Here-and-now adaptations in a group setting

Adaptations to the individual patient and to the group were not always reflective and preplanned but sometimes emerged through physical and verbal here-and-now interactions between PTs and patients.

3.2.1 | Embedded physical strategies

The PTs utilized hands-on approaches to facilitate improved movement quality in the exercise session. For example, in a supine leg-raising exercise, a patient compensated by extending her spine and struggled when raising her leg. The PT noticed this inefficient strategy and carefully used her hands to facilitate a posterior pelvic tilt and the activation of her abdominal muscles, which resulted in ceased compensations and an easier looking movement. PT–patient discussions regarding benefits and purposes followed, and the patient appeared focused and engaged when expressing her perception of change. In the interviews, the PTs stated that observations, hands-on techniques, and discussions regarding the patients' perception of the exercise provided the needed information to adapt exercises and address the primary goal of increasing balance and other activity functions. The bodily elements of these interactions were claimed to be a key factor.

> *I think that a hands-on approach works out very well because many times I want the patients to work differently in a region of the body where they lack some activity and that they have trouble with this activation. In addition, it goes without saying that for the patients, complying with verbal instructions is not as easy as hands-on, because then they can perceive where I want them to be.*

3.2.2 | Verbal instructional strategies

Instructions such as "activate your abdominals" and "lengthen your necks" were spoken out clearly to inform the entire group. Alone, these instructions lead to movement and alignment changes less often than are observed for physical, hands-on techniques. However, if the PTs emphasized connecting these words to a previous physical perception of movement change from earlier stages of the exercise period, the efficiency of the instructions seemed to increase. The instructions were stated to represent a cognitive reminder for the entire group—a reminder of a previously learned and experienced change in movement strategy achieved through hands-on approaches.

> *After a while into the exercise period, there was no need to be hands on* all *the time. They managed themselves to take over that part and sense that they were activated and ready to proceed with the exercise.*

4 | DISCUSSION

The aim of our study was to generate new knowledge in the field of neurological physiotherapy for people with MS by investigating how PT–patient interactions affect individualization in a group-based intervention. Observations of GroupCoreDIST sessions in three-patient groups and interviews with the conducting PTs revealed that emphasis on the *physical aspects of interaction* yielded opportunities to adapt exercises to the individual patients. However, combining the *collectivity* of being in a group and the *individuality* of specialized physiotherapy in small groups is challenging.

4.1 | Physical interaction yields opportunities for individualization

Findings from our study indicate that individual exercise adaptations require reasoning processes that include information provided by physical aspects of interaction and participation—both from the examination prior to the intervention and in continuous evaluations throughout the training period. Physical aspects of interaction, such as hands-on techniques and facilitation, contributed significantly to gaining insights into movement problems. This beneficial approach became clear especially when PTs and patients together explored how treatment addressing specific impairments affected the patient's ability to perform an activity. These empirical findings are consistent with descriptions of neurological physiotherapy (Gjelsvik & Syre, 2016; Johnson, 2009; Normann, Sorgaard, Salvesen, & Moe, 2013) and in contrast with traditional reasoning models in which linguistic and mental aspects of interaction are emphasized and physical and embodied aspects are lacking (Edwards et al., 2004; Higgs & Jones, 2008). Omitting considerations of bodily perceptions and salient movement changes seems rather self-contradictory in the field of neurological physiotherapy, in which the body and experience of movement are primary concerns. The enactive and embodied framework of cognition embraces such physical aspects of interaction and communication, in which insights emerge through multimodal domains of interaction (Di Paolo & Thompson, 2014; Fuchs & De Jaegher, 2009). Our empirical findings from a small-group intervention illustrate that including information provided by physical interactions in the reasoning processes enabled individually adapted exercises addressing the underlying impairments that gave rise to activity limitations. These results accentuate the need for an embodied extension of the theoretical framework in neurological physiotherapy practice and reasoning, which is also of current interest across other disciplines and professions (Arntzen, 2017; Chowdhury & Bjorbækmo, 2017; Gallagher & Payne, 2015; Øberg et al., 2015).

Furthermore, our empirical findings indicated that the degrees of patients' participation in the here-and-now group session encounter corresponded to the level of sense-making achieved in the situation, as proposed in the concept of *participatory sense-making* by De Jaegher and Di Paolo (2007), in which interactions between individuals provide insights that would be inaccessible for either one of them to reach alone. When patients in GroupCoreDIST were invited to participate in the reasoning processes, their movement perceptions appeared as vital contributions to decision making regarding suitable adaptations of the exercises. The bodily aspects of such sense-making processes distinguished themselves, and verbal instructions without explicit coupling to a previous movement experience were a relatively ineffective tool for establishing insights than are physical touch and new movement experiences. The PTs who succeeded in these

participatory interactions did not have a predefined plan but adjusted their actions and interactions to the patients' emerging movements and expressions in a continuous evaluation process. However, the high complexity of these processes, particularly within a group setting with *three* patients, may explain why some PTs fell short and omitted the demanding individual adaptations.

4.2 | The challenge of balancing collectivity and individuality

The PTs in our study found it challenging to combine GroupCoreDIST's requested *exercise equality* within the group with *variation specificity* for individual patients. The balance between collectivity and individuality in the same encounter was put to the test and sometimes ended with the PTs selecting a "golden mean" for all the patients, thus failing to comply with the prevailing principle of individualization. From an enactive view of social systems (Di Paolo & Thompson, 2014), the group encounter consists of numerous processes that both generate and intrude on the encounter's identity. The requested and predefined identity of the exercise sessions in GroupCoreDIST consisted of a combination of two main sets of identities, including (a) a clinical setting where all participants experience a positive and united affiliation (collectivity) and (b) adaptations of the exercises addressing specific impairments of the individual patients (individuality). As already discussed, individualization requires demanding processes of reasoning and decision making, and its complexity naturally increases with the number of and divergence among the participants in a group. When the patients' impairment levels differed greatly within a group and individualization was considered a complex process requiring extended one-on-one attentiveness, some PTs chose to prioritize the collectivity identity and omitted the individuality identity to preserve the dynamics of the group. Simultaneously, our empirical findings also illustrate that other PTs managed to combine the benefits of individual adaptations *and* being in a collective group, indicating a latent effect potential in individualized *and* group-based interventions for people with MS. However, in contrast to the identity of GroupCoreDIST, instrumental and nonindividualized organization of exercises is the common formula used in group interventions studies for people with MS (Forsberg et al., 2016; Tarakci et al., 2013; Taylor et al., 2006), whereas individually adapted exercises seem to be reserved for one-on-one follow-ups (Brichetto et al., 2015; Gjelsvik & Syre, 2016).

4.3 | Methodological considerations

The trustworthiness of our study is ensured through in-depth descriptions of the study design, selection and sampling methods, data collection and analysis, and the reports on each item of the Consolidated Criteria for Reporting Qualitative Research (Tong et al., 2007) and Standards for Reporting Qualitative Research (O'Brien, Harris, Beckman, Reed, & Cook, 2014) checklists. Regardless, our study has several methodological challenges. The participants in our study originated from a geographically constricted area and took part in one single intervention. None of the participating patients had an Expanded Disability Status Scale higher than 6.5, which means that our findings have limited transferability to patients severely affected by MS. Group size probably matters, and our study is limited to illustrating the possibilities and challenges in individual adaptations for groups of three patients. Additionally, we acknowledge the complexity of investigating interactions and reflections regarding clinical meetings. However, our rich data set of observations complemented by interviews strengthens the trustworthiness of our empirical data.

5 | CONCLUSION

Our study's empirical findings indicate that interaction strategies and social system settings in a group-based intervention for people with MS affect opportunities and challenges when adapting physiotherapy treatment to individual patients' needs. Embedded physical interactions, such as hands-on techniques and facilitation, promote opportunities to plan and adapt exercises to each specific patient's needs, whereas the somewhat contradictory facets of collectivity and individuality within the same clinical encounter present the challenge of individual adaptations when patients' impairment levels are divergent. Although challenging and demanding, our study illustrates that the benefits of individualization and being part of a group are both obtainable in our investigated small group physiotherapy intervention for people with MS.

5.1 | Implications for physiotherapy practice and future studies

The results of our study imply that PTs should possess interaction strategies that address physical aspects of communication to adapt exercises to the patients' individual treatment needs. Additionally, PTs should be aware of potential challenges in balancing collectivity and individuality in group interventions and should attempt to preserve the benefits of being in a group *and* individualization. However, future studies with different designs, samples, and contexts are needed. A particularly interesting study would be an RCT in which a standardized exercise protocol is compared with a protocol in which individualization was thoroughly emphasized. Such a study would contribute to the discussion about the necessity of individualization in neurological physiotherapy.

AUTHORSHIP

All authors qualify according to the criteria from ICMJE (International Committee of Medical Journal Editors).

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

AUTHOR CONTRIBUTIONS

Andreas Falck Lahelle planned the study design, acquired the data material, conducted the analysis, and drafted the manuscript. Gunn Kristin Øberg planned the study design, cosupervised the study, participated in the analysis, and revised the manuscript critically several times. Britt Normann planned the study design, supervised the study, and revised the manuscript critically several times.

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APPENDIX A

OBSERVATION GUIDE GROUP TRAINING

Theme	Possible focus of observation
Framework	Date? Where does the group training take place? Who participates in the group training? How much time is spent on the group training? How are the room and facilities? Are there any equipment available or/and used?
Introductory part of the group training	How is the introductory part carried out? What are the actions of the PT and what are the actions of the patient? What are they talking about, and how is the conversation carried out? How is the professional appearance of the PT? How are the patients informing the group about how they are doing? In what manner is the nonsupervised home training discussed?
Main part of the group training	What exercises are the group doing in the beginning of the training? How are the exercises explained or showed to the patients? How is the appearance of the PT as a group leader? How is the atmosphere in the group? What kinds of adaptations are conducted? • Equipment? • "Hands on" techniques? • Verbal instructions? How is the interaction between the PTs and patients? What does the PT emphasize on? How is the training session set up? • How many exercises? • Do the patients perform different options of the exercises? How is the focus on goal attainment? What is emphasized in the communication? Are the exercises individualized? • If yes, how? How is the relaxation part conducted? How is the group dynamics? How are the participants motivated? How is the progression of the exercises? How is the intensity? Is the movement quality emphasized?
Closing	Is there a relation between the exercises in the group session and the recommended home exercises? • How are they interrelated? What does the PT communicate to the patients at the end of the group session? How is the group session closed? What do the patients express at this stage? How is the balance retesting conducted? What happens when the PT presents the recommended home exercises?

APPENDIX B

INTERVIEW GUIDE FOLLOWING GROUP TRAINING

Theme	Possible questions
The PTs' experiences with conducting individualized group-based core stability training.	How many groups have you conducted? Generally speaking, how did you think it was to conduct this kind of group training? What did you find important to communicate during the first session? How did you introduce the concept of balance? • Core stability? • Spike ball and distal input? Did the patients have any questions? How did you find these elements to work out: 1. Group situation? 2. Content of the training? 3. Individualization? 4. "Hands on" and "hands off." 5. The exercise library? 6. Progression? 7. Equipment (balls, plinths, mats)? 8. The patients' motivation? How did you experience your role as a PT? How did you feel that you made use of your specific knowledge and skills in neurological physiotherapy? How did you find the atmosphere in the group? Are there any special moments you which to elaborate? How do you think it was to adjust the dose and intensity in the exercises? Did you meet any challenges during the session? • How did you handle these challenges? What things worked out good, and what did not? Did anything special occur in the meeting whit the group or individuals of the group that you want to elaborate? Are there anything you wish you had done different? How do you think group treatment is compared to your experiences with individual treatments? What did it mean for you to participate in this group training project? How did you think it was to give the patients home exercises?
PTs' 5-day theoretical and practical training prior to the intervention.	How did you experience the content of the training prior to the group sessions? What do you think about: • The relation between theory and practice? • The scope? • Time? How did the exercise manual affect your organization of the intervention? Regarding the training: • What worked out good? • What did not work out good? • Is there anything you think should have been done differently? What kind of previous knowledge do you think is necessary for PTs to possess to profit from the training? What kind of competence do you think is important to emphasize on in such training? What kind of previous knowledge and competence do you think are necessary to possess to do this kind of intervention?
Communication with the specialist healthcare service and care pathway	In your experience, how is the cooperation between the specialist health service and the primary health-care? • In general? • During this current project? Are there any specific incidents regarding cooperation in the healthcare services you can elaborate on? Do you have any reflections regarding the information flow between primary health-care and the specialist health-care? • In general? • During this current project? How do you think the cooperation with other professionals in the healthcare system works out?
Thoughts regarding the future	Do you have any thoughts regarding the future and treatment of people with multiple sclerosis? How do you think that participation in this project will affect your future clinical work?
Closing question	I want you to think about the time you have spent during this project. Are there any experiences you want to elaborate on that you think can be beneficial for other people with multiple sclerosis, or other PTs, to know about?

PAPER III

Lahelle, A.F., Øberg, G.K. & Normann, B. Group dynamics in a group-based, individualized exercise physiotherapy intervention for people with multiple sclerosis – a qualitative observational and interview study. In second review with Physiotherapy.

Group dynamics in a group-based, individualized exercise physiotherapy intervention for people with multiple sclerosis – a qualitative observational and interview study

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Abstract

Background Group-based physiotherapy is a common and beneficial intervention for people with multiple sclerosis (MS). Most group interventions are not individually adapted to each participant's needs. Evidence on how individualization and group elements can be combined in a clinical setting is lacking.

Purpose The purpose of this study was to expand the knowledge base in neurological physiotherapy by investigating the nature of group dynamics in a group-based, individualized intervention for people with MS.

Design Qualitative observational and interview study.

Setting Exercise sessions of GroupCoreDIST.

Participants Purposive sampling of forty patients with MS (Expanded Disability Scale (EDSS) 1.0-6.5) and six physiotherapists (PTs) with expertise in neurological physiotherapy.

Methods This study included thirteen non-participatory video observations (14 h 38 min) of exercise sessions complemented by 13 interviews (12 h 37 min) with PTs. Data were transcribed and organized in NVivo11 software and analyzed using systematic text condensation in an enactive theoretical framework.

Findings Two main categories emerged from our material. (1) *Individual systems affect group dynamics:* Individual perceptions of success through adapted and embodied approaches positively affected the dynamics of the group. (2) *Disease and exercise peer support:* Social support was a substantial product of dynamic group processes and was enhanced through the PTs' strategic focus on experience sharing.

Conclusion The findings from our study revealed that group dynamics benefit from individualization and the PTs' focus on experience sharing, contrary to the prevailing view that individualization and group-based interventions are mutually exclusive.

Introduction

Group-based exercise is a widespread physiotherapy intervention for people with multiple sclerosis (MS) [1], and related effect studies indicate improvements in several vital health domains, such as strength, gait, balance, fatigue, exercise tolerance and quality of life [2-6]. Peer support is additionally considered to be a major benefit in group-based exercise, which is not possible to achieve in one-on-one interventions [7-9]. Qualitative interview studies report that companionship, experience sharing and being accepted in a group are highly valued among patients with MS participating in group-based exercise [10-12]. To our knowledge, no studies[1] have investigated how peer support processes occur in the clinical setting, reflecting the need for qualitative observational studies to develop group-based interventions for people with MS.

In rehabilitation, physiotherapy is traditionally provided as either one-on-one or group-based interventions. One-on-one interventions are thought to provide greater effects on physical functioning, while group-based interventions provide greater impacts on the social aspects of support and motivation [7, 8]. According to Plow and colleagues [13], group-based therapy may not address patients' individual and complex needs and therefore conflicts with the prevailing principle of individualization in MS rehabilitation [14-17]. To include individualization in group-based therapy, Normann and colleagues [18] developed an intervention (GroupCoreDIST) with specialized and adjustable balance exercises for people with MS, where the benefits of collectivity and individuality are combined. Thus, to explore how group dynamic processes take place in group-based and individualized physiotherapy interventions, qualitative investigations of GroupCoreDIST exercise sessions served as the basis for our study.

Individualization: A prevailing principle in physiotherapy where assessments and treatments are adapted to a patient's specific needs concerning physical and cognitive functioning, underlying impairments and the patient's life situation and desires (19,20). Individualization implies that patients must engage in tasks relevant to their problems (25) and that different causes of movement problems are detected through a thorough examination and addressed in treatment (24,21). Individualization is particularly vital in MS rehabilitation where symptoms and movement problems are complex and heterogeneous (14,15). Research on individualization in physiotherapy for people with MS is considerably limited, probably due to the rigorous standardization of interventions in clinical trials.

The scientific view of group dynamics is that they involve social processes that influence relations within groups [22, 23]. Originating from psychology, group dynamics mainly rely on cognitivist theories in which the body and movements (which are essential in physiotherapy [24, 25]) are omitted. Therefore, to enrich the understanding of group-based physiotherapy, theoretical perspectives that emphasize movements and the body are needed [26].

The body and movements are cornerstones of the *enactive approach*, which is the selected theoretical framework of our study. The enactive approach argues that understanding others, situations and the world emerge through an individual's movements and interactions with the environment and other individuals [27-29]. Enaction emphasizes subjective experience, bodily movement, and continuous interactions between the individual, the task and the environment [30], which renders the approach highly relevant for interpretation of clinical physiotherapy practice.

Considering the enactive approach, the dynamics of group-based interventions are affected by the context and by how physiotherapists (PTs) and patients interact with each other. Interaction processes emerge between people and consist of mutually influencing words, gestures and physical communication [31, 32]. Interaction can be particularly complex in an intervention such as GroupCoreDIST, where the PT must take care of each individual´s complex and specific needs *and* the group as a whole. Given these considerations,

[1] PubMed, MedLine and PEDro were searched using the keywords multiple sclerosis, group exercise(/training/treatment/therapy), physiotherapy, physical therapy, group dynamics(/atmosphere), qualitative research, interaction, communication, therapeutic alliance, embodiment, and enactive theory. The latest search was executed on 29.03.2019.

the enactive approach seems appropriate to adress the following aims of our study: (1) To explore the nature of group dynamics within an individualized group-based intervention for people with MS and (2) to investigate how PTs' interactional strategies affect such dynamics.

Methods

Design

As our research question aims to *understand* the content of group processes and interactions within the clinical encounter, we selected a qualitative methodology within the *interpretive* paradigm, where the world and knowledge depend on individuals' interpretations. Phenomenology, where lived experience is given primacy, and hermeneutics, where parts only make sense in relation to the whole, are the main philosophies of the interpretative paradigm and qualitative methodologies [33]. However, our study is not purely phenomenological or hermeneutical but relies on a more pragmatic methodology. Accordingly, the ability to choose among relevant, consistent and appropriate theoretical frameworks and analysis methods becomes flexible. The enactive theoretical framework complies with the interactional matters of our research question and emphasizes the most important elements of neurological physiotherapy: the body and movement. Specifically, regarding methods of data collection, we selected video observations of exercise sessions to capture critical information about PTs' and patients' interactions within a group setting, which were complemented by in-depth interviews to obtain the PTs' reflections regarding the strategies used to generate positive group dynamics.

Context of the study

The data for this study was collected from GroupCoreDIST[2] exercise sessions, a group-based and individualized intervention for people with MS [18]. In GroupCoreDIST, groups of three patients exercise together in an intensive six-week period with three 60-minute supervised sessions and two 30-minute unsupervised home sessions per week. To include specific adaptations, the PTs individually examine each patient and then choose options from among 33 predefined core stability exercises, which each consist of five levels of difficulty. According to the GroupCoreDIST intervention, all patients perform the same exercise simultaneously but at different levels of difficulty according to their impairments.

Participant selection and sample

The participants in our study were purposely sampled from a randomized controlled trial (RCT) investigating the effect of GroupCoreDIST [18]. All 13 groups (patients n=40, PTs n=6) from the RCT were selected. We observed the exercise sessions and interviewed PTs at several stages of the intervention period, including the first session, last session and at least one session during each week of the six-week program. The textbox presents the inclusion and exclusion criteria, and Table 1 presents the participants' characteristics. The last author invited patients and PTs to participate by mail. All participants signed informed consent documents, and none refused to participate or dropped out.

Inclusion criteria: Diagnosed with MS and registered at the MS outpatient clinic in Norland Hospital Trust, Bodø, Norway, living in one of the six municipalities of the study, ≥18 years of age, able to sign written informed consent and an Expanded Disability Status Scale (EDSS) score of 0-6.5.

Exclusion criteria: pregnancy at the time of inclusion, exacerbation in the previous 2 weeks before enrollment and other acute conditions.

[2] The intervention was originally named GroupCoreSIT, but the letter D (DIST) was added after further development and analysis of the RCT. D – dose, dual task, I – individualized, intensive, insights, S – selective movements, specificity, stability, somatosensory activation, T – training, teaching, task-oriented.

Table 1: Participant characteristics. Originated from 6 municipalities in Norway (population 1 000 - 50 000)

Patients (n=40)	
Age at intervention, mean, (SD) range	52.2, (13) 24-77
Gender	
Male, n, (%)	27, (68)
Female, n, (%)	13, (32)
Type of MS	
RRMS, n, (%)	33, (83)
SPMS, n, (%)	5, (12)
PPMS, n, (%)	2, (5)
Years of MS, mean, (SD) range	10.2, (7.9) 0.5-33.0
EDSS[3], mean, (SD) range	2.4, (1.7) 1.0-6.5
Physiotherapists (n=6)	n
Gender	
Male	1
Female	5
Years since graduation	
0 – 5	0
6 – 10	2
> 10	4
Number of PTs with a Master's degree	2
Years of experience with neurological conditions	
0 – 5	1
6 – 10	1
> 10	4
Experience with group interventions	6
Workplace[4]	
Primary health care with operating grant	3
Primary health care	3

Data collection

From September 2015 to March 2016, the first author conducted non-participatory video observations of 13 group sessions for a total time of 14 h 38 min. A hand-held video camera with a zoom feature was used to move around the room and focus on details of the interactions in the group. Following the observations, the first author conducted 13 theme-based audio-recorded interviews with the six PTs at the PTs' facilities for a total time of 12 h 37 min. We imported, transcribed and organized the data and field notes in the NVivo11 software [34]. See appendixes 1 and 2 for the interview and observation guide (pilot tested).

Analysis

In our analysis of the data material, we used Malterud's [35] method *systematic text condensation*. This pragmatic method is appropriate for our study as the research question assumes that both observations and interviews serve as data collection methods, and the method is not restricted to specific theoretical perspectives. However, systematic text condensation is inspired by methods grounded in phenomenology,

[3] Expanded disability status scale (EDSS) – a measure widely used in clinical trials and the assessment of people with MS to quantify disability and monitor changes in disability over time. 1.0 – walking independently; 6.5 – able to walk 20 m with two crutches [37].

[4] In Norway, PTs working in public primary healthcare work in a private practice or have a fixed salary. A PT can run his or her own practice in which he or she receives an operating grant combined with a preset fee per patient from the government health financial management program plus a copayment from the patient. The PT can also be a public-sector employee with a fixed salary from the municipality.

which is also one of the foundations of our selected enactive framework [30]. We followed each of the four steps of the systematic text condensation method (see the textbox for the general procedures and figure 1 for a specific example) and interpreted the meaning of our data through the enactive notions of sense-making and interaction [28, 31, 32].

Systematic text condensation: Systematic text condensation is a strategy for analyzing qualitative data that emphasizes utility, feasibility and transparency (35). The strategy is pragmatic and allows incorporation of several types of empirical data and various theoretical frameworks. The strategy includes four steps:

1 - Total impression: Read through the data material with an open mind to acquire an overall of the whole. The research question and professional discipline guide the process. This process results in approximately four to eight *preliminary themes*.

2 - Identification and sorting of meaning units: Organize fragments of the data (*meaning unit*) that are relevant for our research question. Only parts of the whole text are meaning units. Each meaning unit is coded – meaning units with the same code constitute a *code group*. Code groups can be split into *subgroups*. The names of the subgroups are determined from the preliminary themes. Flexibility is emphasized and adjustments are encouraged. Software can be used to improve order. This step results in three to six code groups.

3 - Condensation: In this step, the content of each subgroup is abstracted – we write a *condensate* (a short, artificial summary) from each subgroup. At this step, the condensates are decontextualized from the whole. The text is written in a first-person format as a reminder to represent each source of information. The condensate is a basis for the result presentation, which is created in the fourth and final step.

4 - Synthesis: In this step, the decontextualized condensates are recontextualized – we put the pieces back together to form a whole. The condensates are transformed *to analytic texts*, which serve as the result presentation in a paper or report. This step of the analysis considers existing and relevant empirical findings and theory, which are further detailed in the discussion section. At this stage, the text is re-narrated in a third-person format. We validate whether the analytic texts are good representations of the whole. We select and include a few examples from our data material (observed situations or quotes, etc.) that illustrate the analytic text. Lastly, each analytic text is assigned to a category that represents the main findings of the analysis.

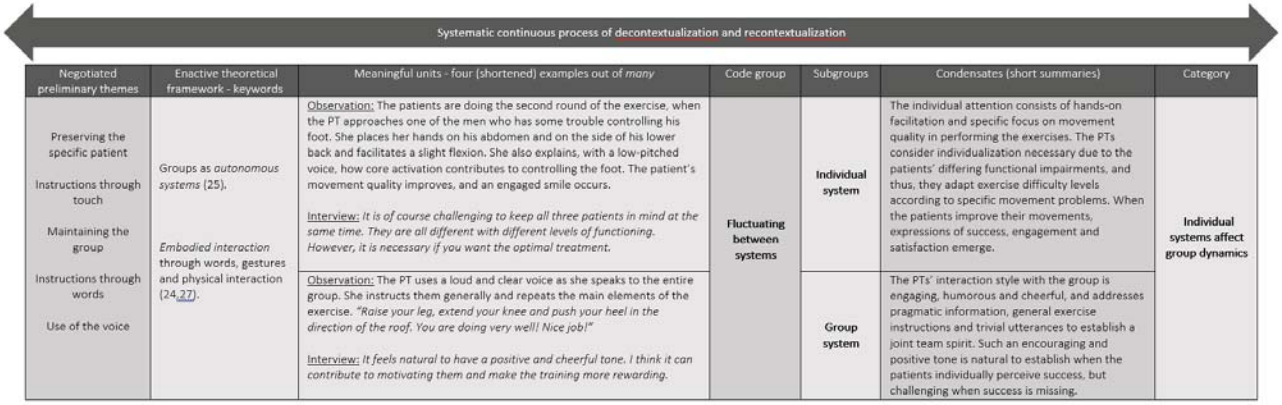
Step 1: To obtain an initial overview of the material, the first author read the transcripts from the interviews and watched the video observations multiple times. Data concerning the research question were presented to the second and last authors, which led to negotiations of possible *preliminary themes*.

Step 2: After establishing preliminary themes, the first author proceeded with identifying meaning units – fragments of text from the interviews (approximately one to four sentences) or videos of the observations (approximately 20 seconds to one minute) related to the research question. We assigned a code to the meaning units with a name that described their contents. We developed the codes considering the enactive approach and prevailing principles of neurological physiotherapy. The first author presented these codes and their contents to the second and last authors, and further discussions followed. We repeated this process several times. We sorted the codes that concerned the same content into two groups, each with two subgroups.

Step 3: We used the content (text and video) of each subgroup to write a condensate – a short artificial summary in first-person format. To write these condensates, we continued our interpretations considering the theoretical perspective and our physiotherapy knowledge. This text served as a basis for the result presentation that emerged in the fourth and final step.

Step 4: We rewrote the condensates to a text in third-person format, which is suitable for a result presentation in a scientific journal. We validated the text by carefully comparing the texts to their original contexts. For the result presentation, we selected specific quotes from the interviews and written

descriptions from the observations that illustrated the content. The names of the code groups and the subgroups changed as the text developed. The final names are presented in table 2.



Figur 1 Analytic process, example category 1, Individual systems affect group dynamics

Table 2: Overview of categories and subgroups

Category	Individual systems affect group dynamics		Disease and exercise peer support	
Subgroup	Individual system	Group system	Disease-dependent experiences	Exercise-specific experiences

Research team and reflexivity

The first, second and last authors are neurological PTs with experience in primary and secondary healthcare. The first and last authors have clinical experience with adults with MS, and the second author has a background in pediatrics. The second and last authors are experienced qualitative researchers with previous publications addressing enactive theoretical frameworks. All authors share an interest in enactive theories and consider the approach to be an adequate framework for studying physiotherapy. The last author is one of the two PTs who developed the GroupCoreDIST intervention, which necessitated particular awareness of our predispositions. We analyzed the data material theoretically, critically and systematically, resulting in a balanced presentation of the findings.

Findings

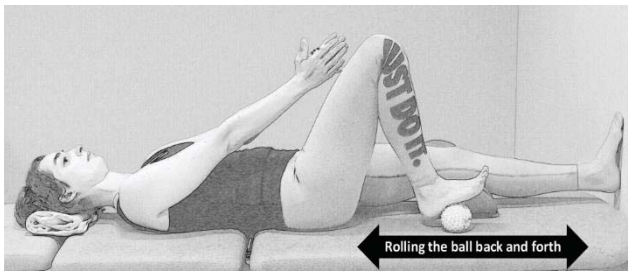
The findings are presented as analytic text based on a combination of video and interview material. Illustrative situations from the observations and quotations from the interviews with the PTs are presented in text boxes.

Individual systems affect group dynamics

The establishment of positive dynamics in the exercise groups was affected by how the PTs managed to move between each individual patient and the group as an overall entity. The PTs' interaction strategies differed between the individual and the group, and a relationship was apparent between success at an individual level and how dynamic processes within the group evolved.

Individual system: In most of the group sessions, the individual attention given to the patients by the PTs mainly consisted of hands-on facilitation and a specific focus on each individual patient's movement quality. The PTs considered such individualization necessary due to the patients' differing impairments, and they therefore adapted the exercise levels of difficulty according to each specific patient's needs. When the patients improved their movements, joint expressions of success, engagement and satisfaction emerged.

Observation: In a supine lying exercise (figure 2), *the PT notices that one of the patients extends his spine and has trouble controlling the direction of his foot and the ball. The PT approaches him, places her hands on his pelvis and abdomen, and facilitates slight flexion through activation of the abdominal muscles. "If you push your lower back down to the plinth, stabilizing muscles will contribute to controlling your foot," the PT says in a low-pitched voice. The patient continues the exercise with firm contact between the plinth and his lower back. He seems focused and achieves a more controlled back-and-forth roll of the ball. The patient clearly values the improved movement experience, as he utters "Much better!" with an engaged smile on his face.*



Figur 2 Supine exercise with a small ball (edited/anonymized photo from the GroupCoreDIST manual)

In the interviews, the PTs stated that continuous movement between the patients was challenging as they had to manage three individual patients at the same time. Additionally, the PTs stated that they had to balance their attention between the patients and the group as an entity to address the needs of each individual *and* maintain a positive joint group spirit. Sometimes, when the patients' functional levels differed substantially, the PTs omitted individualization, and the organization of the exercise session was adjusted such that all patients performed the exercises at the same level of difficulty. In these groups, patients with low functional levels seemed to be frustrated when they failed to perform exercises that were too difficult, and patients with high functional levels seemed to lose some engagement when performing exercises that were too easy. As illustrated in the next subgroup, both the presence and absence of individualization affected the dynamics of the group.

Group system: The PTs' interactions with the group as an entity were mainly characterized by engaging, humorous and cheerful verbal interactions, which engendered a joint team spirit. The example in the text box is from the same exercise situation as presented in the previous subgroup ("individual system"), which illustrates both the joint team spirit and the fluctuation between the individual system and the group system.

Observation: *After helping the patient in the supine lying exercise, the PT turns to the group with a loud and clear voice: "Extend your arms in the direction of your knee, remain stable, and roll the ball back and forth slowly and with control". The PT pauses for a few seconds as she continues to move through the room. "And don't forget to breathe!" The group breaks into a laugh. "Yes, thank you, that is a very good advice, we will do our best", says one of the patients, and the laughter continues.*

According to the interviewed PTs, such encouraging and positive dynamics were easy and natural to establish when the patients individually demonstrated success and improvements. However, in groups where success and improvements were lacking, the PTs stated that establishing a joint positive team spirit was challenging, which was also confirmed in the observations. These findings illustrate how individual perceptions of meaningful achievements affect dynamics at a group level.

Disease and exercise peer support

Interactions between the patients themselves also contributed to the dynamics of the group. Two main facets of these interactions emerged, namely, general sharing of disease-dependent experiences and specific here-and-now discussions regarding exercise perceptions and improvements. These processes of interaction emerged naturally between the patients but were enhanced when the PTs strategically arranged for such sharing.

Disease-dependent experiences: The group sessions became an arena in which the patients shared various disease experiences that did not necessarily concern the specific exercises, such as medication-related matters and social support for newly diagnosed patients. The PTs considered such sharing a significant part of the intervention, which often took place before and after the actual exercise sessions. The textbox contains a quote from one of the interviewed PTs explaining how the group warmly took care of a newly diagnosed and worried patient.

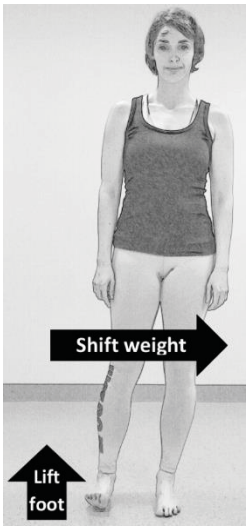
> Quote: *"They took such good care of her, comforted her and shared experiences from the time that they were newly diagnosed. An "experienced" patient even invited her to a café meeting with another newly diagnosed woman of a similar age… …So this has really been an opportunity to find peer support, and I think it is very good to have group dynamics*

Exercise-specific experiences: The interactions between the patients within the actual training session shifted from disease-dependent matters to a more detailed exchange of here-and-now perceptions of the exercises. These interactions seemed to make the patients attentive to each other's improvements, and positive remarks were common.

> Observation: *The group performs a standing forefoot lifting exercise (Figure 3), and one of the patients comments to a male patient with severely reduced balance, "Your balance is better!". "Yes, it's unbelievable!" the man replies with a proud smile on his face. The third patient also smiles and nods her assent as the group continues the exercise, and the PT asks if they perceive that the foot is lighter to lift compared to before they joined the group. "Yes, it is easier, but the toes still bend on the right foot sometimes," one of the patients states. "Yes I agree," a third patient replies, "my toes still bend when I am out of balance".*

The PTs stated that giving the patients opportunities to verbalize their perceptions was important to learn from each other's experiences. The PTs considered that exchanging specific perceptions improved the focus on movement quality and progress and clarified that each patient had different functional levels and movement problems. Thus, the group became a safe place where they could learn and work at their own individual levels, while also sharing their experiences and benefitting from being part of a group.

> Quote. *"The support from the group is fundamental because it reduces the fear of failure and makes it clear that it is their own feeling of progress that matters. Yes, they are exercising individually at the same time as they are being part of a group."*



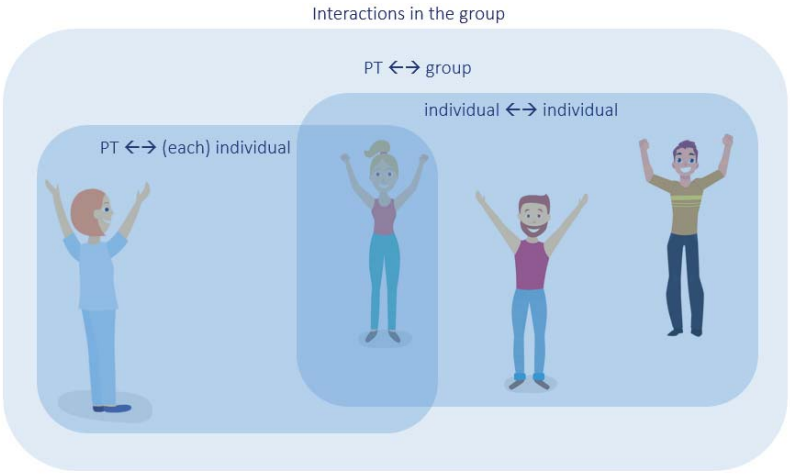
Figur 3 Forefoot lifting exercise (edited/anonymized photo from the GroupCoreDIST manual)

Discussion

Our study's aims were to explore the nature of group dynamics within an individualized and group-based intervention for people with MS and to investigate how PTs' interactional strategies affected such dynamics. The findings revealed that the patients' individual movement success and the PTs' strategies for giving the patients opportunities to share their experiences substantially affected the dynamics of the groups. Patient-specific adaptations and bodily aspects of the interactions were important, implying that hands-on facilitation and individualization are beneficial in group interventions.

Success and improvements at an individual level contributed to a positive joint group spirit, and the absence of individual success seemed to be detrimental to the group spirit. Individualized approaches through hands-on facilitation were clear prerequisites for such success, illustrating the significance of physical interactions in clinical meaning-making processes [36]. From an enactive viewpoint [27-29], the socially situated, moving and perceiving body is essential to sense-making and contributes to our interpretation of patients' perceptions of improvements as powerful tools in physiotherapy. Thus, it seems appropriate to criticize the traditional view of individualized and group-based interventions as mutually exclusive [7, 8, 13], and rather to welcome individual adaptations as an integrated approach within group settings.

However, individualization within a group can be challenging, and our findings illustrate how the absence of patient-specific attention also affects the group as an entity. When success and improvements were difficult to achieve for each patient, for example, if individualization was omitted due to widely differing functional levels, the atmosphere in the group deteriorated and the patients expressed disengagement. Accordingly, the dependent relationship between each individual patient and the group as an entity implies that PTs should possess strategies to combine individuality, for example, specific hands-on approaches that provide a patient with positive movement experiences, and collectivity, for example providing engaging and humorous instructions to the entire group.



Figur 4 Several interaction systems

Interactions between the patients themselves played a significant part in the intervention and were enhanced when the PTs encouraged the patients to share their disease-related experiences. These findings illustrate how the group became an arena of social support, which is in accordance with previous research [10-12]. Our findings complement these previous studies by elucidating how the PTs' interactional strategies affected the patients' opportunities for such sharing. When the PTs invited the patients to verbalize their experiences, shared reflections within the group seemed to establish a joint awareness and expanded the patients' insights and engagement. Similar processes were described in a study investigating individual treatment settings [37], which together with the results of this study underline the significance of integrating bodily experiences as part of communication in physiotherapy encounters.

Strengths and limitations

The combination of observations and interviews strengthens our study's trustworthiness and elucidates an uninvestigated field of physiotherapy. Preconceptions were continuously questioned throughout the

research period, and validity and reliability are provided through descriptions of the methods, which report each item of the COREQ [38] and SRQR [39] checklists. Nevertheless, readers should consider that all patients had EDSS[3] scores ≤ 6.5, originated from the same geographic area, and underwent one type of intervention. All data in our study originate from an RCT, which potentially misrepresents ordinary clinical practice. The PTs in our study were probably more experienced and skilled than the average PT working in Norwegian municipalities, which also may misrepresent ordinary clinical practice. The patients and the PTs were asked whether they felt that the presence of the researcher and the camera influenced them. The typical answer was: "After a few minutes, I totally forgot that you were here". However, we assume that the presence of the researcher and the camera at least influenced the participants subconsciously, and thus influenced the natural picture of the clinical encounter.

Conclusions and implications

Individual success and improvements through individualized and physical approaches positively affected group dynamics in a group-based intervention for people with MS. These findings contrast with the view that group-based and individualized interventions are mutually exclusive. Social support is a substantial product of dynamic group processes, which are enhanced through PTs' strategic focus on bodily experience sharing. PTs should be aware of how their interactional strategies affect group dynamics and include specific and adapted approaches in group settings. Future studies with different designs, samples and contexts are needed. The patient perspective is particularly relevant in developing group-based interventions in physiotherapy.

Ethical approval

The study was conducted according to the Deceleration of Helsinki and approved by The Norwegian Regional Committee for Medical Research Ethics (REK South-East: 2014/1715-7).

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Conflict of interests

The authors report no conflict of interests.

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APPENDIX 1

Informed consent form for physiotherapists (in Norwegian)

Forespørsel om deltakelse i forskningsprosjektet

”Innovative Physiotherapy and Coordination of Care in People with MS: A Randomized Controlled Trial and a Qualitative Study”

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å få ny kunnskap om intensiv gruppetrening for personer med multippel sklerose (MS). Hensikten med studien er å undersøke om individuelt tilpasset gruppebasert intensiv trening, har effekt på balanse, gangfunksjon, daglige aktiviteter og helserelatert livskvalitet sammenlignet med standard oppfølging for personer med MS, og om gruppetrening er samfunnsøkonomisk. Det søkes også etter å få innsikt i deltakernes erfaringer med å delta i dette treningsopplegget, samt erfaringer med standard oppfølging i kommunen. Videre søker prosjektet å få kunnskap om samhandling mellom MS-poliklinikken og kommunehelsetjenesten. I tillegg søkes innsikt i hvordan treningen gjennomføres og hvilke erfaringer fysioterapeutene har med å gjennomføre denne gruppetreningen. Denne forespørselen gjelder denne sistnevnte delen av studien og du er valgt ut fordi du er en av kommunefysioterapeutene som gjennomfører intervensjonen i studien som gjennomføres med deltakere fra kommunene Bodø, Fauske, Rana, Meløy, Rødøy og Vågan i samarbeid med MS-poliklinikken ved Nordlandssykehuset HF, Bodø. Nordlandssykehuset HF, Bodø er ansvarlig for studien som foregår i samarbeid med Universitetet i Tromsø, Norges arktiske universitet.

Hva innebærer studien?
Det skal gjennomføres observasjon med videofilming av undersøkelse av en pasient i hver treningsgruppe før intervensjonsperioden starter; til sammen 12 observasjoner. Disse observasjonene etterfølges av dybdeintervju med fysioterapeuten som utførte den individuelle undersøkelsen. Samtalen vil dreie seg om refleksjoner omkring samhandlingen i undersøkelsen samt opplæringen som du har gjennomgått. Videre skal det gjennomføres observasjon og videofilming av en treningstime i hver av de 12 treningsgruppene i løpet av intervensjonsperioden på 6 uker. Disse observasjonene utfylles med dybdeintervju med den fysioterapeuten som leder den aktuelle treningstimen. Samtalen vil dreie seg om erfaringer og refleksjoner knyttet til å gjennomføre intervensjonen, opplæringen i forkant og pasientforløp. Det registreres navn, profesjon, arbeidssted og antall år erfaring, videreutdanning som fysioterapeut. Intervjuene tas opp som lydfiler.

Mulige fordeler og ulemper
Det er ingen risiko forbundet med å delta i studien. Mulig fordel er at du får anledning til å dele dine erfaringer og bidra til å videreutvikle tjenestetilbudet til personer med MS. Du må sette av inntil en time for gjennomføring av hvert av intervjuene og det kan oppleves som en ulempe. Videre kan det oppleves som en ulempe å bli observert og filmet. Imidlertid vil dette gjennomføres så diskre som mulig og du får anledning til å snakke med fysioterapeuten som filmer etterpå. Mulig fordel med å la seg observere i praksisutøvelse er at du gjennom dette bidrar med kunnskap til fagutvikling som ikke kan formidles på annet vis enn gjennom handling.

Hva skjer med informasjonen om deg?
Informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Alle opplysningene vil bli behandlet uten navn og fødselsnummer eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger og prøver gjennom en navneliste. Informasjon og data lagres forsvarlig ved Universitetet i Tromsø, Norges arktiske universitet. Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg.

Informasjonen om deg, lydfilene og videomaterialet avidentifiseres når prosjektet er slutt 31.12.2019 og slettes fem år senere, seinest den 31.12.2024

Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Frivillig deltakelse
Det er frivillig å delta i studien. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for din videre virksomhet som fysioterapeut. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Om du nå sier ja til å delta, kan du senere før dataene har inngått i analyse og publikasjoner trekke tilbake ditt samtykke. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte prosjektleder Britt Normann, telefon 99614941, e-post britt.normann@uit.no

Utlevering av materiale og opplysninger til andre
Hvis du sier ja til å delta i studien, gir du også ditt samtykke til at avidentifiserte opplysninger utleveres til forsker i prosjektet som arbeider ved Nordlandssykehuset, Universitetet i Tromsø Norges arktiske universitet, Nasjonalt kompetansesenter for telemedisin, UNN, University of Hasselt i Belgia, University of Memphis i USA .

Informasjon om utfallet av studien
Dersom du sier ja til å delta i studien har du rett til å få informasjon om utfallet/resultatet av studien. Informasjon om resultater og publiserte artikler vil du kunne få ved å henvende deg til prosjektleder Britt Normann telefon 99614941 eller e-post: britt.normann@uit.no

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

……..
Deltakers navn, blokkbokstaver

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

APPENDIX 2

Informed consent form for patients (in Norwegian)

Gruppebasert trening av balanse for personer med MS – Hoveddel – 28.8.2014

Forespørsel om deltakelse i forskningsprosjektet

"Innovative Physiotherapy and Coordination of Care in People with MS: A Randomized Controlled Trial and a Qualitative Study"

Bakgrunn og hensikt
Dette er et spørsmål til deg om å delta i en forskningsstudie for å få ny kunnskap om virkning av gruppetrening og standard oppfølging for personer med multippel sklerose (MS). Hensikten med studien er å undersøke om individuelt tilpasset gruppebasert intensive trening, har effekt på balanse, gangfunksjon, daglige aktiviteter og helserelatert livskvalitet sammenlignet med standard oppfølging for personer med MS. Det søkes også etter å få innsikt i deltakernes erfaringer med å delta i dette treningsopplegget, samt erfaringer med standard oppfølging i kommunen og samhandling mellom MS-poliklinikken og kommunehelsetjenesten. Videre søkes innsikt i hvordan treningen gjennomføres og hvilke erfaringer fysioterapeutene har med å gjennomføre denne gruppetreningen. I tillegg undersøkes det om den nye fysioterapiformen er samfunnsøkonomisk. Du er valgt ut til å forespørres om å delta i studien fordi du har diagnosen MS, og bor i en av kommunene som studien skal hente deltakere fra: Bodø, Fauske, Meløy, Rana, Rødøy eller Vågan. Nordlandssykehuset er ansvarlig for studien, som foregår i samarbeid med Universitetet i Tromsø Norges Arktiske Universitet.

Hva innebærer studien?
72 personer med MS planlegges tatt med. Disse vil, ved loddtrekning fordeles i to grupper. Den ene gruppen gjennomfører individuelt tilpasser gruppebasert trening av balanse i lokalene til en fysioterapeut i kommunen. Den andre gruppen følges opp med standard oppfølging i kommunen og utgjør kontrollgruppen. Det er vanlig at standard oppfølging varierer. Noen har ulike former for fysioterapi eller deltar på andre aktiviteter, mens andre ikke gjør det. Alle deltakerne følger sin ordinære medisinske oppfølging.

For å delta i studien må du ha MS (uansett type), ditt funksjonsnivå kan være fra at du har minimale gang og balanseproblemer til at du kan gå minimum 20 meter med krykker (EDSS 1-6,5), og det må være mer enn 14 dager siden siste sykdomsforverring (atakk). Du kan ikke delta dersom du er gravid når studien starter, eller har akutte ortopediske skader som påvirker balanse og gange.

Treningsprogrammet for intervensjonsgruppen innebærer:

- Individuell undersøkelse hos kommunefysioterapeut med spesialkompetanse innen nevrologi, slik at gruppe-behandlingen kan tilpasses den enkelte deltaker.

- Deretter følger trening i grupper på tre deltakere, hvor balanse og bevegelseskontroll vektlegges. Den enkelte deltaker følges tett opp av fysioterapeuten. Hver gruppetrening varer i 60 minutter, 3 dager per uke i 6 uker. Deltakerne utfører i denne perioden egentrening hjemme i 30 minutter, to dager i uken, basert på øvelser fra gruppetreningen. Egentreningen kan deles opp og all trening tilpasses den enkeltes dagsform.

Før loddtrekning til intervensjons eller kontrollgruppe blir alle deltakerne testet hos nevrolog og fysioterapeut ved Nordlandssykehuset HF, Bodø. Reiseutgiftene til testing dekkes av Pasientreiser. Nevrologen skårer EDSS som viser ditt funksjonsnivå. Ved første testing vil alle deltakere også gi kort informasjon om høyde, vekt, alder, yrke, utdanning, om du er i jobb, om du røyker og standard oppfølging i kommunen. Fysioterapeuten vil teste deltakerne med ulike standardiserte balanse- og gangtester samt fire spørreskjema vedrørende gange, daglige aktiviteter og helserelatert livskvalitet. En av gangtestene vil bli videofilmet slik at fysioterapeuten kan skåre testen etterpå. Alle deltakere, også de som ikke mottar behandling, vil testes på nytt med de samme balanse- og gangtestene samt spørreskjema etter 6 uker, samt etter tre og seks måneder. Testing vil foregå ved Nordlandssykehuset HF, Bodø. Hver testsekvens tar inntil 60 minutter. For å registrere daglig aktivitetsnivå i avgrensede perioder vil alle deltakerne få låne en "aktivitesmåler" som er et lite armbånd/klokke. Denne skal brukes i uka etter at første testing er gjort, og deretter en uke etter hver testing hos fysioterapeuten. Deltakerne må sende aktivitesmåleren i ferdig utfylt og frankert konvolutt til prosjektleder etter bruk. I treningsperioden (6 uker) skal deltakerne føre en enkel treningsdagbok med avkryssingsskjema. Alle deltakerne skal registrere forverringer i sykdomsaktivitet i løpet av hele prosjektperioden i et skjema. Fysioterapeuten som gjennomfører alle målingene/testene vet ikke om deltakerne er i treningsgruppene eller kontrollgruppen.

Åtte til ti personer fra intervensjonsgruppen og fra kontrollgruppen vil bli intervjuet to ganger, første gang på slutten /rett etter at gruppetreningen avsluttes og det neste seks måneder senere. Samtalene vil dreie seg om deltakerens erfaringer med å delta i gruppetreningen, tiden etter avsluttet gruppetrening og samhandlingen mellom MS-poliklinikken og kommunehelsetjenesten. Samtalene med deltakere i kontroll-gruppen vil dreie seg om innhold og erfaringer med standard oppfølging. Intervjuene vil foregå i ditt nærmiljø eller ved Nordlandssykehuset HF, tas opp på lydband, og vil vare i maksimum 1 time.

For å utvikle ny kunnskap om det nye gruppebaserte fysioterapitilbudet skal 12 førstegangsundersøkelser hos kommunefysioterapeuten som skal lede gruppetreningen observeres og vidofilmes og det samme gjelder 12 gruppebehandlinger. Det vil til sammen bli 12 treningsgrupper, hver på tre deltakere. Observasjon og videofilming fordeles slik at alle gruppene blir dekket og gjennomføres så diskre og lite forstyrrende som mulig av en fysioterapeut.

Mulige fordeler og ulemper
Det er ingen risiko å delta i studien. Mulige fordeler ved å delta i intervensjonsgruppen er at treningen kan gi bedre balanse, gangfunksjon og funksjonsnivå i det daglige samt innsikt i trening og hva som påvirker balanse og daglige bevegelser. Videre kan det oppleves som en fordel å trene sammen med andre. Deltakerne i intervensjonsgruppen vil gå gjennom en intensiv periode med trening noe som kan føles krevende. Treningen vil imidlertid til en hver tid tilpasses den enkelte når det gjelder funksjonsnivå, symptomer og dagsform. Testingen, registrening av sykdomsforløp, treningsdagbok samt å ha aktivitetsmålerklokken på armen i til sammen fire uker kan oppleves som en ulempe. Imidlertid kan det være inspirerende å delta på slike målinger, da det gir den enkelte innsikt i egen situasjon. Det er gratis å delta. Utgifter til transport til og fra testing og behandling dekkes av pasientreiser. Observasjon og videofilming kan oppleves som forstyrrende og være en belastning. Imidlertid vil fysioterapeuten gjennomføre dette så skånsomt som mulig for deltakerne ved å oppholde seg i periferien av rommet og bevege seg minst mulig slik at forstyrrelsen blir minst mulig. Videre vil fysioterapeuten åpne for at deltakerne etterpå får si noe om hvordan det var å bli observert og filmet.

Frivillig deltakelse
Det er frivillig å delta i studien. Dersom du ønsker å delta, undertegner du samtykkeerklæringen på siste side. Du kan når som helst og uten å oppgi noen grunn trekke ditt samtykke til å delta i studien. Dette vil ikke få konsekvenser for din videre behandling. Dersom du nå sier ja til å delta, kan du senere trekke tilbake ditt samtykke uten at det påvirker din øvrige behandling. Dersom du trekker deg fra prosjektet, kan du kreve å få slettet innsamlede opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner. Dersom du senere ønsker å trekke deg eller har spørsmål til studien, kan du kontakte prosjektleder Britt Normann, Tlf. 99614941, e-post britt.normann@uit.no

Hva skjer med informasjonen om deg?
Testresultatene og informasjonen som registreres om deg skal kun brukes slik som beskrevet i hensikten med studien. Du har rett til innsyn i hvilke opplysninger som er registrert om deg og rett til å få korrigert eventuelle feil i de opplysningene som er registrert. Alle opplysningene og testresultatene vil bli behandlet uten navn og fødselsnummer, eller andre direkte gjenkjennende opplysninger. En kode knytter deg til dine opplysninger og testresultater gjennom en navneliste. Det er kun autorisert personell knyttet til prosjektet som har adgang til navnelisten og som kan finne tilbake til deg. Bruk av helsetjenester og kostnader ved disse vil bli innhentet gjennom kobling mot sykehusenes journalsystem (DIPS), Norsk pasientregister og HELFOs system for kontroll og Utbetaling av Helserefusjoner. Alle data lagres forsvarlig ved Nordlandssykehuset HF, Bodø. Lyd- og bildefilene slettes ved prosjektets slutt 31.12.2019, og avidentifiserte data og øvrige opplysninger vil bli slettet 5 år etter prosjektslutt, 31.12.2024. Det vil ikke være mulig å identifisere deg i resultatene av studien når disse publiseres.

Ytterligere informasjon om studien finnes i kapittel A – utdypende forklaring av hva studien innebærer.
Ytterligere informasjon om biobank, personvern og forsikring finnes i kapittel B – Personvern, biobank, økonomi og forsikring.
Samtykkeerklæring følger etter kapittel B.

Kapittel A- utdypende forklaring av hva studien innebærer

Kriterier for deltakelse

- Ha diagnosen MS
- Bo i kommunene Bodø, Fauske, Meløy, Rana, Rødøy eller Vågan
- Være 18 år eller eldre
- EDSS 1-6.5 (fra minimale symptomer til de som kan gå minimum 20 meter med to krykker)
- I stand til å gi informert samtykke
- Ikke gravid
- Ikke ha akutte ortopediske skader som påvirker balanse og gange

Gruppebasert balansetrening for personer med MS

Bakgrunnsinformasjon om studien
I Norge er det ca. 10000 personer med MS. Gange og balanse er ett av hovedproblemene for denne pasientgruppen. Individuelt tilpasset fysioterapi med moderat høy intensitet anbefales. Vi har i dag noe kunnskap om betydningen av trening av balanse og gange gjennom å styrke stabiliteten i mage/rygg, hofte/bekken og overkropp. Imidlertid er denne kunnskapen mangelfull, særlig når det gjelder trening i grupper. I forkant av denne studien er det gjennomført en liten studie som prøvde ut intervensjonen, og denne viste at alle gjennomførte treningen og viste lovende resultater med tanke på endret balanse og gange. Tilgang til spesialisert fysioterapi i kommunene er begrenset og gruppetrening vil kunne øke tilgjengeligheten til fysioterapeuter som er spesialisert i nevrologisk fysioterapi. MS-poliklinikken har en nøkkelfunksjon i forhold til koordinering av helsetjeneste-tilbudet til personer med MS. Foreløpig er det kun i spesialisthelsetjenesten de kan henvise videre til intensive treningsopphold. Studien søker å bidra med utvikling og innsikt i nye pasientforløp.

Behandling/oppfølging som pasienten får dersom personen velger å ikke delta i studien
Dersom du velger å ikke delta i studien vil du få den vanlige oppfølgingen i din hjem-kommune. Oppfølging av personer med MS varierer fra kommune til kommune og fra person til person. Standard oppfølging kan innebære en eller annen form for fysioterapi.

Undersøkelser den inkluderte må gjennom i studien
Det vil gjennomføres standardiserte tester på alle undersøkelsestidspunkter i studien. Testene er relevante og pålitelige for å måle balanse og gange. Videre er spørreskjemaene som brukes i forhold til å få innsikt i deltakernes opplevelse av endring i balanse, gang og daglige aktiviteter beregnet for personer med MS. Aktivitetsmålerne som deltakerne skal ha på armen er liten og lett og gir pålitelig informasjon om aktivitetsnivå. På et overordnet nivå kan vi si at vi måler både hvor fort deltakerne går, hvordan de går og hvordan de selv opplever at de går og hvordan balansen er både i ro og under bevegelse. De deltakerne som intervjues vil kunne komme fram med erfaringer fra deltakelse i gruppebasert trening av balanse eller standard oppfølging. Videre vil noen førstegangsundersøkelser hos kommunefysioterapeut og en gruppebehandling fra hver treningsgruppe på tre deltakere observeres og video-filmes.

Tidsskjema – hva skjer og når skjer det?
Etter at man har takket ja til å være med i studien blir man innkalt til første testing hos nevrolog og fysioterapeut på Nordlandssykehuset HF, Bodø. Deretter brukes aktivitetsmåleren i en uke og returneres så til prosjektleder i ferdig utfylt konvolutt. Deretter trekkes deltakerne tilfeldig av en datamaskin til treningsgruppen eller kontrollgruppen. Når en treningsgruppe i en kommune er har fått tre deltakere starter intervensjonsperioden med individuell undersøkelse hos kommunefysioterapeut etterfulgt av treningsperioden som varer i seks uker. Så følger ny testrunde. Denne gjentas etter tre måneder og etter 6 måneder. Observasjon og videofilming foregår når kommunefysioterapeuten gjør den individuelle undersøkelsen før treningsgruppene starter og observasjon og videofilming av gruppetreninger skjer i løpet av treningsperioden. Deltakere som bor i Fauske kommune får sin gruppetrening i Bodø kommune. Deltakere som bor i Meløy og Rødøy kommune får sin gruppetrening av på Nordtun i Meløy kommune. Øvrige deltakere får sin trening hos kommunefysioterapeut i hjemkommunen.

Pasientens/studiedeltakerens ansvar
Alle deltakerne har ansvar for å møte til tesing og registrere sykdomsforløp. Deltakerne i behandlingsgruppen har

ansvar for å delta i treningsopplegget, gjøre egentrening og registrere dette. For øvrig skal alle deltakere følge opp de medisinske anbefalinger som de har fått.

Gruppebasert balansetrening for personer med MS – Kapittel A og B – 28.8.2014

Informasjon underveis
Dersom ny informasjon blir tilgjengelig som kan påvirke din villighet til å delta i studien vil du så raskt som mulig bli orientert om dette. Du vil få opplysning dersom mulige beslutninger/situasjoner gjør at din deltagelse i studien kan bli avsluttet tidligere enn planlagt

Som deltaker i intervensjonsgruppene vil du få dekket treningen på vanlig måte, siden personer med MS har full refusjon. Reiseutgifter til og fra testing og behandling dekkes av Pasientreiser.

Kapittel B - Personvern, økonomi og forsikring

Personvern
Opplysninger som registreres om deg er navn, fødselsdato, kjønn, høyde, vekt, tidspunkt for diagnosen MS, type MS og funksjonsnivå registrert gjennom European Disability Score Scale (EDSS), medikamentbruk, fysioterapi og annen aktivitet de siste seks måneder, oppfølging i sykehus og kommunehelsetjeneste siste seks måneder, andre diagnoser, om du er gravid, bosteds-kommune, yrke, om du er i jobb, utdanning, om du røyker og sivil status. Videre registreres resultatene fra de standardiserte balanse- og gangtestene, spørreskjemaene og data fra aktivitetsmåleren. Andre opplysninger som vi ønsker å registrere om deg er opphold på rehabiliteringsinstitusjoner, sykehusinnleggelser, legekonsultasjoner i primærhelsetjenesten og spesialisthelsetjenesten, akuttinnleggelser, samt diagnostiske undersøkelser. Denne informasjonen vil bli hentet fra din pasientjournal, Norsk pasientregister og HELFO. All informasjonen du gir om deg vil anonymiseres, og vil bli lagret sikkert og beskyttet. Lydfilene og videofilmene vil bli lagret sikkert og beskyttet. Kobling mot sykehusenes journalsystem (DIPS), Norsk pasientregister og HELFOs system for kontroll og Utbetaling av Utbetaling av Helserefusjoner gjøres for å beregne om intervensjonen er samfunnsøkonomisk

Nordlandssykehuset HF, Bodø ved administrerende direktør er databehandlingsansvarlig.

Utlevering av materiale og opplysninger til andre
Hvis du sier ja til å delta i studien, gir du også ditt samtykke til at avidentifiserte opplysninger utleveres til forskere i prosjektet som arbeider ved Nordlandssykehuset HF, Universitetet i Tromsø; Norges Arktiske Universitet, Nasjonalt kompetansesenter for Telemedisin Universitetssykehuset Nord Norge, University of Hasselt i Belgia og University of Memphis i USA .

Rett til innsyn og sletting av opplysninger om deg og sletting av prøver
Hvis du sier ja til å delta i studien, har du rett til å få innsyn i hvilke opplysninger som er registrert om deg. Du har videre rett til å få korrigert eventuelle feil i de opplysningene vi har registrert. Dersom du trekker deg fra studien, kan du kreve å få slettet innsamlede opplysninger, med mindre opplysningene allerede er inngått i analyser eller brukt i vitenskapelige publikasjoner.

Økonomi
Studien er finansiert av Helse Nord HF og Universitetet i Tromsø. De økonomiske ytelsene er lønn til prosjektleder, en prosjektmedarbeider og to doktorgradsstudenter, samt driftsmidler og midler til utstyr. Det er ingen interessekonflikter mellom finansieringskilde og gjennomføring av studien.

Forsikring
Deltakerne i studien er dekket gjennom pasientskadeloven.

Informasjon om utfallet av studien
Dersom du sier ja til å delta i studien har du rett til å få informasjon om utfallet/resultatet av studien. Informasjon om resultatet og publiserte artikler vil du kunne få ved å henvende deg til prosjektleder Britt Normann telefon: 99614941 eller e-post britt.normann@uit.no

Samtykke til deltakelse i studien

Jeg er villig til å delta i studien

(Signert av prosjektdeltaker, dato)

.....

(Blokkbokstaver, prosjektdeltakers navn)

Jeg bekrefter å ha gitt informasjon om studien

(Signert, rolle i studien, dato)

APPENDIX 3

Observation guide examinations

Observation guide examination

Location: _____

Date: _____

Patient: _____

Therapist: _____

Theme	Possible focus of observation
Framework	Where does the assessment take place? Who participates in the assessment? Name of the PT? How much time is spent on the assessment? How is the room and facilities? Are there any equipment available or/and used?
Introduction of the consultation	How is the introduction carried out? What are the actions of the PT and what are the actions of the patient? What are they talking about, and how is the conversation carried out? How does the PT inform the patient regarding the assessment and the purpose of the assessment? What does the PT emphasize? How is the patient expressed?
Main part	What are the actions of the PT and what does he or she say? What are the actions of the patient and what does he or she say? Hoe is the interaction? What does the PT emphasize? How is the consultation composed? How is the relation between the assessment and the forthcoming intervention emphasized? What happens regarding individualization? What happens regarding identifying the movement problem? What happens regarding goal setting? What is emphasized in the communication? What is expressed by the PT and what is expressed by the patient? Is exploration of potential for improvement conducted? Are there are any changes in movement quality?
Closing	What does the PT say to the patient at the end of the assessment? How is the assessment finished? What does the patient express?

APPENDIX 4

Observation guide group sessions

Observation guide group training

Location: _____

Date: _____

Patient: _____

Therapist: _____

Theme	Possible focus of observation
Framework	Date? Where does the group training take place? Who participates in the group training? How much time is spent on the group training? How is the room and facilities? Are there any equipment available or/and used?
Introductory part of the group training	How is the introductory part carried out? What are the actions of the PT and what are the actions of the patient? What are they talking about, and how is the conversation carried out? How is the professional appearance of the PT? How are the patients informing the group about how they are doing? In what manners are the non-supervised home training discussed?
Main part of the group training	What exercises are the group doing in the beginning of the training? How are the exercises explained or showed to the patients? How is the appearance of the PT as a group leader? How is the atmosphere in the group? What kind of adaptations are conducted? • Equipment? • "Hands on" techniques? • Verbal instructions? How is the interaction between the PTs and patients? What does the PT emphasize? How is the training session set up? • How many exercises? • Does the patients perform different options of the exercises? How is the focus on goal attainment? What is emphasized in the commination? Are the exercises individualized? • If yes, how? How is the relaxation part conducted? How is the group dynamics? How are the participants motivated? How is the progression of the exercises? How is the intensity?

	Is the movement quality emphasized?
Closing	Is there a relation between the exercises in the group session and the recommended home exercises? • How are they interrelated? What does the PT communicate to the patients at the end of the group session? How is the group session closed? What does the patients express at this stage? Hoe is the balance re-testing conducted? What happens when the PT present the recommended home exercises?

APPENDIX 5

Interview guide examinations

Interview guide following examination

Location: _____

Date: _____

Patient: _____

Therapist: _____

Theme	Questions, possible formulations
Background information	- Let us start talking a little bit about yourself. - When did you complete your education? - What is your degree and/or specialty? - Do you have any post graduate courses? - Can you tell me about your work place? - How is a typical day at work for you? - What kind of patients do you normally see? - What kind of patients did you see earlier in your career? - Can you tell me about your experience with group interventions? - Can you tell me about your experience with people with MS?
Opening question	I think we can continue talking a little bit about the assessment and the study that you and your patients participates in. To begin with, is there something regarding participation of the study you want to tell me about?
Experiences from the assessment, the first clinical encounter; introduction and framework.	- This was your first time meeting the patient, right? What do you think of the first meeting with the patient? - Let us talk about the history taking and the conversation with the patient. - What information did you think were important to get form the patient? - You also gave some information to the patient. Can you tell me about why you thought that was important? - You spent about xx minutes on the assessment. What do you think about this time frame?
Experiences form the physical examination; content.	I think we move over to the physical examination of the patient. - What did you fin important to examine? And why? - What did you emphasize in the examination? - How did you consider the patients movement problem? - Were there something in the examination you fond challenging? If yes, what? - Were there any particular incidents in the first meeting that touched you you? - The researcher talks about specific incidents form the assessment and invites the PT to talk about his or her considerations. - Exploration of movements? - Exploration of potential for change and improvements?

	- Information and explanations during the examination?
Individual assessment and planning the group training.	Let's move on to talk about the assessment an planning of the group intervention. - Are there anything with the assessment you find particular or important regarding the start-up of the group training? - What value do you think the assessment have when you are about to plan the group training for the patients? - How do you consider your role regarding the patient's motivation to participate in the intervention? - What reflections do you make regarding the patients goal settings? - With insights form the assessment in mind, what reflections do you make regarding choosing exercises and variations of the exercises?
Experiences form the training/education.	I think we can talk a little bit about the training you had with Ellen and Britt in June and August, and we will focus on the training regarding the assessment. - What reflections do you make regarding the training when thinking about the assessment you just did? - What do you think about the theory-part of the training? - What do you think about the clinical/practical part of the training? - What to you think abut the training's a) assessment, b) knowledge about the exercises? c) compose exercises and progression for the intervention period? - What worked out well, and what didn't? Are there anything you could have done differently? - Time frame? - Facilities and equipment?
Closing question	- Are there anything you think we have forgotten to talk about? Something to ad? - How do you think it will be to conduct the group intervention?

APPENDIX 6

Interview guide group-sessions

Interview guide following group training

Location: _____

Date: _____

Patient: _____

Therapist: _____

Theme	Possible questions
The PTs experiences with conducting individualized group-based core stability training.	How many groups have you conducted? Generally speaking, how did you think it was to conduct this kind of group training? What did you find important to communicate during the first session? How did you introduce the concept of balance? • Core stability? • Spike ball and distal input? Did the patients have any questions? How did you find these elements to work out: 1. Group situation? 2. Content of the training? 3. Individualization? 4. "Hands on" and "hands off". 5. The exercise library? 6. Progression? 7. Equipment (balls, plinths, mats)? 8. The patients' motivation? How did you experience your role as a PT? How did you feel that you made use of your specific knowledge and skills in neurological physiotherapy? How did you find the atmosphere in the group? Are there any special moments you which to elaborate? How do you think it was to adjust the dose and intensity in the exercises? Did you meet any challenges during the session? • What did you to deal with them? What things worked out good, and what did not? Did anything special occur in the meeting whit the group or individuals of the group that you want to elaborate? Are there anything you wish you had done different? How do you think group treatment is compared to your experiences with individual treatments? What did it mean for you to participate in this group training project?

	How did you think it was to give the patients home exercises?
Training	How did you experience the content of the training prior to the group sessions? What do you think about: • The relation between theory and practice? • The scope? • Time? How did the booklet with the exercise library matter? Regarding the training: • What worked out good? • What did not work out good? • Are there anything you think should have been done differently? What kind of previous knowledge do you think is necessary to profit from the training? What kind of competence do you think it is important to emphasize in such training? What kind of previous knowledge and competence do you think it is necessary to possess to do this kind of intervention?
Thoughts regarding the future	Do you have any thoughts regarding the future and treatment of people with multiple sclerosis? How do you think that participation in this project will affect your future clinical work?
Closing question	I want you to think about the time you have spent during this project. Are there any experiences you want to elaborate that you think can be beneficial for other people with multiple sclerosis, or other PTs, to know about?

APPENDIX 7

Approval from the Regional Committee for Medical and Health Research Ethics in Norway (in Norwegian).

REK
REGIONALE KOMITEER FOR MEDISINSK OG HELSEFAGLIG FORSKNINGSETIKK

Region:	Saksbehandler:	Telefon:	Vår dato:	Vår referanse:
REK sør-øst	Gjøril Bergva	22845529	07.07.2015	2014/1715/REK sør-øst D
			Deres dato:	**Deres referanse:**
			01.07.2015	

Vår referanse må oppgis ved alle henvendelser

Britt Normann
Universitetet i Tromsø

2014/1715 Gruppebasert trening av balanse til personer med MS: effekt, erfaringer og samhandling

Forskningsansvarlig: UiT Norges Arktiske Universitet
Prosjektleder: Britt Normann

Vi viser til søknad om prosjektendring datert 01.07.2015 for ovennevnte forskningsprosjekt. Søknaden er behandlet av leder for REK sør-øst på fullmakt, med hjemmel i helseforskningsloven § 11.

Endringene innebærer:
- Ny forskningsansvarlig institusjon: Nordlandssykehuset HF. Kontaktperson er direktør Paul Martin Strand

- Utvidelse av prosjektperioden til 31.12.2019

- Endring i design fra trearmet til toarmet studie (telemedisindelen utgår)

- Antall forskningsdeltakere er redusert til 72 (36 i intervensjonsgruppen og 36 i kontrollgruppen)

-Innhenting av nye data fra samme utvalgsgrupper: nytt spørreskjema, observasjoner - inkludert bruk av video, intervju med fysioterapeutene som utfører intervensjonen, endring av måleinstrument.

-Endring i inklusjons- og eksklusjonskriterier

- Endring i rekrutteringsprosedyre

-Ny prosjektmedarbeider (fysioterapeut) knyttes til prosjektet

- Navnet på studien er endret til Innovative Physioterapy and Coordination of Care for People with MS: a Randomized Condtrolled Trial and a Qualitative Study

Vurdering
REK har vurdert endringssøknaden og har ingen forskningsetiske innvendinger mot endringen av prosjektet.

Vedtak

REK godkjenner prosjektet slik det nå foreligger, jfr. helseforskningsloven § 11, annet ledd.

Tillatelsen er gitt under forutsetning av at prosjektet gjennomføres slik det er beskrevet i søknaden, endringssøknad, oppdatert protokoll og de bestemmelser som følger av helseforskningsloven med forskrifter.

REKs vedtak kan påklages, jf. forvaltningslovens § 28 flg. Klagen sendes til REK sør-øst. Klagefristen er tre uker fra du mottar dette brevet. Dersom vedtaket opprettholdes av REK sør-øst, sendes klagen videre til Den nasjonale forskningsetiske komité for medisin og helsefag for endelig vurdering.

Vi ber om at alle henvendelser sendes inn med korrekt skjema via vår saksportal: http://helseforskning.etikkom.no. Dersom det ikke finnes passende skjema kan henvendelsen rettes på e-post til: post@helseforskning.etikkom.no.

Vennligst oppgi vårt referansenummer i korrespondansen.

Med vennlig hilsen

Finn Wisløff
Professor em. dr. med.
Leder

Gjøril Bergva
Rådgiver

Kopi til: *postmottak@iho.uit.no; postmottak@nlsh.no;Paul.martin.strand@nordlandssykehuset.no*