

Manipulating practices

A critical physiotherapy reader

Barbara E. Gibson, David A. Nicholls, Jenny Setchell
and Karen Synne Groven (eds.)



CHAPTER 10

A Baradian approach to evidence-based practice in physiotherapy education

Tone Dahl-Michelsen | Department of Physiotherapy, Oslo and Akershus University College of Applied Sciences

Karen Synne Groven | Institute of Health and Society, University of Oslo / Department of Physiotherapy, Oslo and Akershus University College of Applied Sciences

Abstract

During the past decade, there has been an increased focus on evidence-based practice in physiotherapy programmes. Evidence-based practice involves combining best research evidence (external evidence), clinical expertise and patients' values and preferences. Competence to search and evaluate research evidence is considered crucial in ensuring that a new generation of physiotherapists are able to choose treatments proven to have the best effect. Physiotherapy programmes also focus on equipping students with clinical skills and taking patients' values and needs as their starting point for evidence-based practice. How these different forms of knowledge relate to one another, however, is unclear. Inspired by Karen Barad's theory of agential realism, this paper explores evidence-based practice as processes of becoming within the physiotherapy encounter. Drawing on the experiences

of physiotherapy students, who prior to their study in the physiotherapy programme had encountered different physiotherapists, we put Barad's concept of "intra-acting" into play as a critical and alternative way to conceptualise evidence-based practice. Our findings show how knowledge as best research evidence (external evidence), knowledge as clinical expertise, and knowledge as patients' values and preferences, is co-constructed into the phenomena of evidence-based practice within the physiotherapy-patient encounter. When discussing how students should develop their skills in order to learn how to perform evidence-based practice, we argue that physiotherapy programmes need to take into account that evidence-based physiotherapy comprises a number of intra-active processes of becoming rather than being a fixed phenomenon.

Introduction

During the past decade, there has been an increased emphasis on evidence-based practice within physiotherapy programmes (Olsen, 2015). This emphasis fits a general trend favouring evidence, particularly in Western societies, implying that all educational programmes, professional actions and political decisions should be evidence-based (Kyvik & Vågan, 2014). In medicine, the foundation for the evidence-based paradigm was that historically, medical treatments relied solely on tradition, anecdotes and theoretical reasoning from basic sciences (Hofmeijer, 2014; Engebretsen et al., 2015; Greenhalgh et al., 2014). Thus, there was a lack of evidence as to whether or not treatments were effective. At its most extreme, there was a risk that treatments would provide small benefits, have no effect at all or be potentially harmful. To avoid these scenarios, one solution was to use experimental evidence, giving priority to randomised

controlled trials (RCTs) and meta-analyses of trial results (Engebretsen et al., 2015, p. 529). Historically, there has been a strong link between the professions of physiotherapy and medicine (Haugen, 1997; Nicholls & Cheek, 2006; Ottosson, 2007), which helps explain why evidence-based medicine, e.g. knowledge generated from RCTs design, has also come to strongly influence physiotherapy. Within both professions, the following definition from Sackett et al. (1996) communicates the key to evidence-based practice as being a combination of evidence and clinician expertise:

Evidence based medicine is the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research (Sackett et al., 1996, p. 71).

Crucially, Sackett and colleagues found that good clinicians combine individual clinical expertise and best available external evidence, and neither is found to be sufficient on its own. However, they did not include patient/client preferences, which is a deficit in their definition. Heated debates ensued about how to comprehend evidence, not least in Norway, where the term “evidence-based” was translated as “knowledge-based”, causing critical attention to focus on what counts as knowledge in the clinical health professions (Ekeland, 2009; Ekeli, 2001, 2002; Heggen & Engebretsen, 2009; Nortvedt & Jamtvedt, 2009).

Conflicting logics behind the evidence-based practice model

The debate concerning how to approach and interpret evidence-based practice has been fuelled by discussions of the relationship

between the various concepts as well as how to assess experience-based and scientific knowledge. Some of the key questions in this debate relate to the following: *What counts as scientific knowledge? Do circumstances or context alone count in relation to patient values? Is tacit and personal knowledge devalued as part of clinical expertise?* In addition, questions have been raised as to whether results from clinical trials can inform decisions about real patients, whose complexity seldom fits the textbook description of disease (Greenhalgh et al., 2014). As highlighted by Norwegian philosopher Harald Grimen, the evidence-based model stems from two conflicting logics: the logic of the evidence hierarchy and the logic of the circular model (Grimen, 2009, p. 212). The evidence-based model consists of three components: research (external evidence), clinical expertise and patients' values and preferences. In this model, research is a priority while research designs are arranged in hierarchical order. By comparison, in the circular model, research (external evidence), clinical expertise and patients' values and preferences comprise three circular components of equal size. Together, these three circles form another larger circle, namely the circle of evidence-based practice (see Jamtvedt et al., 2015, p. 22). Grimen's concern revolves around how the circular components are supposed to interact. In this interaction, external evidence seems to play the leading role, although the three circles are ostensibly of equal importance.

Given that the point of evidencing is to inform rather than eliminate discretion, it is hard to see how proponents of evidence-based practice conceptualise or give meaning to the concept of discretion (professional judgement) (Grimen, 2009, p. 214; Hofmeijer, 2014). In other words, what is the point of the circular model if the evidence hierarchy is given priority? And if the circular model is given priority - or if the two different logics are to

be considered equal - what is the point of the evidence hierarchy? (Grimen, 2009, p. 214). Along similar lines, other critics have called for more attention and value to be focused on both clinicians' and patients' experience-based knowledge. Greenhalgh and colleagues, for example, have argued that evidence-based medicine needs to be person-centred, an approach they call "real evidence based medicine" (Greenhalgh et al., 2014, p 3). Gibson and Martin (2003) have addressed potential contributions from qualitative methods in evidence-based physiotherapy practice. As they put it, "if the aim of physiotherapy is to work collaboratively with patients to maximize their integration into the community, then the research agenda needs to address the lived experiences of patients within and outside the physiotherapy setting" (Gibson & Martin, 2003, p. 356). These scholars also suggest that qualitative methods are well suited to capture complexity. In addition, they argue that physiotherapy programmes should arm students with a broad understanding of the nature of evidence in order to prepare them to evaluate research critically (Gibson & Martin, 2003, p. 356).

Within the context of physiotherapy education, Olson and colleagues (2014) explored students' evidence-based learning processes. They found that students who were exposed to more teaching in evidence-based practice more often conducted a critical review of research than those who were exposed to less teaching in evidence-based practice. However, in clinical situations involving patients, there was no difference in terms of how the students utilised research-based knowledge (Olsen et al., 2014). Although students tried to use an evidence-based approach, they felt uncertain, as novices in clinical practice, about how to actually go about doing it. As a result, they relied on their clinical instructors, were more engaged with clinical work, and lacked role models who could show them how to

use an evidence-based approach (Olson, 2015, p. 78). In other words, students seemingly struggled with how to integrate best research evidence (external evidence), clinical expertise and patients' values and preferences into diagnosis and selection of appropriate treatment approaches.

Approaching evidence-based physiotherapy through Barad

In this paper, Karen Barad's agential realism informs our critical approach to traditional notions of evidence-based physiotherapy. Barad's theory (2007) is founded on the idea that not only humans, but all entities have *agency*. As Højgaard and colleagues put it:

Agential denotes that everything “does” something, in other words, that everything is performative and has agency. Nothing is delimited as a separate entity. Everything is always engaging something else, in specific ways designated by the concepts; intra-activity, i.e., matter and meaning, object and subject, nature and culture are all mutually articulated and mutually entangled (Højgaard et al., 2012, p. 68).

Agency enables us to undercut notions of fixation, linearity and the one-dimensionality of matter and materiality. Instead, we can emphasise performativity through intra-active processes across the distinctions by which we normally operate. These distinctions include human/nonhuman, subject/object and matter/discourse. According to Barad, an intra-active mode of thinking offers a fruitful alternative to the linear and somewhat individualistic agential concept of inter-action. Indeed, the concept of “intra-action” is essential within Barad's framework, implying that all entities have agency. Whereas *inter-* means “among”, *intra-* means “within”.

In the context of physiotherapy, *interaction* would be when the bodies of a patient and physiotherapist interact but both bodies remain independent. Conversely, physiotherapy from the perspective of *intra-action* implies that the body of the physiotherapist and the body of the patient co-exist within the encounter. Put differently, whereas *interaction* assumes that there are separate individual agencies, which precede their interaction, *intra-action* recognises that agency emerges *through* intra-action (Barad, 2007, p. 33). Indeed, agency emerges through entangled constitution (Barad, 2007, p. 33; Højgaard et al., 2012, p. 69). In this regard, intra-action can be understood as a relational and entangled *phenomenon*, always in process. There is no definite beginning or end, no clear-cut timeline (Juleskjaer, 2013, p. 756). Such a radical stance enables us to critically explore evidence-based practice as *becoming*. More precisely, we argue that evidence-based practice cannot be understood as consisting of research, clinical expertise and patients' values and preferences as separate and pre-existing entities. Rather, these concepts should be regarded as dynamic and inseparable through *agential intra-action*. In this way, they become the phenomena of evidence-based practice within the physiotherapy encounter. In so arguing, we acknowledge Barad's concept of *apparatus* as key to what sets the *intra-active process* in motion, and which involves a form of *boundary-making* (Højgaard et al., 2012, p. 69). According to Barad, apparatuses are both materials and discursive practices through which "objects" and "subjects" are produced: "[They] are the material conditions of possibility and impossibility of mattering; they enact what matters and what is excluded from mattering [...] Hence apparatuses are 'boundary-making practices,'" (Barad, 2007, p. 148). Different apparatuses perform boundary-setting practices by way of *agential cuts* (Barad, 2007, p. 155). An agential cut is what creates boundaries, and Barad argues that agential cuts in intra-actions

produce phenomena, which are therefore inherently related to one another (Juelskjaer, 2013, p. 757).

Finally, in Barad's view, apparatuses are "specific material reconfigurations of the world that do not merely emerge in time but iteratively reconfigure *spacetime* as part of the ongoing dynamism of becoming" (Barad, 2007, p. 142). This implies that although agential cuts are unique in each setting, the notion of *spacetime* enables us to go beyond a linear perspective of space, time and matter. Barad outlines it as "ways to think about the nature of causality, agency, relationality, and change without taking these distinctions to be foundational or holding them in place" (Barad, 2012, p. 32).

In our analysis, we put Barad's concepts into play through the examples of two physiotherapy students (Celine and Linda). We reframe the evidence-based model by reconceptualising the three key concepts of research, clinical expertise and patients' values and preferences, viewing them as our *apparatus under scrutiny*, in which *agential cuts* draw boundaries between each apparatus or concept of knowledge. This reframing entails an intra-active analysis of the physiotherapy encounter in which *agential cuts* are dependent on how the space of each concept/apparatus varies individually. Concepts and material discursive reconfigurations of the world therefore become meaningful through *agential cuts* (Højgaard et al., 2012, p. 70). In our context, then, *what counts as meaningful* in each encounter with the three knowledge sources emerges as *unique in each encounter*.

Apparatus of analysis

In this paper, we draw upon empirical evidence from in-depth interviews with eight first-year physiotherapy students who visited physiotherapists before enrolling in an undergraduate physiotherapy programme in Norway. The data derives from the

first author's PhD project (Dahl-Michelsen, 2015). The interviews were conducted face-to-face and lasted for 50-70 minutes each. They were digitally recorded and transcribed by Dahl-Michelsen. Barad's (2007) approach of reading diffractively inspired us methodologically. This approach entailed reading the students' stories, and the research literature on evidence-based practice intra-actively, that is through Barad's diffractive approach (Højgaard et al., 2012; Jackson & Mazzei, 2012). In our study, this diffractive approach had a particular bearing on the choice of analytical research questions. Initially, we analysed the interviews in accordance with the following empirical research question: *How do the experiences of physiotherapy students who have encountered physiotherapists themselves relate to the concepts of evidence-based physiotherapy?* Next, to allow for depth as well as variation, we conducted a more detailed analysis during which we selected the two interviews we thought best demonstrated the diverse experiences of students' encounters with physiotherapists. Using a diffractive-narrative approach, we developed Celine's and Linda's stories (Zabrodska et al., 2011). In this phase of our analysis, we addressed the following research question: *What can Baradian agential realism offer our understanding of evidence-based practice within physiotherapy encounters?*

The study was approved by the Data Protection Office for Research (NSD) and all students gave their informed consent. The empirical data was translated from Norwegian into English by both authors separately, and agreed upon, in two face-to-face meetings.

Encountering physiotherapy through a Baradian lens

In the following section, we address how Celine and Linda's experiences within different physiotherapy encounters relate to the concepts of evidence-based physiotherapy viewed through a Baradian lens.

First, let us briefly contextualise their experiences. Earlier, Celine had been an elite athlete in handball. During those years, she suffered various injuries. Her recovery from different injuries involved encounters with various physiotherapists. In contrast, Linda had suffered and recovered from myalgic encephalomyelitis (ME). In this process, she encountered physicians and neurologists as well as different physiotherapists.

Celine's story

I was good at handball from early on. Thinking back, as a child it was only fun. Of course, I trained a lot but, honestly, I remember it as only fun. When I was 15, I started to play on an international level as well and then it became harder. The training was tougher, of course; there was more training. I was forced to run harder, fight more, be more aggressive and, yes, I liked it but in one of the sessions, I was involved in an accident where I fell and unfortunately broke my leg so then I was out for some time. I went to see a physiotherapist. That is, I had thrown my crutches away and I had begun to walk – but I was limping and had a lot of pain and it was painful to move... The treatment was active and I got an exercise programme. There was nothing wrong with the programme, I think. It involved different exercises in weight-bearing positions, tailored to strengthen the weakened muscles in the leg that was broken. He [the physiotherapist] told me that the programme was evidence based. ... But I felt that he did not understand me and my situation. ... Although I could run a little, I was almost depressed because I could not play handball – it hurt too much – the pain made it physically impossible. ... My goal was to get back to handball. My identity was ... I am a handball player. I felt he had no understanding of that. It was difficult [the feeling of not being understood].

In this extract, Celine reflects on the physiotherapist's reliance on clinical guidelines, which emphasise research evidence at the

expense of a more patient-centred approach. Considering how her pain persisted during treatment sessions and how she felt alone in dealing with it, Celine questions the physiotherapist's clinical expertise. As she sees it, reflecting on the episode in retrospect, the physiotherapist was not sensitive to her preferences and needs during the treatment process. What Celine's scepticism brings to the fore, interpreted through Barad's terms, is how the *apparatuses* of patients' values and preferences and clinical expertise become cut off from the phenomena of evidence-based practice. Indeed, the apparatus of research *becomes* the phenomena of evidence-based practice through agential cuts. Viewed through such a lens, one could argue that the physiotherapist fails to engender an intra-active process with Celine to enhance her recovery process. To us, the absence of sensitivity towards how the various exercises affected her pain is striking, suggesting failure to adequately adapt research findings to the individual's unique situation. What Celine emphasises most is the physiotherapist's failure to recognise her identity as a handball player. In Baradian terminology (2007), an ongoing disruption of spacetime-mattering inhibits a meaningful treatment process in terms of progress and effect. The disruption points to a future focus on what to do next, and thus a linear future focus, rather than acknowledging dis/continuity concerning Celine's embodied experiences as a handball player. For Celine, future and past intra-act, intensifying her worries that she may never become able to play handball as well as she did before. Her identity as a sporty and fit handball player is threatened and is not addressed as intra-acting with her pain and worries during treatment. The disruption concerns spacetime-mattering as she strives to reconfigure ongoing subjectivities (Juelskjaer, 2013). In other words, Celine struggles to find meaningful coherence in how to handle her situation of being injured.

In light of our Baradian analysis, it is no wonder that Celine categorises this physiotherapist as less competent. She tells us that she ended the physiotherapy treatment and slowly recovered. However, when she was 22, she again experienced injury.

My crucial ligament broke and, given my prior bad experience with physiotherapists, especially the first one that I told you about, I followed some recommendations and contacted a physiotherapist I knew was a good one. And he truly was - he was very experienced. He made me conscious about what kind of exercising I should do to strengthen my muscles. So, as such, it was similar to the other one - it was evidence based. [The treatment involved various exercises to strengthen the knee muscles in line with guidelines and research evidence as to which method is most effective]. However, it was different. I was in the therapy room doing various exercises but he observed how I was performing them and he kept asking me about what I felt when I was doing them; "what do you feel when you are doing it this way or that way" ... and we developed the progression together. He involved me. That was what he was doing. He knew that my ambition was to be back in handball and was serious about that, and he worked with me all the time.

In this example, Celine seems much more enthusiastic as to the effects of the treatment. This enthusiasm relates to how the physiotherapist combines research evidence, clinical expertise and patients' values and preferences. Or, to put it in a Baradian agential framework, the cut-off of each apparatus takes a different, and more satisfactory, path, in contrast to Celine's experience with the less competent physiotherapist. In other words, agential cuts produce the phenomena of evidence-based physiotherapy differently in terms of intra-actions. In this example, research evidence, clinical expertise and patients' values and preferences intra-act and produce the cut-off through each apparatus,

so that the phenomena of evidence-based physiotherapy incorporate all three concepts of evidence-based practice. Through the apparatus of patients' values and preferences, this agential cut becomes more significant and cuts off clinical expertise and research evidence. In other words, the intra-actions of the three concepts (apparatuses) are dominated by the apparatus of patient's values and preferences. In terms of subjectivity, identity and Barad's notion of spacetimemattering, this points to how the physiotherapist's approach seemingly supports Celine's recovery process. As evidenced through Celine's emphasis on feelings and effect, discourse and matter intra-act as her hopes of recovering to continue as a handball player resonate with the hopes of the physiotherapist. Spacetimemattering is emphasized as part of the intra-active process. In this regard, Celine's past handball career is not something linked only to the past. By acknowledging that she can indeed play handball again, as well as being sensitive to the injury as a possible drawback to her being the same player as before, agential cuts are made during the treatment process, cuts that open up other possibilities; Celine can still be a handball player, albeit not exactly the same as before.

Linda's story

My recovery period from ME lasted four years. Generally, I will say that my encounter with the health system was quite convoluted when I had such an perplexing illness. I was very sick and they [neurologists and physicians] attended to me in kind of odd ways. It was as if they did not really believe me. The focus was on finding out whether or not I had ME. The focus was on the diagnosis and not on how I should cope with the situation, so to speak. In addition, my experiences were troublesome because of arrogance.

When I came into physiotherapy, then, I felt that they were not so concerned with my diagnosis. It was like I had these kinds of problems, and we had to solve these, and so we collaborated to try to solve them. I felt ... I felt more that they believed me in a way. ... However, when I met physiotherapists, I was also in the recovery process, so it was a more positive side of my illness process. However, it is complicated because recovering is not ... just about recovery - you are ill or you are in recovery. How can you actually know with this blurry disease? Nevertheless, I felt that something happened when I was in physiotherapy and it ... felt so wonderful. ... I met several competent physiotherapists during the period when I had ME. However, one of them made a profound impression on me. He was interested in my experiences of my illness (ME) and in my situation. He was in a way a sparring-partner and it was collaboration. For example, if I felt that the exercises were too easy and wanted to progress then he was very much in dialogue - ok then we should try something else, but at the same time, he was good at forcing me to break when I got a relapse because I was doing too much. Therefore, it was - we had this good cooperation. Also, it is complicated with ME because there is little research on it and it is not clear what it is and what treatment to do. So, surely, it is not easy. Nevertheless, he read a lot [of research], told me about it, and asked me what I thought. He was so engaged and had been in a Lightning programme [non-medical training programme], but he was sceptical, I understood, but still open-minded and asked me what I was thinking. He was involved in research himself and was part of a team in England, I think, and gave them input from the clinical setting.

Linda's story points to difficulties related to suffering from an illness lacking evidence both in terms of criteria for diagnosis and guidelines for effective treatment. The evidence concept (external evidence) is thus different in Linda's story compared with Celine's. Viewed through Barad's agential realism, the cut-off through the

apparatuses, to use a Baradian term, produce the phenomena of evidence-based physiotherapy including research, clinical expertise and patients' values and preferences. However, the agential cuts here make research in terms of external evidence less prominent, whereas clinical expertise and patients' values and preferences become more significant. Once again, the apparatus of patients' values and preferences predominate, producing the phenomena of evidence-based physiotherapy. This example brings to the fore a different agential cut than is seen in Celine's story. The cut-off with regard to clinical expertise and patients' values and preferences produces a different evidence-based phenomenon. Linda's story highlights how the concept or apparatus of patients' preferences becomes more uncertain and takes a different path, which suggests a closer intra-action with the apparatus of clinical expertise. In other words, the clinical expertise of the therapists evolves into an intra-actional process with the bodily experiences of the patient (called values and preferences in the model of evidence-based physiotherapy). In this example, the apparatus of research is also produced differently because there is significant uncertainty as to how to approach ME in terms of external evidence. However, this does not imply that the phenomena of evidence-based physiotherapy as produced in Linda's story cuts off research. We argue that the research is intra-acting *in closer relation to* clinical expertise and patients' values and preferences than in the story of Celine.

In a similar way as demonstrated in Celine's story, Linda's story discloses how the uncertainty of ME put her identity under pressure. Linda also seems to strive to reconfigure ongoing spacetime-mattering subjectivities (Juelskjaer, 2013), showing how she struggles to find meaningful coherence for her identity and her situation of being ill and, at the same time, hopefully recovering. From the point of view of her recovery process, Linda narrates from within an agential cut. She is cut off from her illness as

past experience of becoming, and instead she enacts, and becomes enacted, as somebody who is experiencing recovery (Barad, 2007; Juelskjær, 2013). At the same time, she intra-acts between the past, present and future from the point of view of her experiences. In other words, spacetime mattering and subjectivity are threaded through each other (Juelskjær, 2013).

Thinking beyond traditional evidence-based practice in physiotherapy education

Remarkably, scholars, educators and textbooks seem to agree that challenges with using an evidence-based approach should be dealt with through increased emphasis on clinicians' and students' competences in searching, finding and critically evaluating research literature regarding the effectiveness of different methods (e.g., Fetters & Tilson, 2012; Hebert, Jamtvedt, Hagen & Mead, 2011; Jamtvedt et al., 2015; Olsen, 2015). We agree that clinicians and physiotherapy students need to be skilled to search for and critically evaluate research findings and thus identify the most effective treatment approach. Our main point here, however, is that what counts as effective is contextual, dependent on *the very becoming* of evidence-based practice within each physiotherapy encounter. Thus, clinicians and students need to develop competence in understanding the *intra-action* of research, clinical competence and patients' values and preferences. In addition, our Baradian-inspired analysis suggests that physiotherapy encounters may be *intra-active processes* of becoming. In effect, these intra-active processes within each encounter come into being via unique agential cuts through the three apparatuses (circles) within the evidence-based practice model. However, when Celine and Linda describe their treatment as being evidence-based, when referring to their encounters with different physiotherapists, they

denote research evidence as being synonymous with evidence-based practice. This indicates that, as physiotherapy students, they perceived the model of evidence-based physiotherapy as giving priority to one of the circles within the model. Their perceptions, therefore, comply with a hierarchal understanding of the model. As pointed out in our introduction, the main criticism of the model concerns how it promotes a circular and harmonic understanding despite functioning as a hierarchal model in practice (Grimen, 2009; Heggen & Engebretsen, 2009). Needless to say, this discrepancy is bound to confuse students. As critical thinking is regarded as at the core of the student learning process, including professional development in the use of evidence-based practice, we argue that students would benefit from learning how to problematise the basic premises of the model. In this regard, critical thinking should not be limited to the competence of systematic searching for and applying best (external) evidence to practice. Critical thinking needs to include the ontological and epistemological premises upon which the model is based.

Sackett and colleagues (1996) pointed to the philosophical origins of external evidence and clinical expertise as a compelling topic for clinicians, public health practitioners, purchasers, planners and the public. Rowe and Oltmann (2016) argue that there are conflicting logics between evidence-based practice in clinical medicine and learning theories. This conflict concerns the design of RCTs as an ontological and epistemological worldview, assuming context to be controlled.

Current theories of knowledge, however, point to learning as occurring in an open system that cannot be controlled (Rowe & Oltmann, 2016, p. 6). Rowe and Oltmann, thus conclude that because RCTs “risk forcing us to take up ontological and epistemological positions in a technical rationalist framework – a framework that perceives the world as having one truth, which is inconsistent with a real understanding of learning” – RCTs should not be

the favoured method by which to investigate learning (Rowe & Oltmann, 2016, p, 8).

Mumford and Anjum (2011) offer a new ontological foundation called causal dispositionalism. Here, evidence of causation involves how and why an intervention causes a certain effect. Causation concerns tendencies, which come in degrees, and the interaction of different factors is key for the outcome (Anjum et al., 2015, p. 1). These authors emphasise the need to broaden the perspective as to what counts as scientific evidence. This is especially the case with causal evidence. In the same way, we argue that Barad's intra-active perspective offers a unique approach to understanding the relations between the circles within the evidence-based practice model. Indeed, Barad's ideas of entanglement foster a new way of understanding evidence-based practice, and thus also evidence-based physiotherapy. In particular, we suggest that a Baradian approach proposes new ways to overcome the conflicting epistemological premises rooted in the different ontological understandings on which the circles within the evidence-base model are nurtured. Combining epistemology as the theory of knowing and ontology as the theory of being –“*knowing in being*” (Barad, 2007, p. 149), Barad provides a fruitful starting point for future discussions, debates and critical thinking about evidence-based physiotherapy.

Students in physiotherapy education emerge as physiotherapists through their entangled intra-relating: As Barad puts it:

Individuals emerge through and as part of their entangled intra-relating ... thereby making it impossible to differentiate in any absolute sense between creation and renewal, beginning and returning, continuity and dis-continuity, here and there, past and future. (Barad 2007, p. ix).

In other words, learning how to use evidence-based practice in meaningful ways for physiotherapists and their patients' entails acknowledging that they are entangled through intra-active processes.

Within these processes, theory and practice and external and internal evidence do not pre-exist their interactions. Rather, like all interactions they, “extend the entanglements and responsibilities of which one is a part” (Barad, 2007, p. ix). Hence, evidence-based practice cannot be learnt like a package of pre-existing models. Rather, a Baradian approach points to evidence-based physiotherapy as processes of becoming. The circles (apparatuses) within the model are fluid, constantly shifting in their becoming, through ongoing agential cuts. We argue that this approach offers new but also challenging ways to enhance physiotherapy students’ learning of evidence-based physiotherapy.

Acknowledgments

We want to extend our appreciation to the workshop members at the Gendering in Research (GiR) Conference at Aarhus University (Denmark), which took place 23-24 October 2016. We specifically wish to acknowledge Karen Barad for providing inspirational comments engendering the development of our voice in the field of evidence-based practice in physiotherapy education.

References

- Anjum, R. L., Kerry, R. & Mumford, S. D. (2016). Evidence based on what? *Journal of Evaluation in Clinical Practice*, 6(21), E11–E12.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*: Durham, NC: Duke University Press.
- Barad, K. (2012). Nature’s Queer Performativity. *Kvinder, Køn & Forskning* (2).
- Dahl-Michelsen, T. (2015). Gender in physiotherapy education. A study of gender performance among physiotherapy students and changes in the significance of gender. *Centre for the Study of Professions, Oslo and Akershus University College of Applied Sciences, Oslo. (2015 nr. 4).*

- Ekeland, T.-J. (2009). Hva er evidensen for evidensbasert praksis. In Grimen & Terum (eds.), *Evidensbasert profesjonsutøvelse* (145–168).
- Ekeli, B. (2001). Det vokser ikke pærer på epletrær: Innlegg i debatten om evidensbasert fysioterapi [Pears do not grow on apple trees: Contribution to the debate about evidence-based physiotherapy]. *Fysioterapeuten*, 14, 14–24.
- Ekeli, B.-V. (2002). Evidensbasert praksis: Snublestein i arbeidet for bedre kvalitet i helsetjenesten? Eureka Forlag, Høgskolen i Tromsø.
- Engebretsen, E., Vøllestad, N. K., Wahl, A. K., Robinson, H. S. & Heggen, K. (2015). Unpacking the process of interpretation in evidence-based decision making. *Journal of Evaluation in Clinical Practice*, 21(3), 529–531.
- Fettters, L. & Tilson, J. (2012). *Evidence-based physical therapy*. Philadelphia: F.A. Davis Co.
- Gibson, B. E. & Martin, D. K. (2003). Qualitative research and evidence-based physiotherapy practice. *Physiotherapy*, 89(6), 350–358.
- Greenhalgh, T., Howick, J. & Maskrey, N. (2014). Evidence based medicine: a movement in crisis? *BMJ*, 348, g3725.
- Grimen, H. (2009). Debatten om evidensbasering–noen utfordringer. In H. Grimen & L. Terum (eds.), *Evidensbasert profesjonsutøvelse*. Oslo: abstract forlag.
- Haugen, K. H. (1997). *En utdanning i bevegelse: 100 år med fysioterapiutdanning i Norge*. Oslo: Universitetsforlaget.
- Heggen, K. & Engebretsen, E. (2009). En dekonstruktiv nærlesning av arbeidsbok for sykepleiere. *Sykepleien forskning*, 4(1), 28–33.
- Hebert, R., Jamtvedt, G., Hagen, K. & Mead, J. (2011). *Practical Evidence-Based Physiotherapy*. Churchill Livingstone. London, UK.
- Hofmeijer, J. (2014). Evidence-based medical knowledge: The neglected role of expert opinion. *Journal of Evaluation in Clinical Practice*, 20(6), 803–808.
- Højgaard, L., Juelskjær, M. & Søndergaard, D. M. (2012). The ‘WHAT OF’ and the ‘WHAT IF’ of agential realism–In search of the gendered subject. *Kvinder, Køn & Forskning* (12).
- Jackson, A. Y. & Mazzei, L. A. (2011). *Thinking with theory in qualitative research: Viewing data across multiple perspectives*. London and New York: Routledge.
- Jamtvedt, G., Hagen, K. B. & Bjørndal, A. (2015). *Kunnskapsbasert fysioterapi*. Oslo: Gyldendal Akademisk.

- Juelskjaer, M. (2013). Gendered subjectivities of spacetime matter. *Gender and Education*, 25(6), 754–768.
- Kyvik, S. & Vågan, A. (2014). *Forskningsbasert utdanning?: Forholdet mellom forskning, utdanning og yrkesutøvelse i de korte profesjonsutdanningene*. Oslo: abstract forlag.
- Mumford, S. & Anjum, R. L. (2011). *Getting causes from powers*. Oxford: Oxford University Press.
- Nicholls, D. A. & Cheek, J. (2006). Physiotherapy and the shadow of prostitution: The Society of Trained Masseuses and the massage scandals of 1894. *Social Science & Medicine*, 62(9), 2336–2348.
- Nortvedt, M. W. & Jamtvedt, G. (2009). Engasjerer og provoserer. *Sykepleien*, 7(09), 64.
- Olsen, N. R. (2015). *Evidence-based practice in physiotherapy education*. (PhD), University of Bergen, Bergen.
- Olsen, N. R., Lygren, H., Espehaug, B., Nortvedt, M. W., Bradley, P. & Bjordal, J. M. (2014). Evidence-based practice exposure and physiotherapy students' behaviour during clinical placements: A survey. *Physiotherapy Research International*, 19(4), 238–247.
- Ottosson, A. (2007). *Sjukgymnasten - vart tog han vägen?: En undersökning av sjukgymnastyrkets maskulinisering och avmaskulinisering 1813–1934*. (43), Göteborg Universitet, Göteborg.
- Rowe, M. & Oltmann, C. (2016). Randomised controlled trials in educational research: Ontological and epistemological limitations: short report. *African Journal of Health Professions Education*, 8(1), 6–8.
- Sackett, D. L., Rosenberg, W. M., Gray, J. M., Haynes, R. B. & Richardson, W. S. (1996). *Evidence based medicine: What it is and what it isn't*. London: British Medical Journal Publishing Group.
- Zabrodska, K., Linnell, S., Laws, C. & Davies, B. (2011). Bullying as intra-active process in neoliberal universities. *Qualitative Inquiry*, 17(8), 709–719.