Becoming a physician-scientist

A study on the power of membership in communities of practice

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Physician-scientists play a pivotal part within healthcare. Involved partly in the practice of medicine and partly in scientific research, they serve as a bridge between research and clinical practice. It is therefore problematic that the number of physician-scientists have decreased over the last decades, a development that have coincided with an increasing issue of scientific knowledge not being translated into clinical practice at the same level that we have gotten used to. In this study, I explore the physician-scientists understanding of their career, taking the experience of being part of two different communities simultaneously as the starting point.

Through qualitative interviews with physician-scientists at different stages of their career, and utilising the concept of communities of practice in my analysis, I connect the individual physician-scientists experience with the practices in the two communities they are members of. Acknowledging the different experiences of my interviewees, this study challenges the notion of physician-scientists as a homogeneous group, arguing that it is necessary to re-define the physician-scientists into three different types. Doing so, I suggest that it is possible to have a more fruitful debate on their situation and their purpose, highlighting the different roles that they have in the translation of knowledge between science and clinical practice. Finally, through considering the physician-scientists as members of different communities, I make contributions to the communities of practice literature regarding the notion of boundary crossing and the role of power.

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Abstract

Physician-scientists play a pivotal part within healthcare. Involved partly in the practice of medicine and partly in scientific research, they serve as a bridge between research and clinical practice. It is therefore problematic that the number of physician-scientists have decreased over the last decades, a development that have coincided with an increasing issue of scientific knowledge not being translated into clinical practice at the same level that we have gotten used to. This has led to an increased attention on the physician-scientists situation, identifying barriers and obstacles for physicians to get involved with research. Despite this, the question of how, when, and why physicians choose an academic career in medicine remains essentially unanswered.

Through qualitative interviews with physician-scientists at different stages of their career, this study contributes to a deeper understanding of the physician-scientists situation by exploring how they experience their career. Taking the experience of being part of two different communities simultaneously as the starting point, this study investigates the individuals' experience in relation to the colleagues with whom they work. Applying the concept of communities of practice, I connect the individual physician-scientists experience with the practices in the two communities they are members of. This includes the process of learning the role of research in the clinical community through becoming a member, managing what I call the dependence-independence paradox that relates to different interpretations of independence between communities, and how the individual physician-scientists role in the community is affected by his or her multi-membership.

Acknowledging the different experiences of my interviewees, this study challenges the notion of physician-scientists as a homogeneous group, arguing that it is necessary to re-define the physician-scientists into three different types. While these types face different structural situations in the organisation, their primary differences relate to the social barriers and possibilities they experience in their communities. This highlights that structural changes in the physician-scientists career must acknowledge how such changes are interpreted in practice by the members of the communities. Furthermore, by re-defining the physician-scientist into these three types, I suggest that it is possible to have a more fruitful debate on their situation and their purpose, highlighting the different roles that they have in the translation of knowledge between science and clinical practice. Finally, through considering the physician-scientists as members of different communities, I make contributions to the communities of practice literature regarding the notion of boundary crossing and the role of power.

Key words Physician-scientists, communities of practice, membership, power, identity, socialisation

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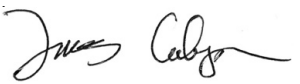
Signature  Date 2022-02-24

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To my parents, Christel & Göran

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It is a strange feeling to put the final touches on a dissertation. After years of hard work, oscillating between anguish and joy, lethargy and excitement, success and failure, to finally reach the endpoint, which has for so long felt like a mirage in the distance, it is not without a certain amount of trepidation. Leaving my own community of practice and shredding the identity of the doctoral student is a challenging prospect – albeit a challenge that I look forward to. Writing these words is thus with equal amounts of sadness for what I am leaving behind, as with anticipation for what the future holds. A large part of that is due to all the amazing people that in different ways have supported me in writing this dissertation, and who deserve to be acknowledged.

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Introduction

> 'The beleaguered individuals who continue to combine basic science and clinical medicine often feel like the chimeric creature in the painting by the famous surrealist René Magritte. Half human, half fish—they are not at home on land or in the sea … patient-oriented scientists are currently experiencing an identity crisis, and they need special attention if they are to survive' (Goldstein & Brown, 1997, p. 2805).

Physician-scientists are individuals that are simultaneously involved in both medical research and clinical practice (Permar et al., 2020; Wyngaarden, 1979). Idealised as the translators that can bring scientific discoveries into the clinical setting, where it can benefit the patients, and bring clinically relevant questions and observations into the scientific setting, where it can benefit the clinical relevance of science, they serve a crucial role in the advancement of medicine (Permar et al., 2020). As such, they are members of two different professional communities – one scientific and one clinical – where they ideally can oscillate between the communities on a frequent basis (Schafer, 2009b). However, as suggested by Nobel laureates Joseph Goldstein and Michael Brown above, this multi-membership also involves their struggle with the notion of belonging, where similar to a chimeric creature, being two things at the same time can also create the experience of being neither (Goldstein & Brown, 1997).

In this thesis, I explore how physician-scientists understand the experience of being part of two different communities simultaneously, through studying their careers. This is, in turn, connected to a practical problem within the medical field, which relates to the declining number of physician-scientists over the last few decades (Permar et al., 2020; Rosenberg, 1999; SOU, 2008:7; Wyngaarden, 1979). As they play a key part in translating scientific findings into clinical practice, their dwindling numbers are connected to a decline in the impact of clinical research (e.g. Academy of Finland, 2009; Billig et al., 2007; Cooksey, 2006; Murillo, Reece, Snyderman, & Sung, 2006; Sung et al., 2003). Despite vast scientific advances on the human anatomy, this new knowledge has been less successful in being transferred into the clinical practice, where it

could benefit the patients. In other words, there is a problem of translation (Mischel, 2011), where physician-scientists have a pivotal role as the translators (Balaban, 2008).

Since James B. Wyngaarden (1979) famously labelled them an 'endangered species', the declining number of physician-scientists has received considerable attention within the medical field. This has typically focused on identifying structural barriers and obstacles, both for physicians to enter into a research career (e.g. Ley & Rosenberg, 2005) and to manage a physician-scientist career successfully (e.g. Arbuckle, Gordon, Pincus, & Oquendo, 2013). Despite having identified a number of factors that could impede an aspiring physician-scientist's career (e.g. M. K. Jain et al., 2019; Milewicz, Lorenz, Dermody, & Brass, 2015; SOU, 2008:7), a recent literature review concluded that the question of how, when, and why physicians choose an academic career in medicine 'remains essentially unanswered' (Borges, Navarro, Grover, & Hoban, 2010, p. 680). Questioning the impact of structural barriers, to a certain extent, they suggest that in order to answer this question, it is necessary to consider the impact of values (Borges et al., 2010).

Although the term is rather loosely defined, they suggest that it is relevant to consider the values of individuals, groups, and organisations. While these can be treated independently, I argue that they are connected to each other, in most cases. Referring back to the initial quote by Goldstein and Brown, the notion of not feeling at home in either role highlights how the physician-scientists' situation relates to their social relations. In other words, the individual physician-scientist is impacted by the values of the organisation and group to which they belong, in addition to their own personal values. This suggests that the decreasing number of physician-scientists can no longer be considered merely an outcome of structural barriers and obstacles. Instead, it is also relevant to consider how the physician-scientist career is impacted by the social context in which it takes place.

The social context relates to the environment where the physician-scientists work, which includes the values of the group and organisation to which they belong. A few recent studies have explored this, highlighting how the physician-scientists situation could be understood in relation to the social context they experience (Hendriks, Simons, & Reinhart, 2019; Rosenblum, Kluijtmans, & ten Cate, 2016). Building on these, this thesis sets out to further investigate the impact of the social context on the individual physician-scientist's career. Accordingly, I have conducted qualitative interviews with active physician-scientists at different stages of their career, exploring how they have experienced their situation in relation to the social environment.

Taking the notion of being a member of different professional communities simultaneously as the starting point, my interest lies in how individual physician-scientists experience and manage such a situation. In contrast to earlier studies, however, I put the main focus on the individuals' experience in relation to the colleagues with whom they work the closest. This includes considering the socialisation process of becoming a member in a community, the experience of attaining a new membership in a different community, and how the individual's role in the community is affected by his or her multi-membership.

To better understand this experience, I apply the concept of communities of practice (Lave & Wenger, 1991; Wenger, 1998) in my analysis. The concept is founded on the notion of situated learning, where learning takes place through participation in a practice (Lave & Wenger, 1991). As such, it puts the emphasis on the social aspects of learning, in how new members learn to become practitioners through their interactions with their senior colleagues (J. S. Brown & Duguid, 1991). With much of the physician education being based on learning in practice – throughout medical school, internship, and residency – the notion of situated learning is applicable to their situation. Especially as the concept emphasises the connection between the individual and the community, highlighting the impact the social group has on the individual members. Furthermore, with the notion of membership being a critical aspect, it highlights the difficulties associated with crossing boundaries between communities (Wenger, 1998).

In addition to being a relevant analytical framework for my study, it also offers a context that enables my findings to contribute to the understanding of a more general phenomena – that of multi-membership. By connecting the experience of the physician-scientists to the experience of boundary crossing, I can elevate the discussion beyond the physician-scientists and make contributions to the communities of practice literature. This includes empirically investigating the experience of boundary crossers, which has been conceptualised to create an uprootedness for the individual (Wenger, 1998). Furthermore, studying the physician-scientists' experiences of their multi-membership enables analysis of the power dynamics in communities of practice. I thereby connect my study to the multiple calls for empirical studies to examine the power relations, and how they affect the members, in a community of practice (e.g. Contu & Willmott, 2003; Cox, 2005).

Consequently, this study aims to contribute to a deeper understanding of the physician-scientist career, mainly by putting their experiences in relation to their membership in different communities. Through this, I also intend to

further the understanding of crossing boundaries between communities, as well as connect this to the power relations within communities of practice.

Following this brief introduction, in the remainder of this chapter, I will further explicate the 'practical problem' (H. S. Becker, 2008) around the physician-scientists, and further clarify the relevance of the study. Thereafter, I will frame the study in detail, leading in to defining the purpose and the research question guiding the project.

The physician-scientist problem

Physician-scientists have been involved with some of the most significant scientific advancements over the last centuries (Archer, 2007). As the instigators of modern medicine, most of us have reaped the benefits of their work at some point. They have been instrumental in developing vaccines, drugs, and clinical treatments, which have saved millions of human lives around the world (Schafer, 2009a). In many ways, they have also been pivotal in the advent of modern society. Today, being diagnosed with a severe illness is not necessarily a death sentence, nor does it warrant a life of suffering. The increased longevity in the western world associated with this has, in turn, had major economic benefits for society (Hatfield, Sonnenschein, & Rosenberg, 2000). Thus, the physician-scientist can safely be said to have played an important role in humankind's development over the last centuries.

It is in this regard that the problem of the decreasing number of physician-scientists should be considered, as it has occurred in parallel with a decline in clinical medical research in the western world (Murillo et al., 2006; Sung et al., 2003). Thus, the problem of the decreasing number of physician-scientists is founded in a larger problem, where the considerable scientific discoveries regarding the human anatomy and physiology over the last few decades have struggled to translate into an equal clinical impact and improved health (Sung et al., 2003). Thus, to better understand the issue of the decreasing number of physician-scientists, I find it relevant to start by providing a brief background of the decline of clinical medical research.

Decline of clinical medical research

Clinical medical research is considered the foundation of medical advances within the health care sector (Remuzzi, Schieppati, Boissel, Garattini, &

Horton, 2004). The purpose of clinical medical research is to test new and existing drugs, surgeries, treatments, etc., scientifically in order to validate their function and quality in clinical practice (SOU, 2009:43). Furthermore, it is considered an essential link in translating new scientific discoveries to clinical advancements that can benefit patients (Drolet & Lorenzi, 2011; Woolf, 2008). Although there is a debate as to what should be considered clinical research, I intend to use a rather inclusive definition. This was used in a Swedish governmental investigation and is viewed as having broad support from representatives of both academia and the hospitals (SOU, 2008:7).

> 'the term clinical research refers to the research that requires structures and resources from the health care setting and aims to solve health problems or identifiable factors that lead to better health' (SOU, 2009:43, p. 10, my translation).

It is also in line with the fundamental purpose of medical research – 'to advance knowledge for the good of society; to improve the health of people worldwide; or to find better ways to treat and prevent disease' (Lancet, 2013). Thus, improvements in health care rely on the success of clinical research (The Academy of Medical Sciences, 2009). In other words, the purpose of clinical medical research is to improve all aspects of the clinical health care setting, to provide the best possible treatment for patients. It is with this purpose in mind that the reports suggesting the decline of clinical medical research were clearly problematic.

Highlighting the unequal distribution of funding between basic research and clinical research, Edward H. Ahrens (1992) was one of the first to suggest that there was a crisis in clinical research. Illustrating the shift from patient-oriented research to research at the cellular and molecular level, he argued that this would have a negative impact on the translation of new knowledge into clinical practice. Over the following decade, the issue of the impact of the 'unprecedented supply of information for improving human health' (Sung et al., 2003, p. 1278) was further elevated, as political pressure for more clinical impact from the investments in medical research increased (Bell, 2003; Murillo et al., 2006). Although it is difficult to specify in what way this decline takes place, there are several indicators which suggest that so is the case.

Among these, the decreasing number of physician-scientists is identified as one of the crucial indicators (Ahrens, 1992; Arbuckle et al., 2013; Bell, 2003; Lemoine, 2008; Murillo et al., 2006; Rosenberg, 1999; Schafer, 2010; SOU, 2009:43; Sung et al., 2003). In addition to their essential role in clinical research, the physician-scientists are typically connected to related issues, such

as inadequate research funding, a fragmented infrastructure, and institutional barriers (Sung et al., 2003). In other words, by putting the physician-scientists at the core, it is also possible to get insights into these issues, as they are affecting the physician-scientists.

The 'endangered' physician-scientist

Physician-scientists are sometimes referred to as clinical investigators (e.g. Goldstein & Brown, 1997), clinician-scientists (e.g. Lemoine, 2008), and clinician-researchers (e.g. Yanos & Ziedonis, 2006). However, to prevent confusion, the term physician-scientist will be used exclusively in this dissertation. Especially as the term clinician does not only refer to medical doctors, which is the focus here, but it can also refer to other clinical professions such as nursing (e.g. Kluijtmans, De Haan, Akkerman, & Van Tartwijk, 2017). Following the diversity in terminology, there is a similar variation in defining what is a physician-scientist. As with the definition of clinical research above, I use the definition from a Swedish governmental investigation:

> an individual with both a clinical medical degree and a doctoral degree (MD/PhD), who is actively both practising medicine at a clinic and conducting research (SOU, 2008:7, my translation).

It should be noted that compared to other definitions, this could be seen as both inclusive and exclusive. It is exclusive, in the sense that it requires a doctoral degree, which is not necessarily the norm in other countries where physicians can do research without a PhD. However, as the first step to be involved with research is to earn a doctoral degree in the Swedish context, it is a reasonable requirement for this study. The inclusivity relates to the amount of time/effort that should be spent on research, where most other definitions suggest that a physician-scientist should divide his or her effort evenly between the two practices (Wyngaarden, 1979) or the majority of the time on research (Rosenberg, 1999). Actively, on the other hand, can refer to someone who spends anywhere from 5 to 95% of their time on either practice. This more inclusive definition is a conscious decision, which I argue provides more opportunities to understand how physician-scientists handle their double membership.

With that said, the different definitions of physician-scientists are problematic. It makes it difficult to track the exact number of physician-scientists, compare

differences between cases, and to evaluate what kind of changes could be made to improve their situation. One reason for the discrepant definitions relates to how the nature of medical research has evolved (M. R. Rosen, 2011), which also means that the types of research conducted by physician-scientists have changed (Mirmira, 2014). As both clinical medicine and biomedical research have become more advanced, being specialised in both has become increasingly more difficult (Gill, 1984; Lemoine, 2008). Regardless of the definition, however, the physician-scientists are seen as pivotal within clinical medical research, since they are involved partly in the practice of medicine and partly in scientific research (Archer, 2007).

They serve as a bridge between basic research and clinical practice, as they can both question current clinical methods from a scientific point of view, and use their clinical expertise to advance the basic research by asking clinically relevant questions (Goldstein & Brown, 1997). Thus, with their dual competence, they can help make the research more focused on the clinical issues and what would best serve the patients. At the same time, they can introduce the latest advancements from the research side into the clinical setting, implementing new procedures and techniques. This is typically referred to as translation between 'bench and bedside' (S. Wolf, 1974), which should ideally go both ways. Although the idea of the physician-scientist as a translator between science (bench) and practice (bedside) was not new, the concept of translational research gained considerable traction in the 2000s (e.g. Lenfant, 2003; Zerhouni, 2005). It is through this translation that physician-scientists are considered essential for the continuous progress of medical innovations (Rosenberg, 1999).

Since James B. Wyngaarden (1979) famously labelled them as an 'endangered species' approximately 40 years ago, regular reports since then have showed a continuing decrease in physicians involved in research (e.g. Goldstein, 1986; Mirmira, 2014; Permar et al., 2020; Rosenberg, 1999; Schafer, 2009c). While many of the earlier reports came from the US, similar indications have been acknowledged in Europe (Academy of Finland, 2009; Kordel-Bödigheimer & Lücke, 2007; Sheridan, 2006; The Academy of Medical Sciences, 2009) and in Sweden (Andersson, 2019; Arner, 2003; Rydgren Stale, 2019; SOU, 2008:7).

The initial reports from the US highlighted how the research funding from the NIH (National Health Institute) was increasingly granted to basic scientists. Hence, scientists without a clinical background were increasingly replacing physician-scientists during the 1970s as postdoctoral trainees and fellows, as well as investigators (Wyngaarden, 1979). Despite efforts to promote more

clinically oriented research conducted by physician-scientists over the last few decades, recent data indicate that the problem remains (Mirmira, 2014). In the US, approximately 1.5% of the overall physician workforce is engaged in research today, compared to a peak of approximately 4.7% in the 1980s (M. K. Jain et al., 2019). In Sweden, an estimated 25–30% of all physicians in the country had a PhD in the 1980s (Stendahl, 2012), compared to approximately 20% in 2005 and 17% today (Andersson, 2019).

The rapid decline can be explained through the combination of a high number of physician-scientists retiring, a low recruitment of new physician-scientists taking their place, and a general increase in the number of physicians (SOU, 2008:7). As a result, the question becomes more oriented towards the recruitment and retention of young physicians to a career as physician-scientists. Especially considering the fact that the average age of physician-scientists is increasing, both in regards to when one earn the PhD-degree and when one get awarded first major funding (Daye, Patel, Ahn, & Nguyen, 2015; SOU, 2008:7). This highlights how the physician-scientists become independent later in their career, which is increasingly identified as a major issue in the physician-scientist career (Daye et al., 2015; Feldman, 2014). Furthermore, despite the notion of independence being prevalent within science, what it actually means is seldom clear (B. C. Rosen & Bates, 1967; Van den Besselaar & Sandström, 2019).

The interest in determining why fewer physicians become physician-scientists has mainly involved quantitative data studies and surveys, identifying barriers and obstacles in their careers (Daye et al., 2015). It is often assumed that by simply removing certain barriers and developing a clear career track for advancement, there will be an influx of physicians interested in research (Ley & Rosenberg, 2005). These barriers include financial loss for physicians doing research (Ljunglöf, 2011), increased complexity of biomedical research (Lemoine, 2008), insecure funding with increased competition for younger faculty (Giglio, 2009; Ortlieb & Weiss, 2015), and the extended training required within both the clinical and scientific practice (Daye et al., 2015). However, despite identifying a number of barriers and obstacles, and creating initiatives to limit them, the number of physician-scientists keeps on decreasing (Mirmira, 2014). Thus, even though more than 40 years have passed since Wyngaarden (1979) labelled the physician-scientists as an ‘endangered species’, most of the reasons he suggested for the decrease are still relevant today.

The plurality of identified factors that have an impact on the situation for physician-scientists indicates that it is a complex problem, where all these

factors must be considered in order to 'reinvigorate the physician-scientist work-force' (Daye et al., 2015). Yet, despite having identified these factors, a recent literature review concluded that the question of how, when, and why physicians choose an academic career in medicine 'remains essentially unanswered' (Borges et al., 2010, p. 680). Thus, there appears to be reasons for approaching the question of the decreasing number of physician-scientists from a different perspective.

Framing the study

As illustrated in the previous section, it seems apparent the problem with the decreasing number of physician-scientists is not sufficiently answered by identifying barriers and obstacles. Therefore, Borges et al. (2010) argue that it is necessary to put increased focus on the impact of individual, organisational, and group values, in order to better understand physicians' decisions to conduct research. As discussed earlier, this supports the idea that it is relevant to consider the social context in which physician-scientists operate, as they influence the situation for the individual. Especially by considering that the 'organizational values of research, teaching, and patient care seem to be at odds with one another' (Borges et al., 2010, p. 684). It is then up to the physician-scientists to manage these different values at the same time. It can thus be inferred that there is a need to consider how the social environment influences the physician-scientists career, which has mostly been peripheral in the literature.

Traditionally, the social context has mostly been discussed in personal essays or annual meeting speeches, where physician-scientists elevate certain problems through their own, or others', experiences (Archer, 2007; Gill, 1984; Goldstein & Brown, 1997; M. Wolf, 2002). For example, Gordon Gill (1984), using his own experience of attending the annual meeting of the most prominent physician-scientist association, illustrated how it had gradually lost its prestige over the years as those involved with basic science migrated to other, more specialised associations. This illustrated the separation between physicians and scientists through the different communities with which they identified. At the same time, as described in the initial quote of the chapter, Goldstein and Brown (1997, p. 2805) argue that physician-scientists struggle to belong in their respective communities. These essays typically involve something similar to a sociological analysis of physician-scientists, suggesting that the social context seems to have a larger impact than most studies indicate.

While these have served as inspiration to take a different approach, other recent sociological studies with physician-scientists as the empirical focus have also done so. Some of these have used professional theory to illustrate how physician-scientists lack a clear role, compared to the established separate roles of physicians and scientists (Hendriks et al., 2019). For example, Wilson-Kovacs and Hauskeller (2012, p. 509) argued that physician-scientists were trying to 'establish distinct fields of expertise, maintain professional jurisdictions, and justify research positions at the top of a knowledge hierarchy'. Thus, they emphasised how physician-scientists struggle to be either physician or scientist, as these are distinctly different professions. Others have suggested paying increased attention to the physician-scientists' professional identity, arguing that the inherent differences between scientific research and clinical care make it relevant to consider how this affects the individuals involved with both (Rosenblum et al., 2016).

These recent studies indicate a growing interest within the social sciences to understand the precarious role held by physician-scientists. Specifically, how physician-scientists are influenced by their double role and belong to two different professional communities at the same time seem to warrant more consideration. While I intend to build on these earlier studies, my interest lies closer to how the physician-scientists experience the group of people that they work with on a daily basis. That is, rather than relating to the more abstract professional community of physicians and scientists (Freidson, 2001), my focus is on the local community in which they are members. Through the concept of communities of practice, I consider the group and organisation of which the physician-scientists are members, and how this membership influences their careers.

Communities of practice and membership

Building on the notion of how the physician-scientists struggle to belong in either of their communities (Goldstein & Brown, 1997), I conceptualise this through the concept of multi-membership in communities of practice (Wenger, 1998). The literature on communities of practice highlight how learning in practice is a social experience rather than a cognitive one (Lave & Wenger, 1991), which is applicable in the training of both physicians (Egan & Jaye, 2009) and scientists (Austin, 2002). It also emphasises how the individual's role can be understood in relation to the social environment, thus providing a relevant framework for the problematisation mentioned above. Furthermore, with the notion of multi-membership already established in the communities

of practice literature, it provides a theoretical context for the study. At the same time, this notion is empirically rather underdeveloped in the community of practice literature, especially regarding how it relates to power relations, which presents a gap in the literature that this study can fill. As such, the concept of communities of practice offers both a suitable analytical framework for interpreting my findings and provides a theoretical context, where I can extend these findings to a more general phenomenon.

Based on the idea of apprenticeship, the concept includes the social aspects of becoming a member in a community, where a newcomer learns what it means to be a practitioner by participating in the practice (Lave & Wenger, 1991). As such, the concept connects learning with socialisation into a group, career movements, and identity development. Combined, this relates to how learning is a social activity where the individual becomes connected to the social community in which it takes place (Wenger, 1998). Through the social interactions in a community, the individual members continuously learn what it means to be a member and a practitioner (J. S. Brown & Duguid, 1991). As a result, the concept highlights the influence, control, and power that the group has on shaping the individual with regard to the values and norms of being a practitioner and a member (Cox, 2005).

I suggest that through this emphasis on membership, the concept connects to the notion of physician-scientists struggling to feel at home in either community (Goldstein & Brown, 1997). Their role as translators between clinic and science involves the crossing of boundaries between the communities on a regular basis, which has received increased attention within the community of practice literature recently (Wenger-Trayner, Fenton-O'Creevy, Hutchinson, Kubiak, & Wenger-Trayner, 2014). Crossing boundaries between communities is considered important for new knowledge to enter the group, especially considering that situated learning typically involves conformism, where the dispersing of new knowledge is slow (Wenger, 1998). To contravene such conformism, there is a need for brokers who have the capacity to transfer new knowledge to a community (Eckert & Wenger, 2005), similar to the notion of physician-scientists as translators between bench-and-bedside.

Furthermore, with this role being seen as complex, entailing ambivalent relations, and creating uprootedness (Wenger, 1998), I suggest that the experience of brokers is also a suitable approach to emphasise the impact of power relations in communities of practice. Although admittedly underdeveloped, the notion of power was prevalent in the original conceptualisation of communities of practice (Lave & Wenger, 1991).

However, questions of power within communities of practice have in many ways been overlooked, as the concept has evolved (Contu & Willmott, 2003), which has also limited the critical power of the concept (Gherardi, 2009). In this study, I intend to elevate the power relations that exist within communities of practice, both regarding how learning can be conformist and how the members can compete for control over the practice in the community.

By doing so, I intend to extend the literature on communities of practice both concerning the experience of multi-membership and suggesting different ways in which the power relations in a community of practice can influence the individual. First, by studying the process of becoming a physician-scientist, I illustrate how members in the community exercise their power over new members. Secondly, I also connect the struggle to belong that is associated with being a broker to the internal power relations in the community of practice. In their role as brokers, the physician-scientists risk having their membership rejected by the other members in the community of practice, as they are not fully committed to the practice. I will do this by illustrating the physician-scientists' career experiences and connect this to the notion of becoming a member in a community of practice, as well as having membership in multiple communities.

To achieve my aims, I have conducted qualitative interviews with physician-scientists at different stages of their career. Based on their own experiences and understanding of their situation, the idea is to contextualise the structural barriers and incentives presented in the literature. By letting them narrate their own career stories (Bosley, Arnold, & Cohen, 2009; Cohen & Mallon, 2001), I aim to present a more nuanced perception of what it entails to be a physician-scientist. This relates to the idea that individual life stories can, while telling us about the actual journey, also provide an understanding of the social world in which they take place (Barley, 1989; E. C. Hughes, 1937). Through semi-structured interviews, the idea is to reach beyond the formal structures, and thereby develop an understanding of how their experiences are influenced by these structures. Furthermore, these interviews will also elucidate the informal aspects, such as how they identify with their role, and how they relate to their position in both the clinical practice and the scientific world.

Purpose and research questions

With this backdrop, the purpose of this thesis is to contribute to a deeper understanding of the physician-scientist career, by analysing the physician-scientists' own understanding of their career experiences. I aim to illuminate the complexities associated with being both a physician and a researcher, and how the physician-scientists manage these. Thus, this dissertation intends to answer the empirical question of *how do physician-scientists experience their career?* To answer this broad question, I have divided their career into three parts: how they get started with research; how they become an independent physician-scientist; and how they manage being a physician-scientist. Each empirical chapter will focus on a separate question as follows:

- How do physicians experience the process of becoming a physician-scientist?
- What aspects influence the transition into becoming an independent physician-scientist?
- How is the role of being a physician-scientist experienced and described?

With the concept of communities of practice as my main analytical tool, I intend to put their individual experiences in relation to how they understand and interpret the communities to which they belong. As such, I connect the individual experiences with the practices in the community, which I argue also gives a broader insight into the physician-scientists' situation in general.

This also provides opportunities to contribute to the communities of practice literature by advancing the understanding of multi-membership and boundary crossing. Through the experiences of the physician-scientists, I will empirically illustrate some of the complexities associated with the general phenomenon of simultaneously belonging to different communities of practice. Furthermore, by connecting this to the power relations in a community, I aim to extend our understanding of how power can be exercised to maintain control over the practice through membership.

Outline of the chapters

Following this introductory chapter, where I have introduced the problem that is being studied, as well as framing the study and its purpose, the remaining chapters are outlined as follows. In the next chapter, I will present a more comprehensive review of the physician-scientists and their role in medical research, as briefly introduced in this chapter, as well as discuss previous literature regarding the separate roles of physicians and scientists.

Thereafter, in chapter 3, I will introduce the concept of communities of practice. There, I will provide a brief overview of the concept, as well as some of the theoretical and philosophical ideas on which the concept is built. Primarily, however, I present the analytical toolbox that has supported this study, with an emphasis on the ideas of legitimate peripheral participation and membership. Furthermore, I focus on the power relations that are inherent aspects of situated learning, where the newcomers are subject to the full members' ideas on what is deemed relevant in the community.

In chapter 4, I will discuss the methodological considerations guiding the study and present my research process. This includes arguing for the benefits of an interpretative approach, the philosophical underpinnings that have influenced this study, and thoughts on interviews as a research method. Furthermore, I introduce the reader to how this project has developed through my research journey, which includes my selection of interviewees and how the interviews were conducted. Finally, I discuss my analytical process, following the three steps of sorting the material, reducing the material, and developing concepts.

Chapter 5 will introduce the empirical setting, the Southern University-Hospital (SUH). This chapter gives the reader a brief background on SUH and the formal ways that the university-hospital promote research during the medical education and the clinical training. This chapter is followed by my three empirical chapters, where I present the material and my analysis.

In the first of these, chapter 6, I focus on the clinical community of practice, and how resident physicians learn that research can be seen to have three different roles in the practice: research as membership requirement; research as a clinical instrument; and research as membership fee. Through these roles, the community of practice has developed an informal expectation that residents should write a dissertation, in order to be accepted as members of the community. As such, I argue that the senior physicians use their control and power over the residents, where they are expected to be mutually engaged in the joint venture of the community. Thus, the residents learn to become

members of the community of practice, where they are socialised into sharing their ideas regarding the clinical practice.

In chapter 7, I will focus on the period after the physician has defended his or her dissertation, where he or she experiences a gap period. This period is characterised by, what I call, a dependence-independence paradox, which relates to the idea that in order to become independent physician-scientists, they are dependent on the support from their former supervisors. I discuss the importance placed on the idea of independence, and how it is interpreted in different ways by the scientific community of practice that the physicians were a part of during their doctoral period, and the scientific bodies that review funding applications. I argue that physicians tend to be trained for dependence, which results in them struggling to demonstrate the independence, operationalised through an expanded research network and/or additional publications, which is necessary to acquire individual funding. This leads to them being dependent on support from their former supervisors, which are the ones that they should demonstrate independence from, creating the paradox.

In the final empirical chapter, chapter 8, I illustrate the experience of being a physician-scientist. I suggest that there are three different types, where each type has a different position in the clinical community of practice. Primarily focusing on the 'serious' physician-scientist, who is equally involved with research and clinic, I discuss how they are perceived as problematic in the clinical community. As a result, they tend to experience liminality, where they struggle to identify with either role. Through a combination of formal and informal structures, they typically end up moving towards either becoming 'hobby' physician-scientists, primarily focused on the clinic with some research, or 'professional' physician-scientists, where they are predominantly scientists, with limited clinical work.

In chapter 9, I will summarise my findings and discuss these in relation to the purpose of the study. I will discuss my contributions to the literature on physician-scientists and suggest the need for a more nuanced perspective with regard to their role in clinical research. Furthermore, I will highlight how this study contributes to the communities of practice literature, in empirically illustrating how power can be exercised through membership. Finally, I discuss the implications of the study, the limitations that it has, and avenues for future research.

The physician-scientists

In this chapter I will first go into further detail about the physician-scientists and their role in clinical medical research, which primarily draws from the medical literature, and then move into the separate roles of physicians and scientists, primarily drawing from the literature on professionals. In the first part, I will discuss the physician-scientists regarding their role in medical research, and the problem of translation between clinical practice and science. Following this, I will discuss the physician-scientists specifically, illustrating their decreasing numbers, the suggested reasons for this, and focus in on problematising the double role that they have. Finally, I will move into the literature on their two roles separately, thus moving away from the medical literature. While the physician-scientists have received limited attention within social science, both physicians and scientists have been studied extensively, especially in their roles as professionals. Thus, I will focus on the professional communities that the physician-scientists belong to separately, highlighting how these roles differ.

The physician-scientist and medical research

In this first section, I will present the previous research conducted on the physician-scientists and their role in medical research, as discussed within the medical literature. This starts with a discussion on the different definitions of physician-scientists, and how these relate to each other. Following this, I will give a historical overview of the physician-scientists role in medical research and how this have developed during the 20th century. This leads into the issue of translation between science and clinical practice, which has been prevalent over the last two decades. Here, I highlight the physician-scientists role as translators, and how they play a critical part in improving the situation.

Defining the physician-scientist

> Only the well-trained physician scientist can thoroughly understand, interpret, and properly care for human subjects during studies that involve an intervention. Even more important, the physician-scientist is uniquely positioned to ask the relevant questions that will redefine the therapeutic and preventive opportunities and to identify the human conditions, inherited or acquired, that offer new opportunities to advance health science (Shine, 1998, p. 1442).

> The physician-scientist is the translator and reverse translator between the laboratory and clinical practice (Balaban, 2008, p. 766)

While physician-scientist is the most common label, and the one that will be used in this thesis, it is sometimes referred to as clinical investigator (e.g. Goldstein & Brown, 1997), clinician-scientist (e.g. Lemoine, 2008) and clinician-researcher (e.g. Yanos & Ziedonis, 2006). The distinct difference between these is that clinician can refer to any clinical profession, while physician specify that it concerns a medical doctor. In the most basic definition, a physician-scientist can refer to a physician who is actively involved in clinical research. Nevertheless, there are a few different definitions of who is considered a physician-scientist. Typically, this relates to what capacity, and to what extent, the physician conducts research. Wyngaarden (1979, p. 415), for example, defines the physician-scientist as:

> an individual thoroughly trained in clinical medicine and also thoroughly trained in a scientific discipline, and who, in addition, participates in both clinical and experimental endeavors as a career role. Thus I refer to the physician who is simultaneously a serious scientist, and far less to the clinician who may occasionally also do some research'.

Following this definition, there are three requirements in order for someone to be a physician-scientist: they should have training in both clinical medicine and science; they should be involved with both clinical and research duties; and they should be a serious scientist. This is a rather inclusive definition in the sense that it does not specify to what extent they do either of the two tasks, nor what thoroughly trained means. Although the last requirement does not specifically clarify it, at least it hints to the fact that doing just a little research on the side is not deemed enough to be a physician-scientist. Rosenberg (1999, p. 1622, italics added) uses a more specific definition,

> M.D.s who devote *all or a majority* of their effort to seeking new knowledge about health and diseases using established scientific principles.

More specifically than Wyngaarden's definition, the physician-scientist must be a medical doctor, and not just trained in clinical medicine, although it is reasonable to assume that this has the same meaning. However, he specifies the extent to which the physician should be involved with research, where it is not necessary to work clinically. Thus, according to Rosenberg, it is possible to work only with research and still be considered a physician-scientist; this disregards the simultaneous exercise of the two that Wyngaarden suggests. The important demarcation between the two definitions can thus be seen as mainly relating to the amount of time that is allocated between research and clinic, although neither specifies an optimal distribution. At the same time, neither of them specifies what type of research activity they should be involved in, thus accepting both basic and clinical research.

In this thesis, I find Wyngaarden's definition as being more suitable, since it includes physicians that are active researchers, even though they perhaps spend the majority of their time working clinically. There are certain caveats to his definition, however, specifically about the lack of specificity in the training required to be a physician-scientist. While there are no such requirements in the US, in the Swedish setting, one must have a PhD in order to be considered a physician-scientist (SOU, 2008:7). Thus, one must have finished both medical school and written a dissertation, in order to show that he or she is thoroughly trained in both clinical medicine and in a scientific discipline. From this, I will use the following definition of the physician-scientist,

> an individual with both a clinical medical degree and a doctoral degree (MD/PhD), who is *actively* both practising medicine at a clinic and conducting research.

Historical development

The connection between scientific research and clinical care has a long history, where it was primarily physicians that developed our understanding of the human anatomy. Ancient Greeks, such as the famous physicians Hippokrates and Galen, are often referred to as the originators of medicine, in the sense that they instituted 'a learning process founded on a scientific and experimental basis' (De Divitiis, Cappabianca, & De Divitiis, 2004, p. 724). While their theories based on empiricism have long been discarded, the idea of basing patient care on the available scientific knowledge has lasted ever since

(Boynton & Elster, 2012). The history of medicine is thus replete with breakthroughs based on observations and tests made by physicians through their practice of treating patients. However, it was with the discovery of cells and germs during the 19th century, which made it possible to identify the causation of diseases and thus establish a scientific foundation for medical practice, that modern medicine was born (Schafer, 2009a).

It was with this scientific foundation, and the continuous scientific advancements, that the medical practice started to evolve. Consequently, the growth in medical knowledge made it impossible for one person to master all aspects of it, resulting in different branches of medicine braking off and becoming independent (Meltzer, 1909). At the same time, medical research evolved and with the introduction of biomedicine during the 20th century (Quirke & Gaudillière, 2008), the scientific knowledge expanded rapidly. Around this time, full time scientists without a clinical background started to enter medicine. Gradually replacing physicians in the preclinical departments, research and clinical practice started to become somewhat separated activities. Nevertheless, with the laboratories closely connected to the hospitals, the research conducted was typically rooted in the clinical questions based on the study of patients (Schafer, 2009a). Thus, even though a split between clinical practice and medical research started to develop, they were still closely tied together during this time.

Expediated by the two World Wars, medicine made enormous strides in developing vaccines and treatments for widespread diseases. The scientific advances quickly generated an impact in the clinical practice, which in turn led governments, philanthropist, and pharmaceutical companies to invest vast sums into medical research. Physician-scientists were instrumental in this development during the first half of the 20th century, becoming labelled as the "triple threat" academic, referring to an individual that successfully pursued patient care, teaching, and research simultaneously. At the same time, however, the scientific advancements during this period made it increasingly difficult to manage all these tasks. With unprecedented support for basic research as medicine moved into the molecular era, the practical relevance for research gradually diminished (Schafer, 2009a).

Consequently, the earlier marriage between clinical practice and research started to slowly become separated. New laboratories were built outside of the hospitals and were increasingly filled by non-clinical researchers. Physicians and scientists were developing different languages, creating barriers between the bench and the bedside. As molecular biology expanded in the 1970s, the 'clinical and basic research started to diverge dramatically' (Schafer, 2009a, p.

37). Somewhat ironically, this development took place during the "golden age" of clinical research. Exemplified by the Oslerian ideal, physician-scientists were portrayed as the 'individual clinical investigator who can… shuttle effortlessly back and forth between bedside and bench, managing both a busy clinical practice and a productive research laboratory' (Schafer, 2009b, pp. 15-16). However, the recruitment of these "triple threat" physicians, who pursued patient care, research, and teaching simultaneously, were slowing down (Wyngaarden, 1979).

Although there were occasional reports about the weakened connection between research and clinical practice (e.g. Gill, 1984; Goldstein, 1986; Wyngaarden, 1979), it was not until the end of the 20th century that the issue became seriously recognised outside of the medical field. Once it did, however, the decline in clinical research and the problem of translating scientific knowledge into practice, became a general issue for health care around the world.

A problem of translation

The crisis in clinical research, as Ahrens (1992) labelled it, started to receive increased attention during the 1990s and early 2000s. While the considerable investments in basic research generated an unprecedented understanding of the human anatomy, they struggled to translate into advancements within clinical practice. The issue of translation (Woolf, 2008), where the knowledge developed at the bench does not reach the bedside (S. Wolf, 1974), thus became a highlighted issue in the end of the 20th century. While the knowledge of the human anatomy is expanding through basic research, it has not been equalled to advances in clinical medical research (Bell, 2003). As a result, these advancements struggle to transform into knowledge that can have an impact in the clinical practice, and thereby become beneficial for patients (Lenfant, 2003).

Furthermore, there was a 'growing public perception that the enormous resources being poured into biomedical research are not resulting in commensurate gains in new treatments, diagnostics, and prevention of disease' (Schafer, 2009b, p. 37). This situation sparked an increased focus on the challenges surrounding clinical medical research around the Western world. Several initiatives were initiated to improve the situation, such as forming *the Institute of Medicines Clinical Research Roundtable* in the US (Sung et al., 2003), *the European Advanced Translational Research Infrastructure in Medicine (EATRIS)* in the European Union (R. Becker & van Dongen, 2011),

the *Clinical Research Collaboration* in the United Kingdom (Cooksey, 2006), *a Road Map for the German health research programme* in Germany (Kordel-Bödigheimer & Lücke, 2007), an *Action plan for clinical research* in Sweden (SOU, 2008:7). Most of these initiatives identified challenges with the translation of the knowledge into clinical practice, with suggestions on how to break the negative spiral that was witnessed.

Sung et al. (2003) presented one of the first of these reports, illustrating four central challenges within clinical research, building primarily on the case of the US: Enhancing public participation; developing information systems; an adequately trained workforce; and funding. The first-mentioned challenge suggests an increasing need for participating patients. However, they identify a number of disincentives, such as safety and privacy concerns, lack of trust towards doctors due to conflicting interests, and participant demands of a higher level of influence in the studies. Regarding information systems, they argue for the benefits of a standardised system for storing electronic patient records, and how there is a need for creating incentives for the development of better computer infrastructure (Sung et al., 2003). Since their article was published in 2003, major advances have been made in this area, as the world has become increasingly digitalised.

The third identified challenge is related to a shortage of qualified clinical investigators (Sung et al., 2003), henceforth called physician-scientists. The problem is often associated with the extended education required for becoming a physician-scientist, resulting in greater debt and a shorter career with an uncertain career pathway (Ley & Rosenberg, 2005; Sung et al., 2003). The problem of decreasing number of physician-scientists was not new, as Wyngaarden (1979) labelled them as an 'endangered species' almost 25 years earlier. Nevertheless, recent reports indicate that there are still problems associated with the careers for the physician-scientists (Milewicz et al., 2015; Mirmira, 2014).

The last challenge identified by Sung et al. (2003) involves clinical medical research being under-funded and fragmented, where the large proportion of available funds being committed to basic science is considered one of the major problems. Furthermore, the changing nature of funding allocations, where most scientists now lack employment and are dependent on external monetary support from private or public organisations, has led to the expansion of marginal positions (Hackett, 1990). With that, the funding situation is often connected to the limited career opportunities for physician-scientists.

Similar challenges have been identified in Europe as well, where Sheridan (2006) identified five factors to reverse the decline of academic medicine: Improve the career tracks and funding for young physician-scientists; improve the communication to the public; improve the clinical relevance when assessing research; promote teaching to provide tomorrow's physician-scientists with adequate training; restructure the funding framework in the European Union to make it less bureaucratic and increase focus on scientific quality. Similar statements have been provided by *the European Medical Research Councils (EMRC),* who in a number of reports have suggested the need to improve the situation within biomedical research (referring to both basic and clinical research) (Berghmans et al., 2011; Billig et al., 2007), clinical trials (CMRC, 2009) and implementation of new discoveries into clinical practice (EMRC, 2011). Similar to the problems discussed in the American debate, the focus has been on funding, infrastructure, and the physician-scientist, and the obstacles facing them to conduct clinical research (CMRC, 2009). Hence, the problems identified in Europe are rather similar to the situation in the US.

Looking at specific countries, this becomes even more evident. After witnessing a decline, the UK focused both on improving the situation for academic research and to provide better opportunities for the pharmaceutical industry to invest in R&D. With a focus on improving coordination, they launched two groups, where one focused on infrastructure, and another to enable a more joined-up approach between governmental research funders (Cooksey, 2006). In addition, the decreasing number of physician-scientists led to a number of initiatives with the focus to revitalise the clinical academic workforce, such as increasing clinical research fellowship programmes, in order to expand on the opportunities for a clinical academic career (The Academy of Medical Sciences, 2009).

In Germany, the Federal Government's Health Research Programme is mainly focused on clinical research, with an emphasis on providing clinically relevant research. Nevertheless, the gap between basic and clinical research is still existent, and in *a Road Map for the German health research programme*, one of the recommendations is to create improved interdisciplinary cooperation between basic and clinical research. Furthermore, the long-term funding for clinical research is considered defective (Kordel-Bödigheimer & Lücke, 2007).

In a joined-up report from the Nordic countries regarding medical research, a number of similar weaknesses were identified (Academy of Finland, 2011). The lack of career opportunities for physician-scientists was here considered

so severe that it was a threat to the entire branch of medical research. Considering that Sweden has a long history of successful medical research, both commercially (Norgren, 1989) and academically (Academy of Finland, 2009), the 'crisis in clinical research' (Medicinska forskningsrådet, 1998) was problematic. Although still successful in international comparisons on field normalised citation rate[1], the country had a negative trajectory over the last 20 years (Academy of Finland, 2009).

With a lack of positions for postdoctoral and young investigators, the research output in the Nordic countries becomes too dependent on doctoral researchers. Furthermore, insufficient funding for infrastructure and for research without a clear commercial purpose is recognised, as well as poor collaboration between the countries. In addition, the connection between clinical research and advanced health care is emphasised, where high-quality education of future physicians is dependent on strong clinical research (Academy of Finland, 2011).

Thus, most of the Western world has identified problems with the production of clinical research, as well as spreading this into clinical practice. I have here shown that this problem has received increasing attention over the last two decades, with most countries/regions facing similar challenges. The situation for physician-scientists, the ones expected to be involved in both of these translational steps, is specifically mentioned by all, often in connection with the typically complex funding structure. With the funding structure also impacting the physician-scientists' careers, their situation can be seen as the most relevant aspect to consider. As suggested in a recent governmental investigation in Sweden, the recruitment of young physicians into research is 'the *single most important measure* to promote the clinical research and create good conditions for new knowledge to be implemented in the healthcare setting' (SOU, 2009:43, p. 113, italics added).

Having established the crisis in clinical research and the issue of translation as the underlying problem, I have here illustrated how the physician-scientists are considered to play a crucial part in its development. In the next section I will focus specifically on the physician-scientists, illustrating their decreasing numbers and discuss some of the reasons for this identified in the literature.

[1] 'The field normalised citation rate is the number of *Citations Per Publication (CPP)* divided by the average number of citations of all publications in the database from the same year, same publication type (article or review) and in the same subject field(s) (i.e., the field citation score, FCS)' (Academy of Finland, 2009, p. 60).

The vanishing physician-scientists

The issue of translation in medical research is thus closely connected to the decreasing numbers of physician-scientists. Their dwindling numbers is seen as both an indication of the decline in clinical research, and as one of the underlying reasons for the decline. In this section I will first illustrate how the physician-scientists has been gradually decreasing over the last decades. Following this, I will discuss the identified reasons for this decline, focusing on the structural barriers and obstacles, which has been the main approach in the medical literature. Finally, I will move into exploring the double role of the physician-scientists, illustrating the need for taking a different perspective in understanding their situation, using ideas from the social sciences.

Decreasing numbers of physician-scientists

Despite numerous reports on the decreasing numbers of physician-scientists, it is difficult to make an exact assessment of how many there are due to a lack of clear data (Randolph & Kelley, 1994). Typically, they do not fall into a distinct job category, especially considering the variety of definitions on who is considered a physician-scientists as described above. Instead, it is necessary to combine different type of data sets to make estimations (Ley & Rosenberg, 2005). As different studies can then use different types of data, it is often difficult to compare the numbers, and especially to compare between countries. Nevertheless, regardless of which approach is being used, the estimations show that the number of physician-scientists are decreasing.

Among the first to highlight the decrease of physician-scientists in medical research was Wyngaarden (1979), who over 40 years ago suggested that they were becoming an "endangered species". Using what is typically the most common approach to estimate the number of physician-scientists in the US, his argument was primarily based on the decreasing numbers of physician-scientists applying for, and being awarded, grants from the NIH. Specifically, he highlighted how full-time researchers without clinical training were increasingly being awarded research fellowships, research career development grants, and principal investigator grants. Most alarmingly was the decrease in new entries of physicians into science, which warranted the call:

> What is needed, and what in my view in now seriously endangered, is an adequate supply of physician investigators, thoroughly trained in a scientific discipline as well as in a clinical field of medicine, capable of bringing both

> their medical insights and their scientific skills to biomedical science (Wyngaarden, 1979, p. 426)

Consequently, he argued how this was an indication of a weakened connection between research and clinical practice. This distinction is especially relevant to emphasise. Although the problem of the decreasing physician-scientists in itself was worrying, the larger issue related to how it would affect the clinical practice. With fewer physicians involved with medical research, the translation between the bench and the bedside could be diminished (Wyngaarden, 1979). He thus predicted the situation that would receive serious attention approximately 20 years later (e.g. Sung et al., 2003), while connecting it to the decreasing numbers of physician-scientists.

Rosenberg (1999) echoed Wyngaarden's argument two decades later, claiming that as 'the entire species of physician-scientists is at risk', everyone concerned with medical research would be affected. Similar to Wyngaarden, he emphasises the decreasing number of physicians applying for major research grants for the first time, and the number of physicians participating in postdoctoral training programmes. While those physicians that do enter a research-career have similar success rates in acquiring major research grants as PhDs without clinical education, there are fewer young physicians that choose the research path. This development seems to have continued, as the numbers of applications to the specifically tailored physician-scientist programs at NIH has been steadily declining between 2005 and 2013 (Mirmira, 2014).

In another study, Ley and Rosenberg (2005) estimated that the number of physicians that engaged in research as their main activity had declined from a peak of 23 268 in 1985 to 14 521 in 2003 in the US. Considering that the number of physicians also increased considerably during this period, the percentage of physicians that spent a majority of their time on research decreased from 4.6% in 1985 to 1.8% in 2003. Thus, not only had the number of physician-scientists decreased, but in relation to the total number of physicians the decline was substantial. Despite this, the authors highlight that there were indications that younger physicians were increasingly interested in entering a research career (Ley & Rosenberg, 2005). Nevertheless, a report by the "Physician-Scientist Workforce Group" released in 2014 showed that the physician-scientists had continued to decrease in numbers as a percentage of the workforce (Feldman, 2014).

Turning to Sweden, the situation is similar to that of the US in many regards. Reports of a 'crisis in clinical research' (Medicinska forskningsrådet, 1998)

and the situation for the physician-scientists started to receive increased attention in the country around the 2000s (e.g. Ahren, 2003; Arner, 2003; Groth, 2003). This led to a governmental investigation that focused on the state of clinical research and the conditions for physician-scientists in the country. This showed that while the actual number of physician-scientists was not decreasing, the relative numbers were (SOU, 2008:7). This was based on the number of physicians that have earned a PhD, which is a required first step for becoming a physician-scientist. With an estimated 25-30% of all physicians having a PhD in the 1980s (Stendahl, 2012), this has gradually decreased to approximately 20% in 2005 and 17% today (Andersson, 2019). Furthermore, it is not necessarily the case that all physicians that hold a PhD-degree are active physician-scientists, meaning that these numbers could be lower.

While the number of PhD students within medicine in general has been steadily increasing for the last 15 years (Universitetskanslerämbetet, 2015), this increase is mostly derived from non-physician students. The number of physicians completing a PhD has been relatively static at the level 200–250 persons per year, which is the same number that is estimated to retire each year (SOU, 2009:43). During the same time frame, there has been a significant increase in the number of licensed physicians in the country (Socialstyrelsen, 2015b), meaning that the relative number of physician-scientists is decreasing. As projections indicate that more physicians, and in particular specialised physicians, will be required in Sweden in the near future (Socialstyrelsen, 2015a), this number is not expected to increase.

Several international evaluations have identified the high average age of the physician-scientists and a weak regrowth as the two main problems. The educational time to become a physician-scientist in Sweden is long, as one must have finished the 5.5 year-long medical school, 18-month internship, and the 4-year doctoral education. With the typical approach being to write the dissertation in parallel with either internship or residency, it usually takes longer. As a result, the average age of new physician-scientists is 42, and 80% of all physician-scientists are over 45 (SOU, 2008:7). Another recent report, which followed up on how many physicians had started doing research within 3 years of graduating medical school, also indicates a slow regrowth. It showed that out of the almost 5,000 physicians graduating in Sweden between 2007/08 and 2011/12, only 321 started doing research within 3 years, equalling 6.4% (Gillström & Severin, 2016).

In the next section I will discuss the extent literature on the identified reasons for the physician-scientists decreasing numbers. As most of this have focused on structural barriers and obstacles in the physician-scientists career track, this

will be my starting point, before I problematise certain aspects of this perspective.

Structural barriers and obstacles

Since Wyngaarden (1979) labelled the physician-scientists as an endangered species, much work has been done trying to identify why this is the case. Despite the label indicating that the physician-scientists are endangered, he mainly neglects the environmental context that could be causing this endangerment (Korn & Heinig, 2009). Instead, with the modest recruitment of young physicians into a career as physician-scientists, much focus has been spent on identifying, and suggesting to remove, possible barriers and obstacles. As a result, there is a major strand within the literature on physician-scientist trying to identify different issues and obstacles for why physicians do not get involved with research. As stated by Borges et al. (2010, p. 681), for 'every reason that could engender the choice of academic medicine, there seems to be a barrier preventing a physician from entering academic medicine'. Despite this, they concluded that the question of how, when, and why physicians choose an academic career in medicine remains essentially unanswered (Borges et al., 2010). Nevertheless, in this section I will give a brief overview over the barriers and obstacles identified in the literature.

Five years after Wyngaarden's first warning, Gordon N. Gill (1984) suggested that the physician-scientist had reached an end due to a combination of three forces; financial changes, the scientific progress, and a greater push towards clinical care. Firstly, salaries for practicing medicine became considerably higher in the 1970s, where engagement in research became a financial loss for physicians. Secondly, the quick advances in the biomedical sciences required a higher technical expertise and a full-time dedication in order to make noteworthy contributions, where physicians struggled to compete with full-time scientists. This change was illustrated through the decline in quality, prestige, and importance, of the previously main annual conference in the USA for physicians and scientists to convene and share their results. This event had gradually been replaced with subspecialty meetings, where scientists were focusing on different questions than the physicians. Thirdly, these changes coincided with an elevated focus on practical care, where the family practitioner became the role model[2] (Gill, 1984). The combination of these

[2] See also Dunn and Jones (2010), who provides an excellent historical overview of the jurisdictional competition between the care and scientific logic in the medical education.

forces, he argued, would make it increasingly difficult to be a physician-scientist, actively involved with both practices.

> few seemed ready to acknowledge that the clinician-scientist was now the clinician-applier of basic science or that the physician-basic researcher was unlikely to keep up, much less surpass, his colleagues in pure basic science (Gill, 1984, p. 360).

Since then, the focus on identifying reasons for the decreasing numbers of physician-scientists often entail variations of these three forces. For example, the financial aspect is still prevalent, where physicians are the only professional group that does not gain financially from doing a PhD (Ljunglöf, 2011). The lengthy training related to mastering two different practices is often highlighted (Glavey, Sahin, Bonilla-Escobar, & Bonilla-Velez, 2013; M. K. Jain et al., 2019), which result in an high average age when physicians finish their dissertation (SOU, 2008:7). Furthermore, most projections indicates a need for more specialised physicians working clinically in Sweden in the future (Socialstyrelsen, 2015a), as an ageing population results in an increasing expansion of clinical care. In addition to the financial effects, as the scientific training postpones clinical advancements, it relates to the higher specialisation needed in both practices.

Many studies have focused on providing a picture of the situation for physician-scientists through either quantitative data studies or quantitative surveys. The data studies typically involve statistics on, for example, the number of grants awarded to physician-scientists (e.g. Ley & Rosenberg, 2005; Mirmira, 2014), the career track for physician-scientists (e.g. Kosik et al., 2014), the number of physicians that enter into academic research and the gender gap within clinical research (e.g. Jagsi & Tarbell, 2009; Ley & Hamilton, 2008). Surveys typically put focus on factors such as characteristics and career intentions of young physician-scientists (e.g. Andriole, Whelan, & Jeffe, 2008), and actual career tracks (e.g. Brass et al., 2010; Goldhamer et al., 2009).

Focusing specifically on Sweden, a governmental investigation summarised various international evaluations, conducted at Uppsala University (2007), Lund University (2003, 2008), within public health research (2004) and allergy and hypersensitivity research (2004) (SOU, 2008:7). Although the reports were generally impressed with the research quality in Sweden, they identified problems concerning the high average age of doctoral students and researchers, and the weak regrowth and career structure of physician-scientists. This was specifically connected to issues of funding, defective national cooperation,

problems with applying new knowledge from different fields than one's own (SOU, 2008:7). Thus, these problems are similar to those identified in most other countries. Regarding the deficient funding, Sweden have a fragmented system, where a high number of different funders with various objectives and systems for how to allocate resources make it difficult to provide an overview (SOU, 2009:43). The ALF-funds are, with its 1.7 billion SEK, the single largest funding source for clinical research in the country (SOU, 2008:7).

In a recent paper, M. K. Jain et al. (2019) summarised the issues that the physician-scientists have on a personal, institutional, and national level, thus bringing together the various barriers and obstacles that are considered to contribute to the decrease in aspiring physician-scientists. For the individual physician interested in becoming a physician-scientist, the main issues relate to student debt, responsibilities for child-care and family, and the increased time for training to become independent (M. K. Jain et al., 2019). While the latter two issues are prevalent in Sweden as well (SOU, 2008:7), the free education in the country makes the student debt less of an issue. On an institutional and national level, they suggest that the obstacles relate to:

Institutional

- Negative effects of health care finances on research support
- Reduced patient contact time that precludes evaluation of difficult cases
- Decreasing numbers of, and decreasing exposure to, physician-scientist mentors
- Insufficient protected time for research
- Absence of organized physician-scientist career-development programs across specialties
- Inflexible family-leave policies

National

- Decreased or stagnant federal and nonfederal research funding
- Increased specialization in medicine and science, leading to a widening gap between clinicians and researchers
- Limited available funding for loan repayment programs, particularly for trainees in basic science disciplines
- Increasingly challenging requirements for board certification and maintenance of certification
- Lack of diversity in the physician-scientist workforce
- Discrepancies in salary and benefits offered during clinical versus scientific training, in part owing to ACGME policies (M. K. Jain et al., 2019, p. 400)

While this is a good summary of the various issues that aspiring physician-scientists must manage, it does not clarify how they impact the physicians, nor to what extent. As argued by Borges et al. (2010), despite identifying a number of barriers and obstacles for aspiring physician-scientist, there is still a lack of understanding when, where, and how physicians become involved with research. In their conclusion, they raise the question of using alternative approaches to understand the physician-scientists situation. The common denominator within these studies is that they usually neglect an analysis of why the situation is as it is, instead focusing on identifying possible barriers. One such alternative approach has been to take inspiration from successful physician-scientists, attempting to determine what factors made it possible for them to succeed. Based on the life stories of five Nobel laureates, Archer (2007) argues that it is essential to: become part of group whose culture embraces research, find a mentor to guide ones career, and to establish partnerships that offer creative synergies. Although he provides a few tips and ideas on how to do this, it is left rather vague how an aspiring physician-scientist should go about it in practice.

Nevertheless, he does provide a somewhat different perspective, where the focus is more on the context in which physician-scientists operate, rather than on the systemic circumstances. Even though these two are connected, there is a relevant distinction. While the interest in the systemic conditions mainly focus on identifying barriers and obstacles, the alternative is to understand how these conditions are understood in practice. For example, by explicating that being part of a culture that embrace research is relevant, Archer (2007), in a sense, elevates the social aspects of the structure that physician-scientists are part of. Thus, this suggests that there could be a need to complement the studies on the systemic conditions that the physician-scientists experience, which takes the social environment into consideration. This was further elucidated by Borges et al. (2010) who argued for a need to contemplate how values are relevant to understand the physicians' decision to enter into research.

Without specifying exactly what they mean with values, they suggest that the individual values, the institutional values, and group values, could all play a part in this (Borges et al., 2010). This connects with notions of culture and professional identity, in regards to how the social context that the physician-scientists find themselves in are influencing their actions (Rosenblum et al., 2016). This can then, in turn, be connected to the split between clinical care and scientific research (Gill, 1984; Lemoine, 2008), where the physician-scientists are part of different social contexts at the same time. Thus, this relates

back to the quote by Goldstein and Brown (1997, p. 2805), who used the metaphor of a chimeric creature of half human and half fish, to illustrate those being involved with both research and patient care, as 'they are not at home on land or in the sea'. This draws the focus back to the double role of the physician-scientists, and the increased separation between the role of physician and the role of scientist (Schafer, 2009a). This is perhaps even more relevant in the Swedish setting, where the governance of medical research fall under two different principals (SOU, 2009:43).

The double role of the physician-scientist

Gill (1984, p. 358) argued that due to the advances in molecular biology, many research-oriented physicians refocused to strictly biomedical research, leaving patient-oriented research behind. A similar sentiment was expressed by Goldstein (1986), who argued that with the increased complexity of the research field, it is close to impossible for one person to be both a passionate researcher and clinician at the same time. As a result, most are pushed towards becoming either a full-time biomedical researcher or a full-time physician, leading to the end of the physician-scientist (Gill, 1984). As stated by Goldstein and Brown (1997, p. 2811):

> we need a larger number of thoughtful, dedicated clinical scholars who care for individual patients and who have the time and resources to achieve a deeper understanding of normal and deranged function at the level of whole human beings.

Based on this, it is possible to talk about them effectively having two different roles, one within the research field and one within the clinical area. This is further emphasised by Lemoine (2008, p. 12), explaining it as physician-scientists have 'two jobs in one', being involved both in the research laboratory and at the clinic. This is especially the case in Sweden, where the healthcare is managed by the regional governing bodies, while the university is managed by the national government. With the university-hospitals thereby having two principals, physician-scientists have two different employers, further strengthening the separation between the two jobs. Although the governmental investigation suggested a reorganisation of how the university-hospitals were governed, influenced by the system in the Netherlands with University Medical Centra (SOU, 2009:43), this change was never implemented. The suggestion can be seen as an attempt to eliminate certain structural barriers, including the formal separation between the physician-scientists two roles.

In order to overcome this separation, the government and the regions have made an agreement, called ALF[3], to cooperate in regards to the medical education, research, and health care development. The basis for the ALF-agreement is that the state should compensate for the additional costs that are caused by the medical education and clinical research at the university-hospitals. The ALF-agreement is seen as the most important link between the state and the regional councils in regards to clinical research. Although the agreement includes governance in regards to organisational structures and defines the purpose of university healthcare, the main function is the economic compensation the regional councils receive for their participation in the medical education and clinical research (SOU, 2009:43).

Consequently, physician-scientists can be seen as both medical and research professionals. This is not new, as Bucher and Strauss (1961) argued that there was a split between clinical practice and research mission within the medical profession 60 years ago. However, as illustrated in the historical development, this split has gradually increased over the years, as both research and clinical care has become increasingly specialised (Schafer, 2009a). With that, there are fundamental differences between the professional worlds of the scientist and that of the physician (Coller, 2009). Thus, the physician-scientists have multiple roles at the same time, where they can both be seen to belong to both the clinical community, and the scientific community, or to neither (Goldstein & Brown, 1997).

While it is connected to the difficulty of being competent in both practices, the emphasise is more towards the experience of being something different, that does not fully fit in. As such, the physician-scientist as a chimeric creature conveys the notion of an individual that is split in two different roles, and finds it difficult to identify with either (Goldstein & Brown, 1997). Or rather, who find it difficult to be identified as either in the social context that they operate within, as the physician-scientist is not seen as a physician by other physicians, nor as a scientist by other scientists (Starr, 1940).

With this backdrop, I suggest that the different perspective that is hinted to by some scholars within the medical field, can be made more distinct by connecting it with ideas from social science. After all, these questions have been extensively studied within sociology, and its adjoining fields, for more than a century. Thus, with the medical field acknowledging that culture (Archer, 2007), values (Borges et al., 2010), and the individuals' role in a

[3] 'Avtal om samarbete om grundutbildning av läkare, medicinsk forskning och utveckling av hälso- och sjukvården', in Swedish.

community (Goldstein & Brown, 1997) is relevant to understand the physician-scientists decreasing numbers, there is evidently a need to consider these questions further. While the introduction of concepts such as values and culture suggest a more interpretative perspective, slightly moving away from the structural focus, these notions are typically used rather colloquially. However, recently there has been some movement into applying ideas from the social sciences to better understand these questions, which I will discuss in the next section.

The professional communities

Although physician-scientists have achieved limited attention in the social sciences, their two separate roles have both been extensively studied, as has the notions of values, roles, and identity. In this section, I will first discuss some of the literature on connecting different professional roles, introducing the concept of hybrid professionals. This leads into the need to consider the two separate roles of the physician and the scientist, which I will primarily do through their roles in the respective professional communities they belong to. While the professions literature is not the focus of this thesis, it provides relevant knowledge of both the role of the physician and of the scientist. Thus, it provides relevant background to the understanding of the respective roles from a social science perspective, which emphasise questions of socialisation, role identity, and values.

Connecting different roles

Rosenblum et al. (2016, p. 1612) argue that it is critical to define the nature of physician-scientist professional identity to understand 'the fundamental beliefs, motivations, and actions that underlie the decision to enter this career track and to remain a clinician–scientist in the face of unique and sometimes-onerous pressures'. Without a clear professional role where clinical and scientific knowledge is integrated, the two different roles instead often compete against each other. They highlight how the ideals differ between the two roles, where 'physicians are valued for their conformity with their colleagues, while scientists are valued for their lack of conformity' (Rosenblum et al., 2016, p. 1613).

Thus, there are fundamental differences between the professional worlds of the scientist and that of the physician (Coller, 2009), which creates a tension between clinical care and scientific research regarding both the identity values and practices (Rosenblum et al., 2016). Furthermore, 'the absence of formal recognition for the clinician–scientist career track may impede a sense of belonging to a likeminded group' (Rosenblum et al., 2016, p. 1613). With that, the issue of belonging (Goldstein & Brown, 1997) is characterised as a lack of professional identity. This follows a growing interest within the medical field to consider the influence of professional identity within medical training (e.g. Cruess, Cruess, Boudreau, Snell, & Steinert, 2014). However, in the absence of a professional identity for the physician-scientists, they instead have to develop two separate professional identities that do not match, one as a physician and one as a scientist.

According to Hendriks et al. (2019), the vagueness of the physician-scientists role limits their possibility to develop a basic occupational identity, and as a result hinders any professionalisation of their work. Through the notion that they should be both a typical physician and a typical scientist, they are stuck in the already existing respective professional roles. This in turn enforces their experience of feeling torn between them, as they have no defined and exclusive occupational space of their own. Arguing that 'the idea that clinician scientists should embody the role of clinicians and scientists simultaneously seems unrealistic' (Hendriks et al., 2019, p. 234), they suggest that there is a space for physician-scientists to professionalise their role, building on the role of the translator.

The notion of professionalising the role of physician-scientists have been suggested by others. Vignola-Gagné (2013) argued that physician-scientists claiming the role as leaders of translational research initiatives could be seen as them gaining professional power. In a study on clinical stem cell research, Wilson-Kovacs and Hauskeller (2012) argued that physician-scientists attained professional legitimisation through their role in the clinical implementation. Although there is an argument for physician-scientists to develop a profession, the role of the physician-scientist typically comprises vague or unspecified expectations, and is 'overburdened with fulfilling a hybrid role of simultaneously being clinicians and scientists' (Hendriks et al., 2019, p. 219).

The notion of hybridity has become popular to explain how professionals manage changes in their role, where they must develop new skills and competences not usually associated with their profession (Noordegraaf, 2015). The growth of hybridity comes from a blurring of professional boundaries,

where professional increasingly find themselves between different roles (Waring, 2014). Inspired by amphibian animals, which live on both land and in water, and hybrid cars that run on both gasoline and electricity, hybrids relate to the capability to maintain such varied and unstable combinations and make them stable (Noordegraaf, 2015). In regards to both physicians and scientists, this has especially been the case regarding managerialist ideas influencing their professional work (e.g. S. Jain, George, & Maltarich, 2009; Kurunmäki, 2004).

Kurunmäki (2004), for example, showed how physicians adapted to the influence of new public management reforms by acquiring tools from management accounting into the profession. Thus, rather than compete with the accountants for influence, the physicians accepted the need to complement their clinical skills with certain techniques typically associated with accounting professionals. This development was characterised as a hybridisation of the professionals, where medicine was no longer 'exclusively curative in its aspirations' (Kurunmäki, 2004, p. 327). The process of becoming a hybrid professional tends to require a negotiation of the professional identity, which involve managing the potential threat that the hybrid identity can have on the existing identity (McGivern, Currie, Ferlie, Fitzgerald, & Waring, 2015; Spyridonidis, Hendy, & Barlow, 2015).

A similar issue was apparent among academic scientists participating in technology transfers, which involved adopting a hybrid role to handle the conflicting pressures between academia and business (S. Jain et al., 2009). The hybridisation indicate that the professionals can make changes in their role by altering the typical activities associated with being an academic scientist. While this involved adopting certain aspects of a commercial persona, they still maintained the academic role identity as the primary. Thus, the hybrid role identity is negotiated, contested and dynamic in nature, where the modification involve 'adding elements of a commercial orientation onto an academic one', and thereby preserving the existing role (S. Jain et al., 2009, p. 927). That is, the notion of hybridity show that it is possible for both the professional work and the professional identity to change, without necessarily abandoning the original professional identity.

A relevant distinction here, however, is that the emergence of hybrid professionals runs parallel with a development where new perspectives and ideas intrude on their work. Part of this relates to the professionals maintaining control and autonomy over their work in the face of changing circumstances (Noordegraaf, 2015). Although, considering the history of the physician-scientists discussed earlier in the chapter, the connection between clinical

practice and science seems to have gradually diverged, rather than one of them imposing on the other. In other words, it is difficult to identify a movement towards hybridisation of the medical profession on a macro level, where physicians increasingly acquire scientific competences. Nevertheless, the notion of hybridity can still be applicable regarding our understanding of the individual physician-scientists. Especially with the ideas on how they manage their roles and professional identity in combining the two different roles.

Consequently, it is relevant to consider what these different roles entail. With the notion of them being both physicians and scientists at the same time (Hendriks et al., 2019), I will in the following two sections discuss these two roles separately. Taking the respective professional communities as the starting point, I will discuss the extant literature on first the medical profession and then the scientific community. This provides relevant insights to the understanding of their roles, specifically around the typical traits associated with each of them.

The medical community

With the medical profession considered to be the archetype of a profession (Freidson, 2001), physicians have been studied extensively in their position as professionals over the last century (e.g. Berlant, 1975; Bucher & Strauss, 1961; Freidson, 1970; Saks, 1995; Timmermans & Oh, 2010). In this section I will draw on this literature, and some adjacent to it, to present an overview of what it entails to be a physician. This highlights the notion of the medical profession as a community, with certain shared characteristics guiding their work.

The term professional has been used for centuries to indicate 'certain vocations with peculiar characteristics' (Carr-Saunders & Wilson, 1933, p. 1), and have been explored by classical theorists such as Weber, Durkheim, and Comte (Brante, 1988). Up until the 1970s, this literature was focused on the functionalistic approach, which highlights that professions are distinctly different from other occupations, and their presence supports 'social order' in civic society (Sciulli, 2005). With medicine being one of the classic professions, many of the special characteristics and traits associated with being a professional is based on physicians (e.g. Freidson, 2001). Thus, while the use of traits to define professions have been criticised (Saks, 2012), they are still applicable regarding physicians.

While the functionalistic perspective typically highlighted the professionals as playing an important societal role without expecting any benefits (Parsons,

1939), this was challenged by the revisionist approach in the 1970s (Sciulli, 2005). In a study on medicine in the US, Eliot Freidson (1970) concluded that professions are based more on autonomy and dominance, than trust and collegiality. Rather than servants of the disembodied social needs (T. J. Johnson, 1972), the professionals sought control over their profession and 'imposed both definition of needs and manner of service on atomized consumers' (Abbott, 1988, p. 4). Thus, contrary to Parsons (1939) argument of professionals disinterestedness in the market, professions were understood as market organisations, seeking domination within their area of expertise through monopoly (Larson, 1977), and to achieve legal protection through the support of the state (Saks, 2012). However, this distinction is less relevant in this thesis, as the focus is more on what the professions literature can explain about the physicians' role.

Consequently, the different traits associated with the medical profession is relevant to explore. However, with the multitude of different traits list within the functional perspective, and with the resurgence of traits lists over the last two decades, it is difficult to include them all here (See Sciulli, 2010, for a good summary). Instead, I will use a summary from Abbott (1988), who states that lists of traits tend to include that professionals have extended training, theoretical knowledge, autonomy, codes of conduct, and an organisation that function as gatekeeper and enforcer of these characteristics.

Physicians have extended training in medicine, nearly 12 years split up between 5.5 years of university education and 6.5 years of clinical training through internship and residency. Through the extended education, the physician has acquired an officially recognised body of knowledge and skills, typically based on abstract concepts and theories (Freidson, 1970). Abbott (1988) explains this abstract knowledge as where the practical skills originate and gets generated. The skills and techniques in themselves are not important, they can actually be delegated to other workers, but rather the knowledge that determines what techniques should be used in what situation. In practice this can be explained by how a physician make a decision on what treatment is best suited for a specific case, but does not necessarily have to be the one who provides the treatment, which instead can be done by a nurse or someone close to the patient.

During this extended training, the physicians go through professional socialisation, which is 'the process by which people selectively acquire the values and attitudes, the interests, skills and knowledge – in short, the culture – current in groups of which they are, or seek to become, a member' (Merton, Reader, & Kendall, 1957, p. 278). The socialisation process start during the

education (H. S. Becker, Geer, Hughes, & Strauss, 1961), which is typically provided by other professionals, and introduces the student to the life of being a professional. Thus, the education does not only provide the student with the skills and values of being a professional, but also introduce the student to his/her occupational identity (Hall, 2005).

The residency period, which typically last for five years, is thought to 'contribute to the development of commitment to the occupation as a life career and to a shared identity, a feeling of community or solidarity among all those who have passed through it' (Freidson, 2001, p. 84). The socialisation can take different forms and be done on different levels, ranging from sharing a specific dress code, to creating a common language, to sharing norms of behaviour and values that result in a common professional identity (Clark, 1997). This can involve senior physicians using their authority to teach, and sometimes berate, younger physicians, where the students accept this kind of hierarchical socialisation system, as it will provide them with the knowledge and competence necessary to be awarded similar authority and legitimacy later in their career (Weinholtz, 1991).

The theoretical knowledge is considered as the foundation on which the professional is granted authority and autonomy (Freidson, 1970), as well as their status and trust (Brante, 2011). Thereby, the physicians have control of both their own work and the work of others within the health care organisation, where hierarchy is based on expertise rather than of administrative position. Furthermore, due to the advanced knowledge in possession by the physicians, a nonprofessional is not equipped to determine or control the work of the physician (Freidson, 1970). Instead, the profession is considered as 'self-regulating, subject only to informal collegial control' (Freidson, 1984, p. 1), which is typically done within the professional association (e.g. The Swedish Medical Association).

The profession of medicine consist of a number of different specialties and sub-specialties (for a full list of medical specialties in Sweden, see Lövtrup, 2015). According to Bucher and Strauss (1961), these specialisations can be seen as different professions with various segments within them, thereby arguing against the view of the medical profession as a homogenous group. At the same time, Abbott (1981), claims that there is a status hierarchy between different specialisations within medicine, highlighting that there are internal differences within the medical profession. Freidson (1984), on the other hand, acknowledges that medical specialisations do divide the profession into different groups, although he argues that the professional training and long

tradition creates solidarity between physicians, which motivates the characterisation of them as a single profession.

The debate regarding the medical profession being a homogeneous group raise a relevant aspect of the professional literature, which is that much of it focus on a macro level. While it provides ample descriptions of the actual work done by professionals, the analytical focus tends to highlight the more abstract notion of the entire community. For example, the professionals' knowledge is typically conceptualised in regards to if it grants the profession a monopoly or not (Haug, 1972; Ritzer & Walczak, 1988), rather than how it is used in practice. As the medical profession face challenges through structural changes in the field of healthcare, Timmermans and Oh (2010) illustrate how it adapts and transforms in response to these challenges. Such a focus highlights the profession on a macrolevel, where the work of the professionals is assumed to be aligned with the professional associations.

In line with this, Cruess and Cruess (2020, p. 52) suggests that the 'medical profession as a whole can be termed a macrocommunity with an identity based on the universal values of the healer'. While influential in establishing the general ideas of being a medical professional, much of the influence on the professionals is exercised in the smaller communities in which they work on a daily basis. Ludmerer (2014, p. 193) argue that there is 'no other period as critical as the internship year in shaping a doctor's professional identity', and that the greatest sense of community is found within their speciality or subspecialty. Similarly, Pratt, Rockmann, and Kaufmann (2006) showed the important role that the senior colleagues played in physicians' identity construction, further highlighting the influence of the smaller local community that the physicians' work within.

Thus, in line with the purpose of this thesis, I will primarily use the concept of communities of practice in my analysis of the physician role. In addition to being a suitable fit to 'clarify the complex nature of medicine's many roles and organisations' (Cruess & Cruess, 2020, p. 53), the concept highlights the smaller community in which the physicians spend most of their time. As such, it also puts attention on understanding the socially situated character of the knowledge used in medical practice, rather than the objectified view associated with professional expertise (Gabbay & Le May, 2004). This will be discussed further in the next chapter.

I have in this section provided a brief overview of the medical professional community, highlighting a number of traits associated with the physician role. While I do not use the professional literature in my analysis, it provides a

background to the traditional idea of the physician, which seems pervasive in the understanding of the physician-scientists (Hendriks et al., 2019). In the next section, I will move on to the scientist role, the community that they belong to and some of the attributes influencing the role.

The scientific community

In this section I will give a brief overview of the scientific community, with a focus on how it influences the role of the scientist. Although scientists are less frequently categorised as professionals than physicians, they share many of the typical traits mentioned in the previous section. The emphasis here will be on how the scientific community is both cosmopolitan and local, and how these together influence the role of the scientist. This includes questions of scientific values and norms, competition and funding, and the socialisation of aspiring scientists and their strive for independence.

Hagstrom (1965) conceptualised the scientific community as the informal relations among autonomous scientists devoted to knowledge production, where intensive socialisation and social control guarantees the solidarity of the community and the conformity of its members. With the massification of higher education and academic research in the 20th century (Holmberg & Hallonsten, 2015), the scientific community has expanded rapidly over the last decades and become more global (Trowler & Becher, 2001). In parallel with this growth, higher education has experienced an economisation, which challenges many of the traditional principals and ideals guiding the scientific community (Hackett, 1990; Hallonsten, 2021b), and have to some extend superseded the core ideals of scientific practice (Hallonsten, 2021a). In the following, I will give a brief overview of this development, and how this influences the scientists in their work.

Schott (1991) argues that the scientific community is a community 'in so far as they cultivate a common intellectual tradition, and are bound together by their common participation in a body of evaluations of scientific activity'. These are certain general principles and ideals that the scientific community is believed to share. Weber (1918/1958), for example, argued for academic values that ought to transcend all of academia, which includes the notion of knowledge being a shared property. A similar notion is expressed by Merton (1942), who identified four norms that he claimed applied to the work of a scientist, where one relates to science as communism, where there is a common ownership of the knowledge. This communal nature of science, where the scientific contribution can only be affirmed by peers, is thus a building block

in the existence of the scientific community (Cotgrove, 1970). Although Merton's norms can be criticised as idealistic, the idea of communism nevertheless present an overarching formulation for what it means to be an academic that is still valid today (Macfarlane & Cheng, 2008).

The shared knowledge is typically highlighted in relation to the scientists' cosmopolitan commitments, which include their collaborators, specialties, disciplines, and the scientific community (Gouldner, 1957). This idea can be further illustrated with the peer-review system. That one scientist's work should be validated by other scientists before it is published in a journal, illustrate how research is not an individual endeavour, but a shared enterprise. This connects to the norm of organisational scepticism (Merton, 1942), meaning 'that ideas, results, and claims are critically examined through structured, predictable and/or mutually agreed procedures' (Hallonsten, 2021a, p. 11). This also highlights how members in the cosmopolitan community function as gatekeepers to ascertain the scientific quality. The idea of peer review is also prevalent in other parts of the scientific community, where for example an external grading committee of senior scientists is used to evaluate the doctoral dissertation, a scientific board assesses funding applications, and academic appointments are reviewed by professors in the specific field (T. J. Roberts & Shambrook, 2012).

At the same time, scientists here compete for external grants from public and private funding bodies, which has increasingly become an essential part of the work of the scientist. This competition, and the associated expanse of peer reviewing, has grown over the last decades as a result of a tension between public accountability and scientists desire for autonomy (Baldwin, 2018). This has resulted in a number of different metrics used as proxy to evaluate scientist, such as number of published articles (preferably in "top" journals), number of citations, and the success of grant applications (Hallonsten, 2021a). This pursuit of economy, efficiency and effectiveness, has had a considerable, and often agonising, impact on the scientific community (Trowler & Becher, 2001). Nevertheless, individual scientists must learn how to take part in this competition, in order to get awarded the funding that is a necessity for an academic career. This learning typically takes place in the local community.

In addition to the cosmopolitan aspect of the scientific community, scientists can also have allegiances to their local community, such as their students, departments, and universities (Gouldner, 1957). A crucial aspect here is the training of new scientists. Aspiring scientists are trained by senior scientists, where supervisors and opponents share the responsibility of evaluating if a doctoral students work is sufficient to meet the scientific criteria established

by the community (Schott, 1991). Achieving acceptance as a scientist, and as such become a member of the community, is determined by those who are already members. With that, the students must meet the requirements of the senior members in the scientific community, before they can be considered to be a scientist (B. C. Rosen & Bates, 1967). At the same time, Trowler and Becher (2001, p. 47) argue that to become a member of the scientific community it is not sufficient to demonstrate proficiency, 'but also a proper measure of loyalty to one's collegial group and of adherence to its norms'.

The formal training of scientists takes place through the doctoral education, which is the highest educational merit in the academic system in Sweden and requires four years of full-time studies (Swedish Higher Education Act, 1992:1434). Through the somewhat standardised doctoral education, the universities function as the gatekeeper to the community, in the sense that they provide the education and grant the doctoral diplomas. At the same time, each doctoral programme develop their own ideas, and they tend to be experienced differently by the doctoral students (Weidman, Twale, & Stein, 2001).

The doctoral training is often portrayed as an apprenticeship (Gardner, 2007), where the student is trained by the faculty through observations and interactions (Austin, 2002). The doctoral education involves a socialisation 'in which a newcomer is made a member of a community—in the case of graduate students, the community of an academic department in a particular discipline' (Golde, 1998, p. 56). The doctoral students understanding of the scientific community and its expectations 'are transmitted directly from teacher to student through day-to-day experiences in the laboratory' (Hackett, 1990, p. 262). Thus, the supervisors and closest colleagues play an important role in preparing the doctoral students to become independent scientists in the scientific community.

The notion of independence is prevalent throughout the entire scientific community (Hackett, 1990). In the formal guidelines for earning the PhD degree, which have been stipulated by members of the scientific community, demonstrating independence is one crucial goal of the doctoral education (Lund University, 2018). That is not to say that the doctoral student should be a fully independent scientist after having earned the PhD, but rather that they are ready to continue his or her development independently, similar to earning a driver's license (Strannegård, 2003). Independence is also a crucial criterion for moving forward in a scientific career, where having demonstrated it is an important requirement for getting funding and be promoted in the scientific community (Van den Besselaar & Sandström, 2019). However, what is meant

with independence, and how it should be demonstrated, is seldom specified, as illustrated by B. C. Rosen and Bates (1967, p. 81),

> The student is urged to be independent in scholarly endeavor. Training an individual to be independent in an authoritarian social structure has a potential paradoxical quality that is not always recognized by the agent. In effect, professors say to students, "Become an independent thinker; be critical, innovate, and question the established body of knowledge; but remember, we will be the sole arbiters of what you must do and how well you go about it.

While the doctoral education is primarily about training the next generation of scientists, Hackett (1990) show that there are indications that the students are becoming more of employees in the research projects, rather than trainees or fellows. Thus, the economisation of academic research has in some ways changed the relationship between the principal investigators and their staffs into becoming more like the relationship between capitalists and workers. As a result, there is a risk that the students' education and development get impeded by the needs to do specialised and technical work, rather than having the time necessary to explore and do independent work under the guidance of the professor (Hackett, 1990). Taken together with the incentive to increase the numbers of PhDs, the actual outcome can be an overproduction of PhDs and lower standards, leading to '[p]ostdocs [are] often required for entry-level academic positions, and PhDs hired for work MS students used to do' (Edwards & Roy, 2017, p. 52).

I have in this section provided a brief overview of the scientific community and its influence on the scientists, through the connection between the cosmopolitan and the local scientific community. Thus, I have discussed some of the traditional values and norms that exist in the scientific community, and how new scientist are socialised into these during the educational training. Furthermore, I have highlighted the increased competition for research funds and the peer review system, which in turn influence the scientists through the somewhat vague notion of independence. Finally, I have discussed some of the detrimental consequences this commercialisation of the scientific community has in the training of new scientists.

Summary

In this chapter I have discussed the extant literature on the physician-scientists, starting with their role in medical research. I have illustrated how clinical practice and scientific research have gradually diverged over the last century, leading into a problem of translation between bench-and-bedside, which has become a prioritised area in many western countries during the last decades. This problem has developed in parallel with a decreasing number of physicians getting involved with research. As the physician-scientist play an essential role as the translators between science and clinical practice, their decreasing numbers have been identified as one of the underlying reasons for the decline in clinical research. Within the medical literature, much of the focus has been to identify structural barriers and obstacles for the physician-scientists, with the assumption that the removal of these would improve the conditions for physicians to get involved with research.

Lately, however, there has been a gradual movement towards considering the impact that other, non-structural, factors might have on the physician-scientists decreasing numbers. This stream of the literature identifies their double role as both physicians and scientists, and the difficulties in connecting these, as a substantial issue, suggesting the need to consider notions such as values and professional identity. Following this, I move into the social sciences, which have studied such issues extensively. Starting with the few studies that have focused on physician-scientists within the social sciences, I discuss the literature on connecting different roles through the notion of the physician-scientists as hybrid professionals. Hybrid professionals combine ideas from different professional roles, in this case that of the physician and scientist. Following this, I then discuss these two roles separately as they are understood within social science, using the literature on professional communities. This highlights how both physicians and scientists relate to a macro community and a more local community, and how these influence each other. Having established this understanding, I will in the next chapter introduce the concept of communities of practice, which I will use as my theoretical framework.

Communities of practice – membership and identity

In this chapter, I will introduce the theoretical framework applied in my analysis, which mainly relates to the concept of communities of practice. As an analytical framework for how learning is situated in practice, it connects ideas of socialisation, identity, membership, power, and career development. It emphasises the social context, where learning takes place through active participation in practice. Learning is thus not just about becoming competent in a craft, but it is also about developing an identity as a practitioner. As a result of the social character of learning, it emphasises the relation between newcomers and old-timers. Specifically, it conceptualises a newcomer's socialisation into becoming a member of the community of practice, and the power relations associated with it.

As the concept of communities of practice has dispersed into several academic fields, it has also been applied in numerous ways, causing some confusion about what the concept can mean. As my application of it mainly aligns with the original conception, the focus here will be regarding what this entails and the philosophical underpinnings guiding my interpretation of the concept. To a large extent, this relates to me disregarding some of the managerialist ideas of the concept, and instead focusing on the critical aspects of communities of practice. Furthermore, I will connect it with certain ideas from adjacent fields, such as an elevated focus on identity construction and role transitions. Throughout the chapter, I will provide suggestions on how the concept is relevant for my study, and how I will apply it.

Communities of practice

The concept of communities of practice was first introduced by Lave and Wenger (1991), in their seminal book *Situated learning: legitimate peripheral participation.* Interested in developing a framework to better understand

learning in practice, they identified communities of practice as places where situated learning could occur. While they left the notion of communities of practice rather underdeveloped, it was quickly introduced into the management and organisation literature by J. S. Brown and Duguid (1991). Later, Wenger (1998) and his colleagues (Wenger, McDermott, & Snyder, 2002; Wenger-Trayner et al., 2014) have expanded the concept considerably by providing a definition, and suggesting that communities of practice are all around us. Despite this, there is a broad disparity in how the concept has been applied, which has resulted in a need to specify which interpretation of the concept one uses (Cox, 2005). In line with this, in the next section, I will present the main conceptualisations of communities of practice, arguing for the perspective that I intend to use throughout this dissertation.

Situated learning

Lave and Wenger (1991) introduced the notion of situated learning as a critique of the idea of learning as a planned mechanistic process of cognitive transmission. They argued that reading books, listening to teachers, attending seminars, or similar activities typically associated with structured learning situations, did not sufficiently account for our understanding of how and when people learn. Instead, they saw learning as a social process that happens continuously through interactions that take place in daily life, situated in the social experience. Individuals continuously experience situations where they learn, merely through existing in the world and interacting with other people. As such, learning is understood as more than only acquiring knowledge; it is about developing an identity. Thus, they saw learning as taking place *in situ*, through observation and participation (Lave & Wenger, 1991).

With the concept of situated learning, Lave and Wenger (1991) tried to expand on ideas from Vygotsky and other Soviet psychologists regarding activity theory (e.g. Engeström, 2015/1987) and critical psychology. Others, such as Gherardi, Nicolini, and Odella (1998), emphasise the contributions from George Herbert Mead and Jerome Bruner in the development of a 'perspective that conceives human cognition and learning as closely related to the material, symbolic, and social context in which they take place' (p. 275). Accordingly, Lave and Wenger joined a conversation on bringing focus from teaching towards learning, where the learner became more than just a recipient of knowledge. Instead, the learner is an active participant, where '[w]hat is learned is profoundly connected to the conditions in which it is learned' (J. S. Brown & Duguid, 1991, p. 48).

Lave and Wenger (1991) introduced the idea of situated learning as a conceptualisation of apprenticeship with regard to learning, as they thought it had become a 'panacea for a broad spectrum of learning-research problems, and it was in danger of becoming meaningless' (p. 30). They therefore proposed a conceptual framework for understanding the learning aspect of apprenticeship, which would be distinguished from the historical form of apprenticeship. Thus, their focus was to conceptualise learning-by-doing, creating an analytical framework to understand such a process of learning, while also extending it by emphasising how situated learning was more than just learning a practice.

With a large part of the medical education taking place in the clinical practice (Faculty of Medicine, 2020), situated learning is considered suitable to apply within healthcare (Nicolini, Scarbrough, & Gracheva, 2016). This builds on the notion of the medical practice as a craft that is learned through clinical experience (Knight & Mattick, 2006). Egan and Jaye (2009) highlight how the clinical training in medicine should be understood as taking place in communities of practice, where their learning is situated in the clinical practice. This complements the traditional academic learning of medicine by focusing on the daily activities of being a medical professional, and thus shifting the emphasis to the social aspects of the work.

Situated learning elevates the social aspects of practice, where learning is one important feature. Hence, learning does not happen in isolation (Bernstein, 1975); activities, tasks, functions, and understanding are instead part of a broader system of relations among persons in a social community (Lave & Wenger, 1991). This is especially applicable in the clinical setting, where 'personal experience, relationships and unique contextual factors are inseparable from learning processes' (Nicolini et al., 2016, p. 17). Through this, learning involves the construction of identities, as it 'implies becoming a different person with respect to the possibilities enabled by the systems of relations' (Lave & Wenger, 1991, p. 53). In other words, identities are developed through participation, where learning is conceived as a way of 'becoming part of the social world' (Gherardi et al., 1998, p. 276). Thus, identities are, in this sense, understood as the relationship between persons and the place of the participation, which they call communities of practice (Lave & Wenger, 1991).

When expanding on the notion of communities of practice by himself, Wenger (1998) based his arguments on a social theory of learning, rather than on situated learning. His social theory of learning includes many of the aspects in the original conception of situated learning, although he claims to put more

emphasis on the notions of practice and identity. From this perspective, a social theory of learning relates to theories of practice, collectivity, social structure, power, identity, subjectivity, situated experience, and meaning. Specifying certain aspects of social learning, he suggested that learning relates to four different components: (i) meaning (learning as experience), (ii) practice (learning as doing), (iii) community (learning as belonging), and (iv) identity (learning as becoming). While all of these components were included in the conceptualisation of situated learning, Wenger (1998) contributed to making each of them more distinct. Perhaps his most impactful contribution, however, was in defining what is a community of practice.

Defining communities of practice

A community of practice, as suggested by Lave and Wenger (1991), is a group of people involved in the same craft, where newcomers experience situated learning. In their original writing, communities of practice were treated as an intuitive notion, where situated learning took place. As a result, they only briefly defined them as 'a set of relations among persons, activity, and world', and that it is 'an intrinsic condition for the existence of knowledge' (p. 98). As such, it does not need to entail a well-defined group, although it does imply that participants should share an 'understanding concerning what they are doing and what that means in their lives and for their communities' (Lave & Wenger, 1991, p. 98). It can thus be inferred that it relates to a group of people and their relations, who share certain ideas about the practice that they are involved with, and who together establish a sort of knowledge resource in relation to this practice.

In many ways, this is how their colleagues J. S. Brown and Duguid (1991) used the notion, namely as a framework for an informal group of people involved in the same activity. Re-analysing Julian Orr's (1990a, 1990b) ethnographic study at Xerox, they argued that the studied service technicians developed a community of practice, where the community's 'shape and membership emerges in the process of activity' (J. S. Brown & Duguid, 1991, p. 49). Mainly disregarding the notion of situated learning, they argue that the informal community developed a non-canonical practice to solve problems. I suggest that this could be seen as the first movement to what Nicolini et al. (2016, p. 7) see as the attention shifting from the learning process to 'the relationships and exchanges of those who are brought together by the desire or need to improve their practice'.

A non-canonical practice relates to diverging from the written and standardised instructions, where the service technicians created new knowledge together through narration and collaboration. As such, one of their main arguments was the need to consider how the actual practice tends to differ from the way that an organisation typically describes its work. From this perspective, they argued for a viewpoint where the actual work in organisations was conducted in communities of practice (J. S. Brown & Duguid, 1991). The idea is then that by working together, where knowledge is shared and newcomers socialised, the members 'develop an internal social organization with different levels of influence and prestige' (Nicolini et al., 2016, p. 7).

The separation between canonical and non-canonical practice thus highlights the difference between how work is organised in the formal structure, and how it actually takes place in practice (J. S. Brown & Duguid, 1991). This is similar to how Gabbay and Le May (2004) showed that physicians used what they called "mindlines" to inform their clinical decisions. These were adaptations of the professional guidelines that were seen as being negotiated through "a range of informal interactions in fluid communities of practice" (p. 1). Thus, this provides a perspective that emphasises the informal aspects in working life, which is then understood to take place in communities of practice. With my interest in considering how informal aspects influence the physician-scientists, it is the non-canonical practice, rather than the canonical practice, that is of interest here. The canonical practice is to a certain extent already illustrated in earlier studies, where the structural barriers and obstacles (e.g. Daye et al., 2015) can be seen as relating to the canonical practice.

While Lave and Wenger (1991) had focused on groups involved with the same craft in a more traditional sense (their examples included midwives, tailors, quartermasters, and butchers), communities of practice were here seen to exist within modern organisations. So, rather than being an isolated group focusing on one practice, communities of practice could illustrate how actual work was conducted in an organisation (J. S. Brown & Duguid, 1991). Furthermore, this entails considering the relations between different communities, as well as the outside world, which is considered a valuable extension of the concept (Cox, 2005). However, by suggesting that organisations can implement communities of practice to foster working, learning, and innovating (J. S. Brown & Duguid, 1991), they have also been attributed to the concept taking a managerialist turn, limiting its use as an analytical concept (Contu & Willmott, 2003).

Nevertheless, many of these aspects were included when Wenger (1998) later expanded the concept of communities of practice in his study of claims processors. Building on his earlier work with Jean Lave, he wanted to put the

spotlight on the concept of communities of practice, with an increased focus on identity in relation to the social theory of learning, which he argued had not received sufficient attention in their initial conceptualisation. This involved providing a definition of a community of practice, which is a group of people with a (i) *mutual engagement* in a (ii) *joint enterprise*, with a (iii) *shared repertoire*. According to Wenger (1998, p. 72), it is the relation between these three dimensions that makes practice 'the source of coherence of a community'. The importance put on these three dimensions warrants a more detailed discussion of each.

Mutual engagement

Communities of practice exist because people are engaged in actions whose meaning they negotiate with one another through mutual engagement. As such, it revolves around being included in the practice by engaging with it, which, in turn, creates a sense of belonging to the community. Mutual engagement can involve an atmosphere of friendliness, personal exchanges, understanding of the work, and awareness of the latest gossip. It can thus require a subtle and delicate combination of practical and social skills with regard to the practice, where both are relevant, to be mutually engaged. However, it is relevant to emphasise that mutual engagement does not require homogeneity, but it could benefit from having diversity and partiality (Wenger, 1998).

Regardless of origin, political views, or career aspirations, the relevant factor is the mutual engagement in the practice. At the same time, the relationships that they create through mutual engagement in the community make it an important aspect of their lives. They work together, see each other every day, talk with each other all the time, exchange information and opinions, and very directly influence each other's understanding, as a matter of routine. This tends to create a certain shared understanding in the community, as the practice is socially developed. Yet, each participant in a community of practice finds a unique place and gains a unique identity, which is both further integrated and defined in the course of an engagement with the practice (Wenger, 1998). This highlights the dual process of the individual members influencing the practice, while at the same time, they are influenced by the practice.

Mutual engagement creates relationships among people and connects members. However, Wenger (1998) stresses that these interrelations arise out of engagement in the practice, and not out of an idealised view of what a community should be like. As with all relationships, this involves both peaceful co-existence and conflict, 'a community of practice is neither a haven of togetherness nor an island of intimacy insulated from political and social

relations' (Wenger, 1998, p. 77). Instead, through their mutual engagement in the practice, the relations reflect the complexity of co-participation. As a result, the relations cannot be reduced to any single principle, as they involve a complex mixture of many things. This further highlight how communities of practice involve a group of people who emerge, not because of their shared background or class, but as a result of their mutual engagement in a specific practice.

Joint enterprise

The second dimension necessary in a community of practice relates to what the group is mutually engaged in, which is a joint enterprise. The enterprise of a community of practice includes the instrumental, the personal, and the interpersonal aspects of our lives. Hence, it is a rather complex notion, which reflects the members' attempts to create a context related to their working lives. Thus, the enterprise defined by the members through their mutual engagement in practice goes beyond just the task itself, as it also involves how to create a habitable environment for themselves. This does not mean that they all share the same views on their working conditions, but rather that how they respond to these conditions is interconnected. The members are thus mutually engaged in the joint enterprise of the community of practice (Wenger, 1998).

Communities of practice are per se constructed by the members' response to their conditions and are, as such, their joint enterprise. Even though there is always a context that the enterprise relates to, through external, institutional, and historical factors, it is how the members handle their day-to-day realities that creates the community. While conditions, resources, and demands shape the practice, they only shape it as far as how the members negotiate their interpretations of them. Regardless of what external factors influence the practice, that power 'is always mediated by the community's production of its practice' (Wenger, 1998, p. 80). Negotiating a joint enterprise leads to relations of mutual accountability among those involved, which includes what matters and what does not, what is important and why, what to do/not do, what to say or not, etc. This accountability stretches beyond what is reified, such as rules and standards, and is negotiated within the community. So, it involves both how to perform the tasks in line with the practice, but also how to behave with regard to the community (Wenger, 1998).

Shared repertoire

The third characteristic of a community of practice is the shared repertoire that the members have developed. This repertoire includes routines, words, tools,

ways of doing things, stories, symbols, actions, or concepts that have become a part of the community's practice over time. So, it relates to how certain activities and exchanges can have specific meanings within the community, which reflects a history of mutual engagement (Wenger, 1998). For example, the service technicians in Orr's study relied on storytelling to apply their situated knowledge. It became a part of their practice to share stories of complex situations, which functioned both as a depository of accumulated knowledge, and as a diagnostic device (J. S. Brown & Duguid, 1991). Although not highlighted in their study, it can be seen as a shared repertoire that bound the service technicians together as a community.

The shared repertoire relates to the idea of being a practitioner; this can distinguish a member of the community of practice from non-members. It is a uessucial aspect that new members should learn, through their interactions with the old-timers. Consequently, it is part of the 'reproduction cycle', where 'communities of practice are engaged in the generative process of producing their own future' (Lave & Wenger, 1991, pp. 57-58). Accordingly, as the newcomers learn the shared repertoire performed by the senior members, the community of practice is regenerated in line with its history. The physical, linguistic, and symbolic artifacts, as well as the social structures, which have been produced by the community, keep influencing the practice over time. Although the influx of new members and new knowledge might lead to gradual modifications, these take place in relation to the historically established repertoire of the practice (Lave & Wenger, 1991).

Community versus practice

Wenger (1998) clearly states that the label communities of practice should be seen as a whole, where the practice is what binds together the community. However, Contu and Willmott (2003) highlight that there are discrepancies between those that accentuate the notion of *community*, and those who emphasise the aspect of *practice*. This can be attributed to the various ways that communities of practice have been conceptualised by the most influential contributors (Cox, 2005). It is therefore relevant to highlight this distinction briefly, including how I see the practice as the basic component in order to apply the concept analytically.

The notion of community is often associated with positive connotations, such as harmony, order, and coherence (Gherardi et al., 1998). Some attribute the widespread application of the concept to this positive notion, where, for example, J. S. Brown and Duguid (2001) question the popularity of the concept

if it was instead called a *cadre* or *commune* of practice. In their original conception, Lave and Wenger (1991) saw the community as a group of people involved in a coherent practice, which was not necessarily a neat group of likeminded individuals. Although Wenger (1998) highlighted that the community develops from the social relations and meaning that participants appropriate around the work process, his emphasis was on the community, more than on the actual practice (Contu & Willmott, 2003). This was further elevated in his book *Cultivating communities of practice: A guide to managing knowledge* (Wenger et al., 2002), with the 'commodification of the idea of community of practice' (Cox, 2005, p. 533).

In this managerial turn (Contu & Willmott, 2003; Gray & Gabriel, 2018; J. Roberts, 2006), somewhat building on the work of J. S. Brown and Duguid (1991), there is an idea that a community can be developed intentionally. Thus, an informal grouping of individuals around a shared practice is no longer needed, as it is suggested that it can be constructed within an organisation. However, this managerialist perspective warrants a discussion, as it is one of the main critiques raised against the communities of practice concept (see Wenger, 2010, for a summary of the critiques). Especially as this notion of using communities of practice has become 'more an umbrella term covering a variety of initiatives than a marker of a specific method or technique' (Nicolini et al., 2016, p. 10). This is one reason to position which use of the concept is being applied (Cox, 2005). With my interest being in applying communities of practice as a conceptual tool to understand the physician-scientists' experience, this managerialist perspective is less relevant in this study.

Nevertheless, J. S. Brown and Duguid (1991), while to some extent being classified as managerialist, contributed significantly to the conceptual toolbox of communities of practice. Specifically, illustrating how it could be applied in the modern organisation and the separation of canonical and non-canonical practice. Similarly, although Wenger (1998) included certain managerialist aspects, he provided a definition of communities of practice, which expanded its analytical applicability. Furthermore, by emphasising the role of identity in the community, it expands on the individual experience in relation to the group. This can be seen to connect with the notion of membership, which has otherwise been mostly neglected in the managerialist writing. Thus, it is difficult to follow Cox (2005) suggestion of positioning strictly, as the different versions of the concept still have relevant connections, which are pertinent in an analytical application.

With that being said, I primarily position myself on how communities of practice were initially conceptualised by Lave and Wenger (1991). With my

interest being to take advantage of the concept's analytical toolbox, I find the notion of legitimate peripheral participation being specifically relevant. Although they leave certain aspects of communities of practice underdeveloped, I find the focus on new members, their movement towards full membership, and the power dynamics that this generates, being crucial in applying the concept. This includes questioning the notion of a community of practice as unified and coherent, which is typically not the case (Amin & Roberts, 2008). In the reminder of this chapter, I will focus on these aspects of the literature, which I have thus far left less developed. Specifically, this involves Lave and Wenger (1991) concept of legitimate peripheral participation. This will also include how the work of Wenger (1998) and J. S. Brown and Duguid (1991) support, and extend, relevant ideas from *Situated learning*.

This section has presented the origin, along with some of the major developments, of the concept of communities of practice. As the concept has dispersed, both in academia and outside, some of the fundamental ideas have changed, or been neglected (Cox, 2005; Wenger, 2010). For example, with the concept spreading into a variety of academic fields, the notion of community has sometimes obscured the importance of practice (J. S. Brown & Duguid, 2001; Gherardi et al., 1998). Others have highlighted the lack of interest in how power has an impact on the learning (e.g. Contu & Willmott, 2003), and that the concept is becoming diluted, which limits it as an analytical tool (e.g. J. Hughes, 2007). It is with this critique in mind that I find it crucial to understand the original ideas of the concept in order to apply it as an analytical framework.

Learning through practice

Questioning the dominant view of learning as a transmission of knowledge from a teacher to a student in a planned process, Lave and Wenger (1991) argued for a perspective where learning happens constantly through interactions in communities of practice. Interested in conceptualising apprenticeship, they focused on the situated learning that newcomers experience by participating in the practice with old-timers. Through the notion of legitimate peripheral participation, they argued that a newcomer gradually becomes more involved with the practice. Through situated learning, a newcomer moves towards becoming a master practitioner him or herself, which entails more than just learning the craft. It also relates to developing an

identity as a practitioner, which includes learning how to talk and act as a practitioner, both with outsiders and insiders.

Legitimate peripheral participation

Legitimate peripheral participation (LPP) is the defining characteristic of the process, where learning is a situated activity. It is an analytical framework that highlights 'the relations between newcomers and old-timers, and about activities, identities, artifacts, and communities of knowledge and practice' (Lave & Wenger, 1991, p. 29). This is especially applicable in the study of physicians (Egan & Jaye, 2009), who during their residency training can be seen as apprentices (Wallenburg, Bont, Heineman, Scheele, & Meurs, 2013), learning from the old-timers to become specialist physicians (E. S. Johnson, 2008), and developing identities through their interactions with senior physicians (Pratt et al., 2006). Thus, the concept is pertinent in understanding how physicians learn the role of being a physician, and provides potential to understand how they become involved in research.

Lave and Wenger (1991) suggest that learning is an essential aspect of engagement in a social practice. Through the concept of LPP, they wanted to connect theories of situated activity with theories on how social order is produced and reproduced. Thus, legitimate peripheral participation 'concerns the whole person acting in the world' that 'break with the dualisms that have kept persons reduced to their minds, mental processes to instrumental rationalism, and learning to the acquisition of knowledge' (Lave & Wenger, 1991, pp. 49-50). With influences from the Marxist tradition of theorising about social practice and Bourdieu's practice theory, they emphasise the socially negotiated character of meaning. Through a constant interaction of understanding and experience, meaning is continuously renegotiated between participants in the practice.

This is somewhat illustrated by J. S. Brown and Duguid (1991), although they do not use the same terminology. The service technicians in Orr's study continuously negotiated meaning in their community of practice, where individual members' experiences were shared through stories. These stories then led to a new understanding of the machines, which then became a part of their non-canonical practice. Thus, socially negotiated experiences, through shared stories, generated new understandings, which, in turn, generated new experiences that led to a new understanding. Through these interactions, the meaning becomes socially negotiated by the members. In the workplace

setting, ‘interaction achieves authentic, motivated learning of what is needed to be known about the complexities of real practice’ (Cox, 2005, p. 528).

As a concept based on social practice, LPP ‘emphasizes the relational interdependency of agent and world, activity, meaning, cognition, learning, and knowing’ (Lave & Wenger, 1991, p. 50). With this, it concerns how individuals relate to each other in activities, where meaning is produced, reproduced, and changed through people’s interactions with each other, while taking part in an activity. Learning is thus situated in a historical development of an ongoing activity, where it can be understood as ‘the historical production, transformation, and change of persons’ (Lave & Wenger, 1991, p. 51). This means that knowledge is not static, as participation involves continuous negotiation and renegotiation of meaning, where experience and understanding are in constant interaction. The practice is thus constantly evolving through interactions in systems of relations among people in the communities of practice.

It is in this context that the concept of LPP should be understood, as it highlights the process of how newcomers learn from old-timers, through increased participation in the practice (Lave & Wenger, 1991). It should also be considered as a whole, rather than three contrasting pairs. This means that there is, for example, no such thing as an illegitimate peripheral participant. Legitimate specifies that the new member is allowed to enter the community of practice, and thus indicates a sense of belonging. ‘Peripherality suggests that there are multiple, varied, more- or less-engaged and -inclusive ways of being located in the fields of participation’ (Lave & Wenger, 1991, p. 36). As such, there is no such thing as central participation; instead, peripherality indicates a location in the social world, which is then changing as a part of the ‘actor’s learning trajectories, developing identities, and forms of membership’ (Lave & Wenger, 1991, p. 36). Finally, participation emphasises that learning happens through continuous engagement in the practice, rather than being an independent process (Lave & Wenger, 1991).

Thus, a newcomer learns by peripherally participating in the practice with the old-timers in the community of practice. This implies that the LPP learns both specific activities of the practice, but also what it means to be a practitioner. So, being an LPP also involves becoming a different person, developing an identity, in relation to the social community, where ‘the person is defined by as well as defines these relations’ (Lave & Wenger, 1991, p. 53). This relates to an intended movement, where increasing participation leads to full membership as the LPP starts to master the practice. Through this movement,

an LLP is starting to become a practitioner, learning how members talk and act in practice (Lave & Wenger, 1991).

As mentioned, the internship and residency training that physicians' go through is in many ways built according to the main tenets of LPP. Swanwick (2005) highlight the predominance of an apprenticeship model in the medical education, where the focus is on learning by doing, accompanied by a master of the medical practice. For example, a trainee surgeon progresses from doing simple procedure to gradually more complex interventions, where the work takes on increasing challenge and value. Parallel with this, the LPP develops an increased professional identity (Swanwick, 2005). It is also in the early stages of their career that physicians experience the strongest influence on their professional identity (Ludmerer, 2014), which is mainly in regards to the community of practice that they belong to (Cruess & Cruess, 2020).

Learning as identity

An essential aspect of LPP relates to how a newcomer develops an identity of being a practitioner, based on how the old-timers act, talk, and interact with other practitioners, as well as with outsiders. In other words, it 'essentially involves becoming an 'insider'…they learn to function in a community' (J. S. Brown & Duguid, 1991, p. 48). However, contrary to their focus on innovation and the dispersion of new knowledge, the idea with the LPP is the reproduction of existing knowledge (Cox, 2005). In Lave and Wenger (1991) conceptualisation, the emphasis is on newcomers learning the craft from the old-timers. This is a considerable difference, which is apparent in how J. S. Brown and Duguid (1991) mainly ignored LPP in their early adoption of the concept of communities of practice. However, by doing so, they also neglected the notion of power, and how the reproduction of knowledge involves newcomers learning an identity that is in line with the old-timers.

With legitimate peripheral participation, the focus is on the individual through his or her relation to the social practice, as 'person-in-the-world'. As such, learning relates to the whole person; activities, tasks, functions, and understandings are part of a broader system of relations. It is then in these relations that meaning is constructed regarding the community's practice. Consequently, learning involves 'becoming a different person' and 'the construction of identities' with regard to these relations (Lave & Wenger, 1991, p. 53). Hence, through LPP, a newcomer learns the identity of being a practitioner, and develops an identity of a member. In this sense, learning and

identity are connected, where neither can happen without involving the other (Lave & Wenger, 1991).

This is further emphasised by Wenger (1998, p. 145), suggesting that identity 'consists of negotiating the meaning of our experience of membership in social communities'. This connects communities of practice with the ideas of Mead and Goffman, who argue that identities are 'constructed and negotiated in social interaction' (Ibarra, 1999, p. 766). Thus, identity is here understood to connect the individual with the social, where they influence each other in developing an identity as a practitioner in the community of practice. The full members are considered as negotiating what this identity entails, where they determine what a practitioner in the community of practice should be. In turn, this influences the identity that the LPPs learn (Wenger, 1998). As a result, learning to become a practitioner through LPP entails a conservative aspect, where the newcomer's develop an identity that is in line with the full members (Lave & Wenger, 1991).

Learning as an identity can as such be connected to ideas of identity being a form of normative control (Alvesson & Willmott, 2002), where individuals learn to develop the role of practitioner as determined by the full members. It is through their participation in the social practice that they observe what type of acting, talking, and behaviour are used by the full members. Through this, they learn what is expected of them in order to become full members. Hence, the learning as identity in the communities of practice shares commonalities with the idea of constructing professional identities. For example, Pratt et al. (2006) illustrated how residents constructed their professional identities through an interplay of identity learning and working in practice. This involved the young physicians customising their identity through validation via the feedback they received from their superiors and via role models.

This connects to the work of Ibarra (1999, p. 774), who noted how individuals that entered new professional roles 'described how role models displayed the role identity they were attempting to assume'. She argued that identity construction involved three steps, observing role models, experimenting with provisional selves, and evaluating provisional selves. I suggest that these steps can be seen to be built into the LPP trajectory, where newcomers observe how the full members act, try it themselves through participation, and evaluate depending on how well they follow the trajectory towards full membership.

This also connects learning as an identity with normative control, which relates to one of the main critiques raised towards the communities of practice literature. This relates to its sometimes negligent treatment of power relations

between members (e.g. Barton & Tusting, 2005; Contu, 2014; Contu & Willmott, 2003; J. Roberts, 2006; Wenger, 2010). Although present in the original work of Lave and Wenger (1991), the notion of power relations has received limited attention within the application of communities of practice. With the introduction to the management and organisations literature, situated learning, to a certain extent, became 'recast as a *technocratic tool* of organisational engineering' (Contu & Willmott, 2003, p. 289; italics in original). However, by including the ideas on learning as identity construction, and how this can be seen as the community of practice exercising normative control through LPP, it brings the question of power and control to the centre of my application of the concept.

This is further done by utilising the notion of legitimate peripheral participation, where the power relations between the old-timers and the newcomers are an inherent aspect. Lave and Wenger (1991, p. 36) state as much, conceptualising LPP as 'a complex notion implicated in social structures involving relations of power'. Furthermore, as Contu and Willmott (2003, p. 286) highlight, the language used in Lave and Wenger's work is 'redolent of radical Marxist understandings', which 'invite a closer and more systemic examination of how power relations mediate the acquisition, maintenance, and transformation of meaning'. Thus, by applying LPP, as suggested by Lave and Wenger (1991), the notions of power and control become a relevant factor in my analysis.

Impact of power on learning

All types of learning consist of an uneven distribution of power, regardless of whether it is situated in practice (Lave & Wenger, 1991) or if it follows the more conventional notion of educational pedagogy (Gore, 1995). It involves one person (e.g. a parent, a master, or a teacher), possessing knowledge that another person (e.g. a child, an LPP, or a student) wants to acquire. As a result, the person possessing the knowledge can be understood as holding power over the person wanting to acquire the knowledge. 'Accordingly, there is no such a thing as learning without conflict, for any modification of the knowledge distribution is perceived as a way of subverting the established knowledge/power relations within a social context' (Gherardi et al., 1998, p. 276). Or, to use a popular conventional wisdom, 'knowledge is power'.

Although Lave and Wenger (1991) largely omitted the power relations in their analysis of LPPs, it was still suggested to be an inherent aspect of situated learning. Referring to the work of H. S. Becker (1972), 'he raises more acutely

than the ethnographic studies discussed here the conflictual character of access for newcomers, the problem about power and control on which these studies are on the whole silent' (Lave & Wenger, 1991, p. 86). Furthermore, the notion of legitimacy in LPP relates to a newcomer having been granted access to learning through participation. At the same time, this legitimacy is not necessarily constant, as the community has the 'power to foster and impede access to, and continuing membership of, communities of practice' (Contu & Willmott, 2003, p. 285). Thus, the community of practices 'hegemony over resources for learning and alienation from full participation (Lave & Wenger, 1991, p. 42) highlights the power that the full members in the community have over the LPPs. It is up to their discretion whether a LPP can access the learning resources, such as participating with the full members in the practice.

Power relations are thus an essential aspect of LPP, and as Lave and Wenger (1991, p. 42) state, it 'must be included more systematically in our analysis'. However, this call has largely been unheeded in much of the application of the concept of communities of practice (Contu & Willmott, 2003; Cox, 2005; Fox, 2000; J. Roberts, 2006). Instead, communities of practice have been associated with 'formulaic distillation … and instrumentalist applications seeking to maximise learning and knowing', where 'the frequently idiosyncratic and always performative nature of learning' is lost (Amin & Roberts, 2008, pp. 353-354). However, by including the original emphasis on context, social interaction, ambiguity, and disagreement, in this study, I intend to apply the role of unequal power relations in my analysis.

One crucial aspect of this is to consider how practice is embedded in language and history (Lave & Wenger, 1991). Activities where learning takes place are 'conceived to be embedded in their *historical* conditions of possibility, and *language* is understood to be the principal medium of communication for the (re)production of social practices' (Contu & Willmott, 2003, p. 287, my emphasis). The relevance of considering language, and how it can be perceived as a tool to exercise power, is further demonstrated by linguists' interest in communities of practice. As expressed by Barton and Tusting (2005, p. 6), 'theories of language literacy, discourse and power are central to understandings of the dynamics of communities of practice'. It is through the use of language that negotiation of meaning (Wenger, 1998) is performed, and how power relations are played out and maintained in communities of practice (Tusting, 2005).

The language used by members, such as what words, labels, and phrases are prevalent, can thus be understood as expressions of power, in how it can signify what is considered relevant in the joint venture of the community. Furthermore,

an interest in language, and its capacities to express power, can be applied to question the assumption of homogeneity in communities of practice. Another common critique, associated with the emphasis on *community*, is the notion that a community of practice is a homogeneous group (Gherardi et al., 1998). Even though Wenger (1998) explicates that any coherence in a community of practice should only be understood with regard to the practice, there is often a disregard for the prevalence of conflicts, ideologies, and contradictions in communities of practice. The relevance is then to understand the ways that the power relations impact these conflicts, ideologies, and contradictions (Contu & Willmott, 2003).

I suggest that the unequal power relations in the community of practice can be understood with regard to the notion of membership. This is an apparent feature in LPP, in how the full members' ideas on the LPP's trajectory towards full membership influence them. This involves conforming with the power and control that old-timers have when it comes to determining the LPP's membership status, and access to learning. Thus, it also involves ideas on identity, where learning to become a practitioner entails developing an identity as a practitioner. However, I also suggest that the notion of membership and the power relation is relevant through the idea of boundary crossing (Wenger, 1998). This is especially relevant for physician-scientists, as their research activity can be understood as them also being members of another community.

Boundaries and multi-membership

As the concept of communities of practice has developed, it has gradually moved from a focus on isolated communities (Lave & Wenger, 1991) to the idea of a landscape of communities (Wenger-Trayner & Wenger-Trayner, 2014). With Wenger (1998) suggesting that communities of practice exist all around us, it becomes relevant to consider the relationship between these communities of practice, the boundaries between them, and how this leads to individuals having multiple memberships. This is especially relevant for the physician-scientists, who in their role as translators are expected to cross the boundaries between clinical practice and science (Hendriks et al., 2019). In this section, I will introduce different types of boundary crossings, and the notion of boundary crossers, who are considered as playing an important role in connecting a community of practice with the outside world. With boundary crossers considered as having multiple memberships, I will then connect these ideas with the notion of hybrid professionals, and thus focus on questions of

identity construction. Thus, I will expand on the notion of identity in the communities of practice literature by linking it to other ideas within identity theory.

Boundary crossers

Crossing boundaries between different communities of practice can take place in different ways, depending on the type of connection and the regularity of the crossings. Temporary connections can involve meetings or visits with one or more members of another community of practice, where the encounter has a limited impact on each community's practice. More long-term connections, however, can have a perpetual impact, and develop into a mutual engagement in each other's practice, where maintaining the relationship becomes a part of the practice (Wenger, 1998). In line with my interest in how physician-scientists handle their dual role, I will now focus on the long-term connection. This can entail the boundary crossers becoming members in both communities of practice, where they can act as brokers between the two, through their multi-membership.

With Wenger's (1998) conceptualisation of communities of practice being all around us, including families and hobby organisations, boundary crossings happen frequently. Here, however, the focus will be on the connections related to the practice, and how members interact with communities with adjacent practices. Boundary crossers tend to develop relationships with members in each community as they engage in a similar practice. As such, they typically become mutually engaged in each community's joint venture and share their repertoire. Connecting with a new community of practice on a frequent basis is, thus, similar to becoming a legitimate peripheral participant, learning the practice through interactions with the members. As a result, the boundary crossers can become members in the adjacent community of practice, attaining multi-membership (Wenger, 1998).

With the physician-scientists' double role as both physicians and scientists (Wyngaarden, 1979), they can be considered as having such a multi-membership. Their role as translators between science and the clinic (Glavey et al., 2013; Hendriks et al., 2019) is similar to what Wenger (1998) labels as brokers, inspired by the work of Penelope Eckert. Brokers are connected across the boundaries of communities of practice and can, as such, enable coordination and transfer knowledge between the two communities. Accordingly, brokering is a complex task, which 'involves processes of

translation, coordination, and alignment between perspectives' (Wenger, 1998, p. 109).

Boundary crossing is thus a necessary aspect for a community of practice to learn new things, where the broker functions as a translator of other practices in the community. This is in line with the idea that learning 'implies the transgression of boundaries between inside and outside' and 'occurs in the space between, in the grey area, where the borders are breached, where definitions are unstable' (Clegg, Kornberger, & Rhodes, 2005, p. 157). The idea is then that, through their multi-membership and the participative connection this provides, the brokers can introduce new ideas and knowledge across the boundaries (Wenger, 1998). Hence, their role as connectors can be pivotal for the community of practice in preventing complacency. Especially considering the importance placed on social networks, and the opinions of colleagues and peers, in the translation of new knowledge into the clinical practice (Thomson, Schneider, & Wright, 2013).

At the same time, the brokers can find it difficult to attain sufficient legitimacy to influence the practice, as a result of the multi-membership. As they belong to different communities of practice, they can also not belong fully to either, leading to uprootedness (Wenger, 1998). The brokers' individual experience can therefore be quite challenging, as they tend to exist in the periphery of both communities. According to Meyer (2010, p. 122), brokers therefore 'often try to make their roles and work visible and appear valuable to others'. Based on this, the brokers share several traits with the LPPs, although they do not have the intention to follow the trajectory towards full membership. Consequently, they run the risk of either being considered as intruders by the other members, which blocks their legitimacy, or be pulled into full membership, removing their brokering role (Wenger, 1998). Despite the importance of brokers, they have received limited attention in the communities of practice literature and warrant increased attention (Meyer, 2010).

In order to do so, I suggest to connect brokering and multi-membership with the notion of hybrid professionals, which I discussed briefly in the previous chapter. This also connects further with the notion of role identity, which I so far have only touched upon briefly with regard to learning. In the next section, I will discuss this in more detail, with an emphasis on how it relates to the experience of having multiple memberships.

Multi-membership, hybridity, and identity

As Lave and Wenger (1991) focused on isolated communities of practice, multi-membership was never discussed in their original conceptualisation. However, as Wenger (1998) extended the concept, he also detailed the notion of identity as a crucial aspect of communities of practice. Arguing for the close connection between identity and practice, boundary crossers were inevitably considered as struggling with identification (Wenger, 1998). As a result of their multiple memberships, the boundary crossers often became stuck in the periphery of the communities (Meyer, 2010), which is an ambiguous position. How the brokers manage this situation has, however, thus far been left rather underdeveloped. To remedy this, I intend to connect the role of the broker with that of hybrid professionals, to extend the framework to better understand the struggle of multimembership. Building on this, I will incorporate ideas from the work on role transitions (Nicholson, 1984), which the boundary crossers can be understood to do.

As discussed in the previous chapter, the notion of hybrids have become popular to understand 'practices in which professional work is (re)organized in one way or the other' (Noordegraaf, 2015, p. 1). Most of the writing has focused on how professionals manage the increased commercialization of their professional work, such as new public management in healthcare (Kurunmäki, 2004) and technology transfers in academia (S. Jain et al., 2009). While typically not portrayed as brokers, hybrid professionals are understood to connect their profession with ideas from another community, learning new skills and competencies that are not part of their traditional role. From a community of practice perspective this can be seen as brokering, where they cross the boundaries from their main community, interacting and developing a peripheral role with these other communities. As such, the hybrid professionals can be seen to have memberships to multiple communities of practice.

Conceptualising the brokers as hybrid professionals also highlights the connection to role transitions, and the accompanying role identity that is part of multimembership. Role transitions are characterised by both personal and role development (Nicholson, 1984), where the new social context influences the individual (Ashforth & Saks, 1995). Ideas relating to role transitions have traditionally focused on more permanent transitions, such as changing jobs (Ashforth, 2000), becoming a mother (Ladge, Clair, & Greenberg, 2012), or entering retirement (Vough, Bataille, Noh, & Lee, 2015). However, they can also entail regularly occurring, temporary, role transitions, such as between home and work (Ashforth, Kreiner, & Fugate, 2000), or the movement between different roles as a hybrid professional (S. Jain et al., 2009). It is this latter

notion of role transitions that is relevant to consider for the brokers, as they move between different communities of practice on a regular basis (Wenger, 1998).

The connection between role transitions, hybrid professionals, and brokers, is further emphasised by their shared understanding that they involve identity processes (Ibarra & Barbulescu, 2010; Spyridonidis et al., 2015; Wenger, 1998). S. Jain et al. (2009, p. 931) highlight the 'careful sense-making and negotiated identity work' that the academic scientists employ in their hybrid roles. They illustrate two mechanisms, delegating and buffering, that hybrid professionals employ in making modifications to their professional identity. These mechanisms are seen as identity work performed by the hybrid professionals, where they reconstruct their professional through layering a new identity upon their extant role identity. Thus, they suggest that hybrid professionals 'adopt a hybrid role identity that comprises a focal academic self and a secondary commercial persona' (S. Jain et al., 2009, p. 922). Translating this into communities of practice, the academics crossed the boundary from their academic community into a commercial community. While they adapted to some notions from this community, they remained mutually engaged to the joint enterprise of their primary community of practice.

Differentiating between "incidental" and "willing" hybrids in how physicians adapted to managerial roles, McGivern et al. (2015, p. 425) suggest that those who incidentally become hybrid professionals 'maintain their personal and social professional identity and traditional professional norms'. They positioned themselves as protecting the traditional professional values and norms, using the role to influence their colleagues to do the same. Those who willingly took on a managerial role, on the other hand, accepted the managerialist ideas and tried to influence the profession to integrate managerialism, creating permanent hybrid identities (McGivern et al., 2015). Translating this to the brokers between communities of practice, the incidental hybrids refuted the knowledge that came from their boundary crossing, remaining committed to their primary community of practice. The willing hybrids however, actively tried to translate the knowledge that they encountered from their boundary crossing.

These different approaches illustrate the multitude of strategies available to manage the hybrid role identity, or the role of the broker. In their work on multiple organizational identities, Pratt and Foreman (2000) suggest four different responses to managing multiple identities. Summarised by S. Jain et al. (2009, p. 932), these are 'compartmentalization, in which the different identities are maintained but are separated from each other; deletion, where

individuals actually rid themselves of one or more of their identities; integration, where individuals fuse identities into a distinct new whole; and aggregation, in which attempts are made to retain all their identities while forging links between them'. Following the idealised view of the brokers crossing boundaries between communities of practice, the idea is that they should be able to aggregate their identities, forging links between them. However, this also requires substantial effort, both psychologically and physically, as well as ambiguity regarding the identity (Wenger, 1998).

Furthermore, with the social aspect of transitioning between roles creating ambiguity, the boundary crosser can easily become caught in-between the roles, experiencing liminality (Ashforth, 2000; Turner, 1967). The concept of liminality comes from anthropological studies and was established by van Gennep (1908/1960), describing situations in which a person goes through a rite of passage from one identity position to another (Ybema, Beech, & Ellis, 2011). The concept was further developed by Turner (1967, p. 96), who emphasised the liminal period as being 'betwixt and between' relatively stable states, where 'lacking a firm identity, [liminars] have shed their old identities and have not been given new ones, so they are neither one thing or another'.

The liminal experience thus has many similarities to the possible difficulties associated with being a broker, where a lack of legitimacy in either community can involve struggling to identify with either role. This can be seen as being in a social limbo, where you are 'no longer' in the previous state, but 'not yet' reached the new state (Hoyer, 2016a). As Noble and Walker (1997, p. 31) put it, experience of liminality 'significantly disrupt[s] one's internal sense of self or place within a social system'. However, traditionally, this experience is constrained to a shorter phase during which an individual adapts to a new role, such as a boy becoming a man (van Gennep, 1908/1960) or an employee becoming a manager (Ashforth, 2000). Thus, while the liminal state might be difficult, once one crosses the *limen,* and reaches the new state, the liminal phase can be considered both educational and have positive consequences (Bamber, Allen-Collinson, & McCormack, 2017).

However, in contrast to this view of liminality as a transitional phase, Ybema et al. (2011) expanded on the idea and argued that individuals could experience perpetual liminality. This manifests 'when social actors occupy social positions which they experience as persistently ambiguous or 'in-between'' (Ybema et al., 2011, p. 5). They argue that working in liminality can become a central feature of an occupation, which has created a more permanent sense of being 'neither-X-nor-Y' or 'both-X-and-Y'. As a result, the perpetual liminars have to navigate in this 'no-mans-land', switching their identification

and often handling conflicting values, loyalties, and demands (Ybema et al., 2011). While Turner (1967) frames this as the downside of liminality, as the ambiguity, uncertainty, and anxiety can lead to stress and break down (Johnsen & Sørensen, 2015), Hoyer (2016a) illustrates how some individuals embrace liminality, over reaching a stable state.

These ideas appear relevant to consider, especially in relation to the ideal of the 'triple threat' physician-scientist who, seamlessly moving between clinical practice, research, and teaching (Schafer, 2009b), are portrayed as embracing and benefitting from being brokers. Connecting this to liminality, which can be experienced in different ways, can highlight how the physician-scientists must manage their role transitions and the associated identity struggles (Goldstein & Brown, 1997). As such, these aspects are directly connected with my research question of how the physician-scientists handle their double role. Furthermore, by connecting the suggested uprootedness of being a broker (Wenger, 1998) to that of being in a liminal state, it highlights how this experience can be understood as an exclusion from the community. Being caught in-between the communities, not fully committing to either practice, thus, relates to questions of inclusion and exclusion from the social group.

Exclusion as being a problem

As a final note pertaining to the experience of brokers with multi-membership, I find it interesting to consider the notion of being excluded. Building on the idea of boundary crossers struggling to gain legitimacy in the community, and as such becoming peripherals that are caught in-between their roles, can lead to a sense of exclusion. Here, I see connections to the work by Ahmed (2012), who problematised the relation between inclusion and exclusion.

In her work on diversity workers at university institutions, she suggested that institutions could use inclusion of minorities to a limited extent, as an illustration that they did not exclude them. So, being included could, at the same time, function as a form of exclusion. Highlighting how the existence of diversity workers was perceived as a solution to the problem of diversity, their inclusion could serve as a way to continue excluding minorities. When diversity workers brought up issues of diversity, they became seen as being the problem, as they questioned the silent agreement at the institution, namely that they were now diverse (Ahmed, 2012). Here, the diversity workers could be portrayed as crossing boundaries between communities, where their work was not in line with the practice within the institutions. Without that legitimacy,

their ideas were not really considered by the other members, and they became excluded by making them into a problem.

However, the idea of being a problem is not new. Sara Ahmed (2012) conceptualised the idea of 'being a problem' in connection with the question of diversity, inspired by the writing of W.E.B. Du Bois (1897). She argues that '[d]escribing the problem of racism can mean being treated as if you have created the problem, as if the very talk about divisions is what is divisive' (Ahmed, 2012, p. 152)[4]. In other words, by highlighting the problems that a minority experiences, they themselves become the problem, as a result of them problematising the current situation. As a concept, I suggest that this can be related to ideas of inclusion/exclusion, in the sense of how a majority exercises power and control over a minority. This can then be connected with how the full members in a community of practice can exercise control over the joint enterprise in a community.

It is in such a capacity I intend to use it here, where the notion of being a problem is something constructed within the clinical community. With the peripheral role of boundary crossers causing them to have a decreased influence in the community of practice, they can be perceived as a minority. Introducing new ideas from the outside can, thus, be seen as challenging the full members' understanding of the joint venture. As a result, when brokers raise possible problems, it is easier to characterise them as the problem, rather than having the community of practice question their perception of the problem. Hence, being the problem relates to exclusion, where the notion of being different, a minority, can create the notion of one also being a problem (Ahmed, 2012).

Summary

In this chapter, I have discussed the concepts of communities of practice and legitimate peripheral participation, which are used as an analytical toolbox for interpreting my material. With situated learning as its starting point, the concepts relate to learning through participation in practice, emphasising the impact of the social context. It relates to learning to become a practitioner,

[4] Note that I am not in any way comparing the situation for a privileged serious physician-scientist with that of a racial minority. Nevertheless, the concept relates to exclusion based on being a minority, which can project similar experiences in any context.

which includes developing an identity as a member of a community. Thus, it also highlights the power associated with situated learning, where the full members determine newcomers' position in the community. Furthermore, I have connected the concepts with certain ideas from the literature on identity construction, hybridity, liminality, and inclusion/exclusion.

I have suggested ways that this literature can help me in my understanding of the physician-scientists. With the education and training for becoming a specialist physician involving participation in the clinical practice, the residents can in many ways be considered apprentices, or legitimate peripheral participants. With clinical practice involving aspects of craftmanship, I see the concepts as especially applicable regarding their learning process. However, I find it important to note that the concepts are used as analytical tools, which are used to better understand the practical problem of the decreasing number of physician-scientists. As such, I did not enter this project with the intention of developing the concept of communities of practice, but rather discovered that it could support my analysis. I will discuss this more explicitly in the next chapter, where I will illustrate my research process and the methods applied.

Method

In this chapter, I discuss the methodological considerations of the thesis, as well as provide details on how the research project has been conducted. First, I discuss my philosophical standpoint in relation to how I have conducted this study, where I focus on the constructed and interpretative nature of my study. Related to this, I discuss considerations to the primary method applied in gathering my material, which is interviews. Following this, I illustrate how my research journey has developed, leading to my decision to rely mainly on qualitative interviews, and a description of how I conducted the gathering of my empirical material. This part ends with a discussion of my own role in the research process, and some of the considerations required when studying other researchers with an objective mindset. Finally, I will illustrate my analytical process, following three steps of engaging with my material. This includes how I have moved between my material and theory in an iterative process, thus sorting and reducing the material to develop the concepts that I illustrate in my empirical chapters.

Interpretivist approach

Scientific research is strongly associated with ideas from the natural sciences, and the positivistic ideas that guide such research. In the study of the natural world, such as the human anatomy, positivism has served the sciences well. Within nature, there are certain causal relationships that we understand as 'objective' truths, where our understanding of these has aided the human development over the last centuries. With natural sciences being the *par excellence* of the sciences, the social scientists have often attempted to emulate their success by adopting conventional positivistic assumptions (Prasad, 2005). However, as Weber (1949) observed, positivism is typically less appropriate within the social sciences, as the assumptions for studying nature are considerably different from studying the social world. With the human

capacity for self-reflection and interpretation, the social sciences lack the capacity to mirror the natural sciences (Flyvbjerg, 2001).

Thus, studying the social world requires another approach than the positivist tradition provides. These can be referred to as post-positivistic traditions, which 'approach questions of social reality and knowledge production from a more problematized vantage point, emphasising the constructed nature of social reality, the constitutive role of language, and the value of research as critique' (Prasad, 2005, p. 9). The post-positivist tradition contains a plethora of different perspectives – the main ones being the interpretative, the structuralist, the critical, and the "post" traditions – where their rejection of the positivist assumptions is their main unifying factor (Prasad, 2005).

Rejecting the positivistic notion that there is an "objective" truth about human behaviour, the interpretivist traditions see reality as socially constructed (Berger & Luckmann, 1966; Burr, 2015). This relates to the phenomenological philosophy, which assumes that 'the experience of any reality is possible only through interpretation' (Prasad, 2005, p. 13). Phenomenology emerged as a German movement, primarily through the work of Edmund Husserl, criticising the negligence of understanding the basics of everyday life in the natural sciences. As such, it took individuals' experience as the starting point, which was then interpreted as a process in a 'stream of experience' (Alvesson & Sköldberg, 2009).

Hence, phenomenology focuses on relating the relationship between the individual and society, where 'human beings continually construct the social world, which then becomes a reality to which they must respond' (Burr, 2015, p. 210). This involves a circular process where symbols carry meaning, which through externalisation is attached to objects, which is then internalised by the individuals in society (Berger & Luckmann, 1966). As such, it involves a dialectic process where the individual agent is actively constructing the social world, while at the same time being constrained by the social structures passed down from previous generations (Burr, 2015). The focus within the interpretivist traditions is then to 'understand these processes of subjective reality construction in all walks of life' (Prasad, 2005, p. 14), and thus relates to the principle of *verstehen* (Weber, 1949).

Consequently, social constructionism does not reject the existence of physical things, but rather emphasises how these things are interpreted within a cultural context (Prasad, 2005). A suitable example here is the white jacket, which is closely associated with the medical profession (e.g. H. S. Becker et al., 1961), and how that association is constructed by the social milieu in which it is seen.

For a stranger to western medicine, this might simply be a white jacket. However, that is based on the idea that a white piece of fabric is to be worn; perhaps it would be seen as a poorly designed tablecloth. Although the latter is less likely, the point here is that social constructionism does not question the ontological existence of the white jacket, but shows 'that even its material reality comes into being through acts of social representation and meaningful sense making' (Prasad, 2005).

Thus, the subjective reality of my interviewees is what drives my understanding, and interpretation, of their situation. I make no claims of presenting *the* way it *is* to be physician-scientists, but rather to illustrate how their situation *can* be interpreted. It is relevant here to emphasise that these interpretations cannot exclude my own subjectivity, politics, or ideology, as the interpretative approach dismisses the idea of a possible separation between the researcher and the research subject (Alvesson & Sköldberg, 2009). As Heidegger argues with the concept of Being-in-the-world (in-der-Welt-sein), '[we] are irrevocably merged with our world, already before any conscious reflection, and the polarization between a thinking subject and an object is therefore a dubious secondary construction' (Alvesson & Sköldberg, 2009, p. 117).

The empirical data can thereby be considered as being affected by my pre-understanding, from the literature on physician-scientists, as well as the theoretical streams that I had worked on prior to this study. The notion that the world is constructed, rather than there being a reality that can be "discovered", necessitates that I have an active role in the study, constructing the interpretations. Although it is impossible to exclude my own assumptions and values in the analysis process, Alvesson and Sköldberg (2009) suggest that it is possible to limit a too narrow interpretation with a reflexive approach. They argue that it is also essential to interpret the interpretations, through critical as well as self-critical interpretations and reflections. As such, they can be seen to combine different perspectives from the post-positivist tradition.

By taking an interpretivist approach in this study, I identify with the phenomenological philosophy, where social reality is constructed through interpretations. Thus, my interest is to understand how physician-scientists make sense of their situation and interpret their own interpretation of the social world as they narrate it. At the same time, I am aware of my own role in this interpretative process, where I take an active part in constructing how this world can be understood. Accordingly, it is relevant to attain a deep understanding of their social world, which I argue requires using qualitative methods. Qualitative research means different things to different people, where

the most common denominator is that they pay little interest in measuring and quantifying things (Prasad, 2005). The primary method I have applied in this study is qualitative interviews, and I find it relevant to discuss here some of the more interpretative aspects associated with doing interviews.

Thoughts on interviews

As one of the most commonly used techniques in qualitative research (Alvesson & Ashcraft, 2012), qualitative interviews are often portrayed as offering 'the opportunity for an authentic gaze into the soul of another' (Atkinson & Silverman, 1997, p. 305). Qualitative interviews differ from talking questionnaires (Potter & Wetherell, 1987) in the sense that they are often loosely structured, where the interviewee is allowed to guide the interview based on what they find relevant (Alvesson, 2003). Interviews are in-depth, and focus on how the interviewee makes sense of specific situations and experiences, rather than on discovering what takes place (Prasad, 2005). In this "romanticised" view (Silverman, 1993), the interviewee's experience is elevated as something authentic, which is often analysed uncritically (Atkinson & Silverman, 1997).

Such a perspective has been criticised for neglecting the local aspect of the interview, which highlights the situated nature of the interview in itself (Silverman, 1993). Localism challenges the assumption that interviews can be used in an instrumental sense, where they instead see the interview as a possible empirical setting to study (Alvesson, 2003). Only seeing the interview as an empirical setting is, however, less useful here, as I want to use interviews to attain an understanding of the interviewee's experiences. However, as Alvesson (2003, 2011) argues, it is necessary to consider the local aspect of the interview to avoid becoming caught in the "romanticised" view. Instead, arguing for a reflexive approach, he suggests eight different metaphors that 'each involve a key feature of an interview and a central problem (challenge) that the interviewee must "solve" or relate to' (Alvesson, 2003, p. 18).

These relate to appreciating the (i) context that the interview takes place in and (ii) the interviewees' understanding of this context. Furthermore, he emphasises the relevance of considering that the interviewee can use the interview to (iii) perform identity work, (iv) apply cultural scripts, use (v) moral storytelling for (vi) political purposes, (vii) construct their world through language, and that the language involves the (viii) power of discourse (Alvesson, 2011). These metaphors could be viewed as being cautions in order not to become caught in the "romanticised" view, where the interviewee's

experiences are taken at face-value. Instead, it is necessary to interpret the interviewees' statements as their own constructed narrative and understanding of themselves, in relation to the social context in which they are a part. This is in line with the interpretivist approach, where the idea is not to discover an objective truth, but rather to develop an understanding of the individual's experience.

With my reflexive and interpretative approach, the metaphors suggested by Alvesson (2011) are used as inspiration for how interviews can be analysed. For example, considering the interview as a performance of identity work and application of cultural scripts has been intentional. It entails elevating the analysis from the individual, where interpreting their stories as identity work in line with cultural scripts can provide an understanding of the social context that they are a part of. By comparing and interpreting interviews together, it is then possible to identify the presence of cultural scripts, and how they, in turn, are interpreted by different individuals. How they construct them through language, and the existence of a power in discourse, is part of their own interpretations of their experiences. Thus, the way that self-narratives are both expressive and constitutive of identity construction (Ibarra & Barbulescu, 2010) is part of the reason for using interviews as the primary method.

My research journey

In this section, I will provide a detailed description of my research process. Having established the interpretative tradition that this study is conducted within, and some of the philosophical considerations that this involves, this section will illustrate how this has been applied in practice. With the notion that I have an active role in the construction of the interpretations (Alvesson & Sköldberg, 2009), I find it relevant to consider this process as my journey through this project. Thus, this will be a description of my perspective, and how that has influenced the research project. Accordingly, the remainder of the chapter will follow a linear structure, detailing how the project has developed through establishing the research question, gathering my empirical material, the iterative process of analysing this material, and writing of this book.

Entering the project

In 2014, I applied to a doctoral position for a project regarding the coordination of clinical research and the organisation of the university-hospital. This project was initiated by Louise Bringselius, my main supervisor, based on the Swedish decline in clinical research, and the difficulties associated with being a physician-scientist. Hence, the research question that I started with can be seen as what H. S. Becker (2008, p. 120) calls a "practical problem", as it is 'defined by its importance to the people involved in it'. Having just finished my master's degree in management accounting, my initial interest was to take a more holistic perspective of the management of clinical research. This can, to some extent, be attributed to my rather loose affiliation with a specific department within business administration.

However, as I approached this project with no prior knowledge of the empirical problem, I started by reviewing the literature on clinical medical research. During this process, I quickly discovered the complexity associated with the problem, which provided a number of different ways to approach it. This included issues regarding research policy; research funding; new public management; the relationships between the university, the hospital, and the pharmaceutical industry (triple-helix); and much more. Thus, there was a need to narrow my focus considerably, and develop a more distinct problematisation. With most of the literature arguing for the importance of the physician-scientists, and how their declining numbers was considered a main contributor to the problem, I decided that this would be relevant to look into more thoroughly.

As a result, I started a process of moving from my initial macro perspective to considering more local aspects on the micro-level. By doing so, I also moved closer to a perspective where the individuals are more central for our understanding of the problem. With my interest in attaining a deeper understanding of the situation for individual physician-scientists, I joined the organisation and management group. This introduced me to many new perspectives, which explicitly involved moving towards an interpretivist view. As I had previously struggled with accepting certain instrumental assumptions, prevalent in the literature that I was used to from my management accounting background, this was a crucial step both for me and this project. As such, I was introduced to ideas that questioned these assumptions, while also presenting a different way to understand the social world.

More crucial here, however, was how it provided me with a different perspective to approach my project. Specifically, this related to problematising

our understanding of the situation for physician-scientists, arguing that there was a need to complement the almost exclusive quantitative studies conducted within the medical profession. With an interpretative qualitative approach, I could contribute to the debate on the physician-scientists by providing a different perspective.

Approaching the field

According to H. S. Becker (2008, p. 120), the trick is then to go out there and gather data, in order to understand what 'kinds of organisations, institutions, and processes are involved in the production of the problem'. Thus, the idea is to let the empirical material guide the development of the sociological question. As such, this study used a rather inductive approach, in the sense that I did not have any predetermined theories in mind before I started collecting my data. With that being said, no person is a blank slate; moreover, as a researcher, it is difficult to not have any preconceived notions about what might be going on. Having spent roughly seven months in the doctoral programme before I started collecting data, of course, meant that I had spent considerable time studying previous literature. Thus, I did have a few initial ideas about what direction the study would take before I started gathering my empirical data. However, more importantly, I was prepared to adapt these ideas once I went into the field, if that was deemed necessary.

Following Becker's suggestion, the first step then was to go out there and gather data. This led to the question of how does one do that, where to start? Fortunately, through personal and professional contacts, I got in contact with four physicians who were involved with research to some extent. These interviews would basically function as a pre-study, where I would try to figure out what specifically might be interesting to focus on. At this point, I was interested in identifying different factors that had affected their careers, such as what had led them to become involved with research, different sorts of incentives and disincentives, and how the organisation promoted or did not promote research. However, I approached the interviews with an open mind, keen to let the interviewees themselves expand on their experiences of what being a physician-scientist meant to them.

Consequently, the interviews were rather unstructured, where I allowed the interviewees to lead the direction in order to figure out what they felt was relevant. I did not see them only as providers of knowledge, answering a number of predefined questions, but as allowing a conversation between me and the respondents (Harvey, 2015). While I had prepared questions within

different themes from the literature, I mostly used them as guidance in the conversation. This included quite broad initial questions, such as: how has your research career developed? What is the view on research at your clinic? What is your opinion on the case of clinical medical research in Sweden today? Depending on the interviewee's responses, I then asked some more direct questions, with a focus on the themes that are of interest in relation to their initial responses (Alvesson, 2011).

By analysing these interviews, I realised that there was not necessarily a typical career path for becoming a physician-scientist, as they had all experienced different circumstances. Based on their stories, I became more interested in exploring the different experiences and going more into depth on what it meant to be a physician-scientist. While I was still interested in what led them into doing research, my focus shifted from attempting to identify specific factors, into trying to get a deeper understanding of *how* different factors affected them. I also became more interested in how they were handling the intricacies of being both physicians and researchers. This included formal aspects such as time distribution and funding, but what I found more interesting was the informal aspects, such as how they related to their colleagues and how their views affected them. In line with this, I made changes to my interview guide before I proceeded with the main data collection.

Doing interviews

I gathered the majority of my empirical material between August 2016 and January 2017, conducting interviews with 25 physician-scientists, bringing the total to 29. To find suitable interviewees, I used a snowball approach, also referred to as chain referral (Biernacki & Waldorf, 1981), where I asked my interviewees to recommend colleagues that might be interesting to talk to for my study. Without having any direct access through the hospital, this approach helped me get in contact with physician-scientists around the university-hospital. With a recommendation from a colleague, it was easier for me to reach out to strangers, especially considering how busy most of them are. Furthermore, most interviewees had friends or colleagues who they knew had different experiences compared to them, providing me with a better spread of informants. A complete list of the interviewees is presented in table 1.

Name	Title	Primary employer	Interview length
Robert	Associate professor	Hospital	77 min
Michael	Professor/admin position	University	54 min
Peter	Specialist/researcher	Hospital	70 min
Niklas	PhD-student	University	39 min
Alice	Specialist/researcher	Hospital	52 min
Beatrice	Specialist/PhD-student	Hospital	64 min
Oscar	Specialist/Post-doc	Hospital	44 min
Bengt	Associate professor	Hospital	79 min
Karl	Adjunct Professor/management	Hospital	109 min
Charlotte	Professor	University	80 min
Anna	Specialist/Lecturer	University	99 min
Dennis	Professor	University	64 min
Stella	Resident/PhD-student	Hospital	92 min
Jenny	Specialist/researcher	Hospital	63 min
Jonathan	Specialist/researcher	Hospital	51 min
Claes	Professor	University	50 min
Patrik	Specialist/researcher	Hospital	18 min
Henrik	Professor/vice dean	University	98 min
Emil	Specialist/PhD	Hospital	39 min
Nils	Professor	University	
Adam	Professor/management	University	102 min
Axel	Professor	University	92 min
Fredrik	Professor	University	53 min
Joshua	Professor	University	69 min
Tobias	Professor	University	120 min
Lisa	PhD-student/intern	Hospital	39 min
Björn	Professor	University	40 min
Sofie	Admin/career council	University	98 min
Kajsa	Specialist/researcher	Hospital	55 min
Matilda	Professor	University	91 min

Table 1. List of interviewees

Out of my 29 interviewees, 26 are physician-scientists with various degrees of activity, ranging from a full-time researcher with a medical degree to an almost full-time physician who spends some time on research, and seniority, from professors to rather new doctoral students. Out of the remaining three, two have strictly administrative tasks, and one is a retired full-time professor who has worked actively to bring together research and clinic at one of the major university-hospitals in Sweden. Although I have mainly been interested in the physician-scientists' experiences, in order to place it in an organisational context, I thought it was relevant to get the administrative perspective as well. Therefore, three physician-scientists who I interviewed are also associated with the medical faculty, and one has an administrative role at the hospital. With the exception of one, every interview has been recorded and then transcribed in verbatim. The exception was my first interview, where technical difficulties resulted in it being over the phone, where I could not record it. The interviews have been between 18 minutes (the interviewee's schedule was changed last minute, so it had to be done quickly) and 2 hours, with an average of 68 minutes. The transcribed texts total roughly 600 pages. All informants were assured confidentiality, and quotes that could compromise anonymity were altered or omitted.

The interviews have been conducted at the interviewees' workplace or home, mostly for practical reasons, but also with the idea that it makes them more comfortable to be in their own environment. The interviews can be described as between semi-structured and unstructured (Alvesson, 2011), in the sense that I have certain themes which I am interested in, with some specific questions relating to these themes. At the same time, I do not follow the interview guide strictly and also appreciate deviations from these themes from the interviewee. As such, the questions have been very open, and I have tried to let the interviewee guide the interview in the direction of their choice, where I have then asked follow-up questions or some specific questions pertaining to my themes. This approach is typical within qualitative interviews, where the interviewer is 'open to what the interviewee feels is relevant and important to talk about, given the interest of the research project' (Alvesson, 2003, p. 13).

In practice, I have started every interview with the same broad question, 'Could you tell me about how you got into research to begin with, and how your career has developed?' The idea with a broad opening question is that it allows the interviewee to narrate his or her own story from the beginning, and the direction taken gives an indication of what is most important to that person. As every interview is different, just as every interviewee is different, the direction of the conversation then takes different routes. Hence, my role in the interview

has also differed depending on the interviewee. Sometimes, the interviewee has talked freely about his or her experiences that I have found relevant, where I have then primarily only asked some follow-up questions and asked for clarification. Although I value allowing the interviewee to construct his or her stories freely, at times it has been necessary for me to ask more direct questions, as the interviewee simply provides brief answers.

Typically, this has involved the amount of detail provided when they discuss their career progress. For some, especially the more junior interviewees, this has involved going back to their initial decision to start studying medicine, and their personal interests with regard to research. Others, such as the senior interviewees, have sometimes started by summarising their career with a few sentences, content with giving the highlights of the last 20–30 years. In such cases, I have asked more specific questions relating to how they got started, how they were funded, how they worked with their supervisors, among others. At the same time, it has been relevant to consider that memories unintentionally change and become modified. As a result, their stories of how they started their career have mainly been used as a reference frame to identify certain changes over time, and to put the junior interviewees' more recent experiences in some historical context.

With an open structure, it has been possible to develop the interview guide, where I have been able to ask questions regarding something brought up by a previous interviewee. As such, there are differences between the questions asked in my initial interviews and in the latter ones. Nevertheless, certain themes have been prevalent throughout the entire interview process, where my questions have been oriented around their experience of being a physician-scientist. These have been about how they divide their time between the two tasks, their situation in the respective communities, the general view on research activity among colleagues, their understanding of the purpose of the university-hospital. Sometimes the answers to these questions have been brought up by the interviewee naturally, and sometimes they have required me to ask specific questions, such as:

- *How do you perceive your opportunities to conduct research in parallel with your clinical work?*
    - *Practically, with getting time approved*
    - *Managers/colleagues' views on being away doing research*
- *What is the general view on research activity at your clinic?*
- *Would you like to do more research?*

Furthermore, I concluded each interview by asking for suggestions on changes that would improve their situation. This was especially relevant in the beginning, as I was then interested in identifying systemic obstacles for physician-scientists. Nevertheless, as my interest gradually changed, I kept the question, as I identified that it usually led to the interviewees summarising the discussion and highlighting their main points.

Relating back to the interview metaphors (Alvesson, 2011), the purpose of the interviews has been to get a glimpse of the individual's interpretation of what it entails to be a physician-scientist. Thus, my interest has also been in understanding how they narrate their stories, where the language and scripts they use in their narrations are relevant to consider (Cohen & Duberley, 2013). For example, when I ask them to formulate how their colleagues view their research activity, the idea is that the interviewee's then put their own experiences in relation to the general script of the community of which they are a part. That means that I do not take these responses at face value, as their colleagues' view of them would require talking to the colleagues, but rather to get the interviewees to consider their role in the community. As such, this stipulates the interviewee to reflect on their experience as members in the community, which provides insights both regarding the individual and the groups to which they belong.

As a final note, I reiterate that with my interpretivist approach, the interviews are not meant to identify a generalisable truth of this experience, but rather to interpret the experience of being a physician-scientist through their own narratives. However, by relating my interviewees' different experiences with each other, I argue that it is possible to generate a deeper understanding of how it is to be a physician-scientist, which to some extent can be generalised, at least at the Southern university-hospital. As such, by then relating their experiences to how they try to fit this into the social context in which they are a part, their narratives also provide an understanding of the organisation (Barley, 1989; E. C. Hughes, 1937). This is not to say that I can present a full picture of the university-hospital, although I argue that it can be sufficient with regard to specific aspects within their specific clinic.

With that being said, I argue that it is possible that my results can contribute to an understanding outside of the physician-scientists' experience. Throughout my analysis, I theorise the results to a more abstract level, especially by connecting to the communities of practice literature. This is done by relating the physician-scientists' experiences to the more general phenomena of being part of different communities. As such, I can abstract my results to a more general understanding of boundary crossers, as well as the phenomenon of

power exertion between members in communities of practices. This will be further discussed in the remainder of this chapter, when I illustrate my analytical process.

Analysing the material

My analytical process can best be described as iterative, where I have moved back and forth between my empirical material and existing theories, trying to develop my own theorisation. This can be seen as abduction, in the sense that it starts from the empirical material while also appreciating existing theories, where both sides are interpreted and reinterpreted in light of each other (Alvesson & Sköldberg, 2009). As such, the analytical process has not been exactly linear; rather, it involved a circular cycle of continuous attempts to understand my material, develop ideas, relate them to existing theory, reinterpretation of material, develop other ideas, and so forth. This follows the notion that the 'theory-building process occurs via recursive cycling among the case data, emerging theory, and later, extant literature' (Eisenhardt & Graebner, 2007, p. 25). However, in order to avoid too much confusion, I will attempt to present it here in a somewhat structured way. This will be done in line with the approach advocated by Rennstam and Wästerfors (2015), who divide the analysis and theorisation of empirical material into three phases: sorting, reducing, and arguing.

Sorting the material

The first phase relates to sorting the material, which can also be called 'dealing with the problem of chaos' (Rennstam & Wästerfors, 2015). This involves getting intimate with the empirical material through engagement, continuous rereading, and categorising. This process starts already during the transcription of the interviews (Ryan & Bernard, 2003), where I have started to engage with the material and mentally started to create themes. This step involves coding and thematising the material, sorting it into categories, and finding commonalities and differences in my material. As discussed above, this kind of thematisation also involved making changes to my interview guide, where specific notions or questions were added, to further expand on a certain theme.

For me, this process can be seen to have followed the more open approach suggested by H. S. Becker (2008), with a number of similarities to the

grounded theory method (Glaser & Strauss, 1967). Especially in the sense that the data guide the study, you work inductively, and you conduct data collection and analysis simultaneously in an iterative process (Charmaz, 2014). Although my study has not explicitly used grounded theory, which is partly due to the diverse applications of the method, it has been influenced by it in the analytical process. This includes the iterative process of continuously analysing the material, constructing initial themes that influence the types of questions I have used in following interviews, and memo writing. However, I have omitted the detailed coding suggested by Charmaz (2014), instead doing more broad coding by constructing themes when I have read through my interview transcripts. This is closer to what H. S. Becker (2008) refers to as playing around with the material to find interesting aspects.

In practice, this has been conducted by reading and rereading my interview transcripts and making notes of things that I find interesting. I then look at other transcripts and if other interviewees share similar experiences, I mark this under the same broad theme. If no one else has talked about it, I go back to the original transcript and try to see if there are any specific factors that might be explicit to that person, in comparison with the others. Thereby, I continuously move backward and forward and compare the different experiences that my interviewees have had (Charmaz, 2014). Although this might not specifically count as coding according to grounded theory (Glaser & Strauss, 1967), the process is similar, with the exception that I take a broader approach and sometimes include entire sections under a theme. With longer excerpts from the interviews, which can touch upon multiple different themes, I found it more relevant to consider the entire discussion regarding these themes together, rather than making strict codes between them.

Rather than ascribing a code to every sentence, I have categorised the context in which statements are made, such as the interviewees talking about a specific period of their career, or a certain situation that they experience. For example, many of my interviewees discussed the period after having finished the dissertation as difficult, with uncertainty concerning how to move forward and the support needed to make the transition from a doctoral student to an independent researcher. Having identified this as a possible interesting theme, I sorted all the material that somehow touched upon this transition into one category. As this theme developed into my second empirical chapter, I then had all the material that touched upon this transition in one place, which could be further divided and analysed in the next step.

Rennstam and Wästerfors (2015) suggest starting with such initial coding, where the labels are closely related to the material, and then moving to a more

focused coding, with more abstract labels that relate to larger amounts of data. For illustration of how this has been done in practice, I will use the reasons why my interviewees started doing research. Going through each interview independently, I created labels based on how the interviewee expressed this in a rather literal sense. By comparing these different codes, I would then try to abstract what they had in common and put a more general label on them. For example, one interviewee talked about being 'approached by a senior colleague' about doing research; a second talked about how at their clinic 'you should do research', and a third talked about how 'everyone else was doing research'.

The question was then what do these interviewees have in common, and what labels could explain these three different experiences, '[w]hat is this an expression of?' (Ryan & Bernard, 2003, p. 87). A more general label of these would then be that they all had experienced some sort of "expectancy" by their peers, that they should do research. As a few other interviewees had talked about there being a strong expectancy to do research, I put this together into a more focused theme. I would then have this theme in mind when rereading the interview transcripts, searching for other examples that could have the same meaning. Gradually, this idea of expectancy became a guiding theme through my analysis, and it was later used in the conceptualisation of how research activity could be related to membership in a community.

Reducing the material

The second phase in the analytical process relates to reducing the material. This involves selecting certain themes that are considered relevant and omitting others that are considered less pertinent (Rennstam & Wästerfors, 2015). Thus, after sorting the roughly 600 pages of transcribed material into several different themes, it became evident that some of these would not fit into the thesis. This is a somewhat agonising process, as it involves removing parts that one might find interesting but not relevant enough to pursue further. Or, to use a more common expression, it involves "killing your darlings". H. S. Becker (2008) suggests that this can be done through having a dialogue with the material, trying to figure out what question it answers. As such, I am disciplined and controlled by the material, at the same time that I have the authority to determine what is analytically interesting (Rennstam & Wästerfors, 2015).

Thus, the process of reducing is directly related to determining the focus of the analysis, both asking oneself what themes are more relevant and what

interpretations might be redundant. While repetition is seen as one of the easiest ways to identify themes (Ryan & Bernard, 2003), it is not necessarily true that the most frequent categories are the most interesting (Davis, 1971). For example, the existing literature has identified funding as an important factor for the success of the physician-scientist. Showing that funding is very important for my interviewees, which it is, does little more than affirm the assumption that already exists. Thus, while funding as a theme was mentioned quite frequently, it has already been established in a number of studies and would therefore not add anything new. At the same time, with funding being such a crucial aspect of doing research, completely omitting it would be naïve. To me, the solution was to connect the role of funding with another prevalent theme, namely that of becoming independent. What was then initially two different themes became connected into one, in the sense of how funding affects the individual's transition to independence.

Reducing is thereby a question of focusing on a few aspects that can present an alternative explanation to the problem, rather than showing all aspects that are found in the material (Rennstam & Wästerfors, 2015). Consequently, in my reduction, I have eliminated certain themes that were considered either to general, not interesting enough, or not sufficiently relevant for answering the research question. During this reduction, I identified three broader themes that were analytically interesting, contributed with relatively new ideas pertaining to the physician-scientists, and were pertinent to answering my research questions. They related to i) how residents are recruited into writing a dissertation through expectations from their seniors, ii) the difficulties of attaining funding after the dissertation, and how it appeared to relate to a lack of independence, and iii) how the view on research activity in the clinical community seemed to influence the physician-scientists' membership, where some experienced an exclusion from their colleagues. In the next section, I will discuss how these were then developed into concepts.

Developing concepts

Rennstam and Wästerfors (2015) third phase of the analytical process is arguing, which refers to using the data to argue for an interpretation. This involves putting my findings in relation to established concepts and ideas and applying an analytical toolbox in order to better understand my themes. One key aspect of that is conceptual development, where a concept is used to represent the findings. H. S. Becker (2008, p. 109) explains concepts as 'generalized statements about whole classes of phenomena rather than specific

statements of facts'. Thus, concepts are a way to summarise data, and should therefore be developed through a continuous dialogue with the empirical material. Developing concepts means that the researcher defines them through interpretation, rather than discovering them (Rennstam & Wästerfors, 2015).

After sorting and reducing my material, it was thus time to relate my themes to the literature. As I am influenced by the Chicago school of sociology, I had up until this point used, what Everett Hughes called, a 'theoretically informed way of working' (H. S. Becker, 2008, p. 3). As such, this study was never based on a specific theoretical framework, but rather inspired by certain general ideas that could be applied to interpret and make sense of the empirical data. This is related to what H. S. Becker (2008) calls *Tricks of the trade*, which suggests that the trade of doing social science involves approaching the study with an open mind. With that, he refers to not becoming caught in 'comfortable thought routines', and instead attempting to problematise these routines. In other words, the idea of theorising in social science is about finding what is interesting (Davis, 1971), which includes ideas that make us question our comfortable thought routines.

How well I have managed to do this, I leave up to the reader to decide in the end. Nevertheless, these ideas inspired my study, where I have attempted to not strictly connect the project with one main theoretical stream. For example, while I have studied professionals, this is not strictly a study on professions, even though it is a theoretical stream with which this study could still be in discussion. Although I have used ideas from the profession's literature (e.g. Abbott, 2002; Brante, 2011; Freidson, 2001) to understand aspects of my material, I did not see how this theoretical stream could help me in my analysis of the identified themes. Similarly, as a study of the careers of physician-scientists, I considered issues surrounding career transitions (e.g. Ashforth, 2000; Barley, 1989), although I did not find these ideas to fully explain the specific problem at hand satisfactorily.

Nevertheless, these theories led me to the concept of communities of practice and legitimate peripheral participation (Lave & Wenger, 1991; Wenger, 1998). These concepts combine ideas on socialisation, identity, and career movement, which were all prevalent in my 'theoretically informed way of working' (H. S. Becker, 2008). As a result, rather than putting this project into a specific theoretical stream, I applied an analytical tool to better understand my empirical material, which also provided a conceptual language, necessary for my argumentation. Furthermore, the concept provided a suitable context for connecting my material, which offered a way to relate my findings to a general phenomenon outside of the university-hospital environment. Thus, I can

elevate my findings by connecting the physician-scientists' experience to that of multiple-membership and brokering, which, in turn, makes it possible to make some generalisations of my results.

With this conceptualisation, I could interpret the expectations that the residents experienced as being related to membership in the clinical community of practice. By separating between the canonical and the non-canonical practice (J. S. Brown & Duguid, 1991), I could conceptualise how the expectations were developed, as the senior colleagues thought that a scientific competence was relevant in the practice. Understanding the notion of how language can be used to exercise power in relation to identity construction (Barton & Tusting, 2005) provided a way to elevate my methodological interest in language to a conceptual tool. Thus, the way that language 'constructs reality in the sense that every instance of language use is to some extent arbitrary and produces a particular version of what is it supposed to represent' (Alvesson & Kärreman, 2000, p. 142) became a crucial aspect in my interpretation of how the individual relates to his or her social context.

As a result, the three themes that I had kept during the reduction phase could be developed into more conceptual ideas. This involved conceptualising the i) expectancy of writing a dissertation as a matter of attaining membership in the clinical community. I argue that a resident physician, in order to become a member, should learn the three roles that research seems to have in the clinic. The difficulties of attaining funding became a question of ii) an independence-dependence paradox, where varied interpretations of independence related to different ideas regarding the research purpose. Here, I argued that the scientific community of practice involved the resident being trained for dependence, which made it especially necessary for them to demonstrate independence through additional work. The notion of exclusion due to research activity was seen as a result of iii) the members in the clinical community of practice having negotiated an interpretation of what a physician-scientist should be. Consequently, I had to re-evaluate the idea of what a physician-scientist should be, as my findings did not fully agree with the proposed definitions in the literature.

In turn, this led me to conclude that it was necessary to re-define the physician-scientists into three different types, each facing their own unique position. This was a result of identifying a broad variation in the experiences among my interviewees. With this insight, I went back to the literature and contemplated the diversity in the different definitions used for physician-scientists. Despite the numerous ideas suggested, the literature tends to talk about physician-scientists as a fairly homogeneous group. Contrary to this, I argue that the

various definitions in the literature can relate to different types of physician-scientists, although they do not necessarily acknowledge this. With the support of the communities of practice literature, I could then distinguish these different types of physician-scientists in relation to their memberships in the respective communities.

Furthermore, the three different types also affect each other in various ways, which I will illustrate in chapter 8. By using the concept of communities of practice to interpret the theme of different experiences identified in my material, it was possible to abstract this to the communities having different ideas about the joint enterprise of the communities. This is especially the case for those that appear to reject the mutual engagement in the respective communities of practice, resulting in a sort of exclusion from the community, which, in turn, can create a feeling of liminality. Thus, the different experiences could be connected to the notion of membership, and how the power of membership can be used in a community of practice to distinguish between the core members and those who are stuck in a peripheral role.

Summary

In this chapter, I have discussed how the study has been conducted. I have argued for my interpretivist approach, and how some of the philosophical aspects associated with it have guided my study. This was followed by a description of my research journey, which included a discussion of my role in the research project and of how this has influenced my approach. I have illustrated how the empirical material is based on qualitative interviews with 29 physician-scientists, where my interest has been to understand how they interpret their experiences. The interviews have been semi-structured, where I have had certain themes of questions prepared beforehand, although the idea has been to allow the interviewee to guide his or her narration.

This is followed by an illustration of my analytical process, portrayed through three stages. First, I discuss how I have sorted through my material, playing around with it to find interesting themes. This involved a broad coding of the material, using the interviewee's language for labelling themes, and then bringing these together into more abstract ideas. Secondly, I reduced the material by going through the different identified themes, considering what questions they were answering, trying to find what was interesting. This resulted in three themes being in focus. In the third stage, I conceptualised

these themes, with the help of communities of practice, as an analytical toolbox. This developed into the three empirical chapters, each focusing on one main theme, while also connecting them to each other.

Southern University-Hospital

The Southern University-Hospital (SUH) is the empirical setting that the physician-scientists that I study work at. It was founded in 2010 through the merger of two university-hospitals located in adjacent cities, one established 1768 and the other 1857. They both had a long history of successful clinical research through their association with one of the oldest universities in the country, founded in 1666. Today, SUH has approximately 12 000 employees that on a daily basis average treating 1235 patients, have 415 visits to the emergency room, perform 128 surgeries, and publish 5 scientific articles (regionskane.se, 2021). SUH provides specialised care in most fields, where five areas are categorised as nationally highly specialised care, meaning that they treat patients from the entire country (regionskane.se, 2021). Here, I will discuss the way that SUH formally connects clinical practice and research in the medical education and the clinical training, which include internship and residency.

Education and research

The medical program comprises of 11 semesters, for a total of 5,5 years of study, which is followed by an 18-24 month long clinical internship[5]. The education is divided into the first 5 semesters mainly focusing on theoretical learning about the basic sciences, followed by 6 semesters of participating in the clinical practice. During the education, the medical students are required to write two scientific theses, which introduces them to the scientific world. One is a half-semester thesis project carried out at the end of the 5th semester, where students are introduced to scientific research and its role within medicine in addition to conducting a smaller individual research project. After 4 semesters of using the basic knowledge in diagnostic and treatment of different diseases, which include supervised participation in a clinical setting, the entire 10th

[5] In 2019, the Swedish government decided to extend the education to 6 years and removing the internship period. However, all students that started before the fall semester 2021 will complete their education in the old system (Ström, 2019) .

semester is dedicated to a thesis project. The purpose is for the student to deepen their knowledge within a certain area and get training in searching, critically assess, and compile scientific information (medicine.lu.se, 2021).

In addition to these mandatory research activities, medical students can participate in summer research schools. This involves joining an established research group for 8 weeks during the summer break, where the students try out doing research, helping with easier tasks such as gathering data and running tests. Thus, it is a possibility for those who already have a research interest, or have developed one through the thesis project, to advance their skills through practical participation in a research environment. Students can get funding for participating in a research summer school as well as course credits after submitting an abstract and giving an oral presentation on the research project. The funds are jointly provided by the medical faculty and the supervisor, on whose project the student work with, and amounts to 10 500 SEK/month for approximately 2 months of research[6]. The specific purpose of these scholarships is to create a research interest for students (medicine.lu.se, 2021).

The medical education thus provides both mandatory and voluntary ways to become involved with research, actively attempting to engage the students in research. Some of my interviewees started doing research as a direct result of these initiatives, where for example the thesis projects developed into a doctoral research project. Similarly, many that participated in the research summer school programs ended up developing a doctoral project together with the supervisor. Furthermore, it was common with teachers trying to promote research activity to the students during lectures.

Clinical training and research

In the current Swedish system, graduating from the medical education does not result in a student becoming a licensed physician, as this requires them to first finish a medical internship. Thus, the intern period is the last step before becoming a licensed physician, which is a requirement for starting residency training, to become a specialist physician. SUH employ 64 interns each year, and the internship is divided into three different postings over an 18 months period, starting with 9 months at the university-hospital working within surgery, medicine, and emergency care. This is followed by 3 months within

[6] This sum roughly equals the amount that a Swedish student can get in aid and loans by the government during the semesters.

psychiatry, and finally 6 months at a health care centre. The total education for becoming a licensed physician in Sweden is thus approximately 7 years.

Although the formal internship does not involve any research activity, SUH does offer a special research internship. This is funded by the ALF-funds, which is the economic compensation the regional councils receive from the national government for their participation in the medical education and clinical research. Approximately half of the 64 internships at the university-hospital are research internships, which allocates 6 months of research time, extending the intern period from 18 to 24 months (regionskane.se, 2021). The main purpose of the research internship positions, is to provide opportunities for young physicians to conduct research in parallel with their clinical training,

> "Because of the long medical education and clinical education during the internship it is important to create space for research education during that period. The purpose is to get more young physicians to get their PhD and offer better conditions for research (*skane.se/forskar-at/*).

For many physicians, these positions offer a way to get into research early in their clinical career. However, in order to get a research internship, it is required to have a research plan and an assigned supervisor (regionskane.se, 2021). As a result, it is essentially required to have prior research experience, or be connected to a research group, in order to compete for these positions. Those of my interviewees who used this track were all already involved with research projects in some capacity, giving them extra merits in the selection for these positions.

Once the internship is completed the student has finished the education, and is now a licensed physician. As such, the physician can start residency training, which entail focusing on a specific clinical area and becoming a specialist physician. Residency training is regulated by the Swedish National Board of Health and Welfare[7], and is specific for each specialty. At SUH, approximately 400 physicians participate in residency training (regionskane.se, 2021). The length of residency training differs between specialties, where the shortest is 5 years. The Regulation on physician specialist training (HSLF-FS-2020:19) stipulate that research activity should be included during residency, under competent supervision. At SUH, the residents are allocated research time to conduct an independent scientific project for a period that equals 10 weeks of

[7] Socialstyrelsen, in Swedish

full-time service. With the exception of these 10 weeks, research has no formal role in the clinical practice.

However, SUH provide the possibility to combine the residency with research activity, through the ALF-funds. There are two different grants available, where 'residency with research space' can be awarded to those that are registered doctoral students. Residents that have already earned their doctoral degree can instead apply for ALF-younger researcher. Both provides the successful applicant with either 3 or 6 months of research time each year, over a 3 or 4-year period. Approximately 30 residents at SUH have this type of ALF-funding, which can be extended for another 3-year period (medicine.lu.se, 2021). The purpose of the ´residency with research space´ is to provide opportunity for physicians to combine their clinical career with research. All residents at the university-hospital can apply for the research space, although it requires approval from their manager. Still employed by the hospital on a full-time basis, the funds are used to buy themselves out from their clinical duties in order to do research for 3 or 6 months each year.

In the following three chapters I will present my empirical material. The chapters are divided by the three identified themes, as discussed in the method chapter. At the same time, they also provide a rather linear perspective on the physician-scientists career. The theme of becoming a member, which will be discussed in chapter 6, mainly relates to the residency period, which is the first step in a physician's career. For the aspiring physician-scientist, this is followed by the period where they experience an independence-dependence paradox, when they are supposed to become independent form their former group. In the third and final empirical chapter, I present the situation of being a physician-scientist, which thus focus on the latter part of the career.

Becoming a member

Starting the medical residency programme is one of the defining moments of a physician's career. Until this point, they have received a broad education in all aspects of the medical field, becoming part of the professional medical community as licensed physicians. During the residency programme, they will specialise in a certain area for the following 5 to 7 years, primarily working in the same clinical community that they will, most likely, spend the rest of their career within. The defining moments are thus not only about the professional development of becoming a specialist but also about finding a place in the clinical community of practice – of becoming a member. I suggest that this is a crucial distinction, as the young physicians are no longer evaluated on just their clinical progress, but also on their suitability in the community.

In this chapter, I will argue that doing a residency at the university-hospital entails more than just meeting the formal requirements defined by the professional community, as the residents also need to be accepted by their senior colleagues as members of the clinical community of practice. In order to gain that acceptance, the resident needs to learn the role of research within their community, which they do through legitimate peripheral participation. However, with the relationship between clinical practice and research being rather complex, research can be understood as having multiple roles in the clinical communities of practice. In this chapter, I propose that there are three different roles that research could play, which the residents need to learn and adapt to, in order to be accepted as members: research as membership requirement, research as clinical instrument, and research as membership fee.

Research as membership requirement

In this section, I will illustrate how residents experience a strong expectation from their senior colleagues that they should write a dissertation. This expectation can be expressed both directly, through active recruitment, and indirectly, where the residents, through participation, learn that research

experience is part of the clinical practice. As writing a dissertation is not a formal requirement for completing the residency, this expectation is instead developed locally in the clinical community of practice. The residents experience that they must meet this expectation, in order to be accepted by the senior colleagues. From this, I will argue that research activity could be understood as an informal membership requirement, which the resident must fulfil to become full members.

Writing a dissertation expected

> It's like this, at a university-hospital. There is, to a large extent, there are somewhat different cultures at different clinics, but to a large extent, it is like this. That it is expected of one that you have some sort of research that leads to a dissertation".

In this section, I intend to focus on the notion of an expectancy of research activity, as stated above by Jonathan, who is a senior physician that wrote a dissertation during his residency and is still an active physician-scientist. The term expectation is central here, and it should be understood in contrast to the formal requirements for the residency. The residency programme is regulated by the National Board of Health and Welfare, which could be understood to represent the professional medical community. This regulation mandates that the resident should participate in research and quality development work for 10 weeks during the entire 5-year programme. The expectation Jonathan talks about, however, where the research activity should lead to a dissertation, requires the resident to complete 240 ECTS, which equal 4 years of full-time studies (The Higher Education Ordinance). Thus, expecting the residents to write a dissertation implicates substantially more research activity than the formal requirements.

Before moving on to how this expectation is interpreted, I find it relevant to discuss briefly what the term entails. To expect something can have a few different connotations, although it always relates to an idea of some future action or event. The Merriam-Webster dictionary suggests a few different meanings, such as a) to consider probable or certain; b) to consider reasonable, due, or necessary; and c) to consider bound in duty or obligated (Merriam-Webster.com). Although these meanings are similar, the reason for the expectation and the different weight associated with it varies. Hence, depending on the interpretation, expectations can carry different weight, although it always involves an anticipation that something ought to happen.

Thus, in order to understand the notion of the expectation, it is relevant to consider the weight associated with it. Going back to Jonathan's statement, although he does not specify this in words, the way that he talks about the expectancy hints at it being more or less an obligation. This is further articulated by Dennis, a senior physician and professor, who talks about the expectation,

> There is an expectation in a place like this, at a university-hospital, you should do research; you should finish your dissertation. And it is a strong expectation as well. It can be quite agonising if you don't fulfil that expectation towards colleagues and the environment.

Corroborating the notion of an expectancy, he also emphasises the strength that it has, exemplified with the idea that it is agonising to not meet the expectation, which I will discuss further at the end of the chapter. At this stage, I find it more relevant to emphasise his statement that the expectation comes from both the colleagues and the environment itself. While indicating that the expectation is rather widespread at the university-hospital, it highlights the informal nature of the expectation. Not meeting the expectation of writing a dissertation is thus not a matter of failing the residency, as it is not a formal requirement, but rather about letting down the colleagues. As such, it is about not getting their trust and respect, and thereby not being accepted as part of the group.

Having thus far explicated how senior physicians express the presence of an expectation, it is also relevant to consider how these expectations are understood and interpreted by the residents. In the following statements by Patrik and Alice, they explain how writing a dissertation was a part of doing a residency in their respective clinical communities.

> So yeah, it was just kind of the deal you know, in Lund and at [clinic X], that as a resident you should do research and get your PhD. (Patrik)

> If you're at [clinic Y] in Malmö or Lund, you do research. You can stop after your dissertation, but you have written a dissertation. (Alice)

Although they do not specifically talk about expectations, the phrasing here indicates that it is something strongly expected of them. Considering the certainty in their statements, they have both understood that doing research is part of being a resident in their respective clinical communities. This further suggests that the weight of the expectation is strong, where it is closer to an obligation or a requirement. This notion can also relate to the general research activity in the community of practice, where most colleagues appear to be

involved in research. Peter connects the high research activity in his clinical community with the notion that residents are expected to do the same,

> At the clinic that I am at now, there are so many that do research, so I think that it more almost, assumes when you are still there as a resident, or after as a specialist, that you either have done some research or, most have done it. Still, I think that almost, it is something that there are many who do it among the residents and so. So, it is more that you think that it is a part of the clinic, kind of.

Similar to Alice and Patrik, Peter suggests that research activity is part of being at the clinic, which becomes apparent through interacting with colleagues. With that, the expectation does not necessarily have to be explicitly stated towards the residents, as it is something that they implicitly understand through their colleagues' research activity.

Thus, there appears to be a strong expectation from the senior physicians towards the younger residents of writing a dissertation, which, in turn, is interpreted by the residents as something that they are obligated to do when doing a residency at the university-hospital. Stella, a resident, suggests that this relates to the need for research experience in order to advance in the career at the university-hospital,

> Then, it's a bit implicit also that in Lund, you cannot really advance in your career as a physician if you do not have a PhD.

This is something that is mentioned by most of my interviewees, where earning a PhD is considered a crucial step in the clinical career at the university-hospital. The expectation of writing a dissertation during residency thus appears related to a requirement that does not become relevant until after they have finished the residency. It is thus not directly connected to the residency training, but rather to prepare the residents for a future career as a specialist physician at the university-hospital clinic.

Before illustrating how this could be seen as research being a part of the clinical practice, it is necessary to understand how this expectation is expressed. I suggest that this happens in two different ways. First, the residents tend to experience being directly recruited into their senior colleagues' research projects, where they are explicitly asked to do research, to the extent of getting a PhD. Secondly, through the residents' participation in the clinical practice, they implicitly learn that research experience is something that is respected in

the clinical practice, urging them to be recruited. In the following two sections, I will discuss each of these expressions.

Direct recruitment

The most explicate expression of the senior members' expectations on the residents to write a dissertation is arguably through, what I call, direct recruitment. This typically entails the senior members approaching residents about their interest in doing research, with the intention of recruiting them into a research project. Although the process of recruitment can take place in different ways, it tends to involve a clear expression that the residents are expected to conduct research and write a dissertation. Beatrice experienced this kind of recruitment,

> My [future] supervisor actually grabbed on to me, or first, he threw out a project … and then I thought that sounded very interesting, so I figured maybe I can do that as my scientific project for the residency … and then he presented this, this thesis project for me and wanted me to jump on board on that, and that was how I got involved with it.

Aware that she was expected to write a dissertation at some point, her initial plan was to do so at a later stage. She raised a concern about starting a doctoral project while she had small children, which is often suggested as a barrier for young physicians doing research (e.g. A. Brown, 2009; SOU, 2008:7). However, with the senior colleague approaching her so strongly, with an interesting project, she ended up joining his project. While this started as a project for her individual scientific paper, which is a required part of the formal residency training, it then developed into a thesis project. I find it interesting to consider the way she phrases how her supervisor grabbed on to her, which indicates a very direct recruitment for his research project. Such direct recruitment appears common, where senior colleagues approach residents to get them involved in their own project. Bengt, a senior physician at his clinic, provides an interesting illustration of the situation at his clinic,

> Supervisors get their claws into the newcomers right away.

The expression he uses is very illustrative of the way that this recruitment can happen, where the senior physicians almost aggressively approach the residents. It draws similarities to the residents being a prey, where the senior colleagues are the hunter, grabbing on to the residents as they please. This

suggests a rather forceful recruitment, where the residents have little-to-no opportunity to resist. For the resident, arriving at a new clinic, aware of the formal dependence they have on their senior colleagues, this expectation can easily be interpreted as a requirement. Although other interviewees have had less forceful experiences, they have still been actively approached by senior members, such as Jonathan,

> I was asked by an associate professor, who subsequently became professor, if I was interested in doing research.

While asking about interest does not necessarily have to mean requesting participation, it implicitly shows that it is expected of the resident. Often, such questions can lead to the resident joining that senior member's project, as was the case with Jonathan. Stella, another resident, had a similar experience at her clinic,

> Then, I started doing research a few months later, when this supervisor asked me if I had any ongoing project that I was interested in researching.

She was approached after only a few months at the clinic, where a senior colleague asked her what sort of research project she was interested in doing. From the senior colleague's perspective, it was not a question whether she would start a research project, but rather what sort of project she was interested in doing. She ended up joining the senior colleagues project, even though she had some hesitations about the project itself. The direct recruitment can thus be seen as a way to clearly express their expectations of the residents, where it becomes explicit that they should write a dissertation. In the next section, I will illustrate how this relates to an understanding where research experience means having respect from others in the clinical setting, which is how the expectations imposed on the residents are expressed indirectly.

Research experience respected

The indirect way that the expectations are expressed relates to the residents' interactions with their senior colleagues on a daily basis. Through their participation in the practice, they understand that research experience is something that is respected in the clinical practice. As such, these expectations are indirectly expressed by the senior colleagues in their clinical discussions and behaviour, which the residents are observing and engaging in. Jonathan,

who is a senior physician, expresses the importance of research experience to contribute to the clinical practice,

> The physicians that don't have a research background, they don't really contribute to these discussions, these clinical discussions either … so we have a few that don't do research. That's how it is, but we actually consider that as a problem in these discussions.

The senior physicians thus highlight the necessity of having research experience to participate in these discussions. Seeing those without this experience as problematic signals to the residents the expectation that they should get research experience to contribute to the clinical practice. By participating in these clinical discussions and observing the added respect that senior colleagues place on research experience in their interactions with each other, it becomes easy for the residents to interpret that they need to write a dissertation in order to be respected by their colleagues. This is clearly stated by Beatrice, a resident and doctoral student,

> I think it's harder to assert oneself and make one's voice heard in the clinical if you don't have the scientific competence. I do think that, at least at this clinic. Because I guess it is like, it gives weight within the clinical as well that this person has this merit, and then maybe you listen a bit more on what that person says. That's how I perceive it a bit.

Through her participation in the clinical practice, she understood that without having research experience, it would be difficult to make herself heard. Confirming the respect associated with having research experience, she felt that she needed to gain research experience in order to be an active participant in the discussions. This shows how being expected to write a dissertation can be expressed indirectly, as, in itself, a resident is not specifically required to do so. Instead, it shows the residents that, in order to become an appreciated practitioner, they are expected to attain the scientific competence associated with writing a dissertation. As such, it can be understood as something that the residents are supposed to learn through their participation.

Thus, through their interactions with senior members in the clinical practice, they can interpret that the colleagues expect them to write a dissertation so that they will be respected as members in the community. In combination with the direct recruitment, the expectations placed on the residents become clear, where research experience is part of the clinical practice. Before exploring this connection in more detail, I will argue that the strength of the expectation is related to the residents getting membership in the clinical community.

Membership requirement

I argue that being expected to write a dissertation, as experienced by resident physicians, can be seen as a requirement for membership in the clinical community of practice. As writing a dissertation is not a formal prerequisite for completing the residency training, it is instead something that has been informally agreed upon in the community. Through their participation in the practice, the residents then learn that they should meet these expectations to become members. I argue that meeting the expectations can therefore be seen as part of the gradual movement from peripheral member towards full membership, which is a fundamental idea within the communities of practice literature (Lave & Wenger, 1991). This entails that the new members, the residents, learn what it means to be a practitioner according to the community, which includes having written a dissertation.

Here, I intend to connect the expectation of research activity to situated learning, and the notion of residents as legitimate peripheral participants in the clinical community of practice (Lave & Wenger, 1991). This connection is rather evident, even in the formal setting, as the residency education has several similarities to an apprenticeship, of which legitimate peripheral participation is a conceptualisation. Although resident physicians have more advanced prior training, both theoretical and practical, than the typical apprentice, they are still supposed to learn by gradually increasing their participation in the practice. The formal training is built on the idea that residents should work closely with established practitioners, who continuously evaluate their progress. As such, residents can be conceptualised as legitimate peripheral participants that through engagement in the practice are moving towards full participation.

This conceptualisation becomes even more evident through the expectations placed on the residents to write a dissertation. Being a legitimate peripheral participant entails learning how the work is actually conducted in the community, rather than what is prescribed in formal documents (J. S. Brown & Duguid, 1991). Here, the informal expectation of attaining a PhD, then relates to it being part of the practice in the clinical community at the university-hospital. This becomes evident for the residents through their participation in the community, where they work closely with the full members and thereby learn what it means to be a member. Through their participation, in addition to learning the actual work, residents learn what type of discussions are accepted in the lunchroom and how people interact with different colleagues (Wenger, 1998). Learning that research experience means being respected in clinical discussions, it becomes evident that full membership in

the community involves attaining this experience themselves. Thus, to become full members of the clinical community of practice, the residents must meet these expectations.

So, research activity here also serves as the crucial distinction between the professional medical community and the local clinical community of practice. Considering that writing a dissertation is not a condition to complete the residency, according to the professional medical community, the expectation relates to local conditions at the university-hospital. Being expected to write a dissertation could thus be seen as something that has developed at the university-hospital, as a result of its special position in the healthcare system. At the same time, the university-hospital does not formally require residents to write a dissertation during their residency, as it does not have the capacity to make changes in the residency education programme. However, with a PhD being a prerequisite for attaining more senior positions later in the clinical career, there are clear signals that residents are expected to write a dissertation.

These are then expressed in the clinical communities, I argue, through the notion of membership in the clinical community of practice. In this sense, the clinical community of practice has been able to develop so that research experience is a requirement for membership, by expressing it as something that is expected of the residents. As was hinted above, this connection between the expectations and membership must then relate to research being part of the clinical practice. In the next section, I will explore this further, suggesting that research is primarily seen as a clinical instrument, which is considered crucial in the clinical community of practice.

Research as clinical instrument

In this section, I will introduce the notion of research as a clinical instrument, which relates to the role of research in the clinical practice. I will illustrate how research experience primarily concerns attaining a scientific methodology, which functions as a tool that is considered necessary in order to provide the most advanced care for the patients. Thus, research is a part of the clinical practice in the clinical communities of practice at the university-hospital, as a clinical instrument. This can be connected with the idea of the physician-scientist as a translator from bench-to-bedside (Drolet & Lorenzi, 2011), where learning the scientific methodology is considered necessary to evaluate and implement new scientific findings into the clinical practice. However, this also

implies that research experience is primarily valued in the sense that it improves the clinical practice, where the research itself, and the idea of advancing the medical science, appear to become secondary.

This becomes evident in the typically weak connection that the research in the clinical community of practice has with the broader scientific community. With the residents being recruited into a project in the clinical community of practice, they usually only have a connection with the university through their supervisors. Furthermore, with research activity being seen as an instrument for the clinical practice, it tends to become valued as less important than actually working clinically. As a result of the clinical practice being the main priority in the community of practice, research activity can also be seen as an obstruction to the resident's clinical progress. This creates something of a contradiction for the residents, as despite the expectation of writing a dissertation, they are not supposed to spend too much time doing research, as it takes time away from participating in the clinical practice.

Research and clinical practice

Medical research and clinical practice share a long history, where they have continuously been driving each other forward. As a result, the majority of all treatments that exist in today's health care is the result of research activities, often conducted in a search for curing certain illnesses. Research and clinical practice can, as such, be seen to have a reciprocal relation, where new findings by either side impact the other. Some argue that the advancement of the medical profession in the 20th century is rooted in the scientific foundation on which the practice is based (e.g. Brante, 1988; Freidson, 2001). Hence, it is not surprising that research is considered an essential aspect for the clinical practice, which Stella, a resident recruited into research, states,

> Research, and new research, I would say is, in general, for all colleagues, regardless of if they do research or not do research, very important. It is something, I don't think… I don't know of any colleagues, and I can't picture one who would say that it was not important, because it controls our daily work so much.

A similar sentiment is raised by all of my interviewees, where medical research is referred to as the foundation of their clinical practice. This is apparent in how Stella emphasises that research controls their daily work. While this can be seen to indicate the close connection between science and providing care, it is also informative in how research influences the clinical practice. Certainly,

with almost all clinical practice being based on scientific knowledge, it does control their work in that sense. However, it could also be seen in the light of the constant scientific advancement that happens in many clinical areas, and how these need to be translated into improving the clinical care. In order to provide the most advanced care for the patients, the physicians must be aware of the latest findings in their specialty and understand them. Thus, new research also influences the clinical practice in the daily work, something Jonathan emphasises,

> The university-hospital kind of stands on three legs, the highly specialised care, like difficult surgeries, that you develop and drive new methods, like the medical engineering development, and the third is the research. And these are much more connected than people think. That is, if you should implement highly specialised care and new methods, you need to have your research background. In order for you to be able to evaluate studies, you need to understand it. Because everything is actually study-based; what we do, at least within my specialty, that we look at and evaluate clinical studies and such, and you are lousy at that if you don't have any research background. So, you have a sort of crossbreeding when it comes to the competences.

Illustrating the purpose of the university-hospital and the close connection between clinical practice and science, he argues for the need for physicians to have a research background. In order to provide the most advanced care, they must be able to interpret the scientific developments, evaluate what studies are relevant for each specific patient case. This kind of reasoning is in line with the argument of physician-scientists having an important role in translating these findings into the clinical care (Rosenberg, 1999), and in them providing better care to patients (Stendahl, 2012). However, although he talks about a crossbreeding of the different tasks, implying that they are equally important, his examples mostly suggest that research influences the clinical practice. The reciprocity in the other direction, where the clinical practice influences the research, the translation from bedside-to-bench, is less emphasised.

This perspective becomes apparent from many of my interviewees, where the purpose of conducting research in the clinical community of practice mainly relates to gaining scientific competence, which, in turn, improves the clinical practice. Thus, the community of practice's expectation towards the resident, that is, they should gain this competence by writing a dissertation, could also be understood as being primarily to aid the clinical practice. I will explore this further in the next section, highlighting how research experience, and the scientific methodology associated with it, are relevant as clinical instruments.

Research as scientific methodology

Although there is an idea about clinical practice and research as closely connected, they seldom appear to be so in practice. It appears that for the clinical community, research is mainly relevant in the way it supports the clinical practice. As such, the scientific competence associated with writing a dissertation can be compared to a clinical instrument, in that it is a tool that aids the physicians in providing the best care possible to the patients. This idea is accentuated by Beatrice, a recruited resident,

> I see it somewhat as a scientific education; it's not really the things that you do research on, but it is that you learn a methodology and you learn to read studies and understand how you do research and, also can you then more easily critically assess and see "is this good or is it not good?" And it results in that when you face new evidence or kind of, affect the treatment or you think like "how do we manage these patients?", you can actually, you have tools to study and maybe also, you have the competence to evaluate this, "is this a handling or treatment method that we should assess, is it applicable on our population, is it well conducted studies?", that is what you take in, so maybe, it's not exactly what your research subject is about, but rather that you, that you learn the methodology.

Her emphasis is on learning the scientific methodology, which functions as an instrument needed to evaluate the best treatment for the patient. In the same way that a stethoscope is needed to determine a patient's condition, the scientific methodology is needed to determine the appropriate treatment. This conceptualisation of research as an instrument can be inferred from the way Beatrice refers to how the scientific methodology can function as tools, which is then used in the clinical practice. The actual research subject is then less relevant, as the scientific methodology learnt is appropriate in a more general sense in the clinical practice.

Writing a dissertation is a scientific education, meant to provide the student with a deeper understanding of the field and different methodologies. Consequently, it always relates to learning the scientific tools, preparing the doctoral student to become an independent researcher (Gardner, 2008). Here, however, the emphasis seems to be that the resident should learn the scientific tools necessary for being a member of the clinical community. I argue that this is a distinction because instead of preparing the residents for a research career, their doctoral education focuses on them developing the tools they can use later in the clinical setting. Thus, the research project, in itself, is less relevant, as the important aspect is rather that the resident learns the methodology to

evaluate studies in order to provide the most advanced clinical care to patients. Although this is sufficient in the clinical setting, it does provide challenges for those who are interested in continuing to do research, as I will explore more in the next chapter.

Research is thus seldom talked about with the idea of expanding the medical knowledge in general, but rather in how it adds scientific competence relevant to the clinical practice. Hence, it could be seen to differ from how the ideal purpose of medical research is often presented, 'to advance knowledge for the good of society; to improve the health of people worldwide; or to find better ways to treat and prevent disease' (The Lancet, 2013, p. 347). While the research that the residents conduct certainly could lead to any of these outcomes, the way that research appears to be appreciated in the clinical community, it is of secondary interest. Instead, the main purpose is to become better physicians, who can provide the best possible care to the patients. Henrik, a senior physician-scientist, specifies this idea, where the scientific competence is what matters in his clinical community of practice,

> Most places try to make sure that all physicians are, at least at our clinic, for example, we try to encourage everyone to write a dissertation because it is a sort of competence increase; they get to work with critically assessing things, familiarise oneself in a problem and formulate things in a scientific manner.

This view is then in line with the argument that researching physicians, possessing a scientific methodology, provide better care to the patients (Stendahl, 2012). To further elevate this point, I will here relate back to a quote by Jonathan that I presented regarding how the community expressed their expectations on research activity as a membership requirement. By referring to those who do not have research experience as problematic, he highlights the necessity of possessing the scientific methodology in the clinical practice,

> The physicians that don't have a research background, they don't really contribute to these discussions, these clinical discussions either … so, we have a few that don't do research; that's how it is, but we actually consider that as a problem in these discussions.

The discussions that Jonathan refers to are clinical discussions where you need to be able to understand scientific studies, in order to provide the most advanced healthcare. Those lacking the scientific competence associated with writing a dissertation are considered as less competent doctors in such discussions and thereby seen as problematic members in the community. It can be seen as similar to them lacking an instrument, which the community deems

necessary in the clinical practice. Thus, by writing a dissertation, you become a more scientifically competent doctor, adding a clinical instrument to your toolbox, and can thus offer more insight into difficult clinical discussions.

However, conceptualising research as a clinical instrument also highlights how it is one tool out of many. Despite the expectations placed on the residents to write a dissertation, the main focus in the clinical community of practice is the clinical practice. The idea behind this expectation of the resident to write a dissertation as a way to learn the scientific methodology relates to how it can be applied in treating patients. Thus, considering doing research as developing a clinical instrument, it becomes clear that it is secondary to working clinically. As a result, the residents may understand these expectations as being contradictory, where the research activity that they have been recruited into is also seen as not being a priority in comparison with their clinical obligations.

Research as obstruction at the clinic

Considering the scientific methodology as a necessary instrument that aids the clinical practice, the residents tend to experience that attaining the tool is at the same time considered as an obstruction in the clinical practice. While writing a dissertation might be required for membership, the most prevalent aspect for a resident to become accepted as a competent member in the community is their mastering of the clinical practice. Thus, while conducting research is understood as benefiting the clinical practice, in the sense that residents learn to use the clinical instrument, it is considered secondary to actually working clinically. Although the scientific methodology is an instrument applied in the practice, the main currency is the experience of meeting and treating patients. As a consequence, research often becomes contrasted against treating patients, which Beatrice states clearly,

> When such things happen within the clinical operations [lack of available physicians and economic constrains], then I can say that then it is the research that gets scratched immediately, yes. Research and education are not something that is essential for the operations to proceed in the short-term; on long-term it is, but not in the short-term. So, it is easy to kind of limit it.

With the physicians being employed by the hospital, treating patients is the main priority in the clinic. Although this is understandable in the larger organisational context, a similar sentiment appears with regard to the clinical community of practice's view on the research activities. Despite their expectations on research activity, taking time off to do research should

typically be minimised, as it limits the time spent at the clinic, and thus limits the residents' opportunities to learn the practice.

This is further explicated through the notion that a resident spending considerable time doing research can be considered a less competent physician because of the more limited experience of treating patients. Jonathan, who earlier referred to the university hospital as a tripod where all tasks are equally important, discusses how he considers such residents to be less appreciated in the clinical practice,

> If I were to have a colleague who is away 50% or more, then that decreases my use of that colleague at the [clinical] lab, for example. Because it means that they get inferior clinical competence and so on. So, then, I maybe have to adjust what tasks and such they get based on this. Not to penalise them, but quite simply, based on where they are on the clinical ladder.
>
> Me: So, if you do a lot of research, you can be negatively affected in the clinical?
>
> You can get that, simply because you cannot do everything at the same time, and I experience that mostly the people who do research are often smart, driven people and such, so I think that they are very time efficient, but the bottom line is there is only 24 hours in a day and a life at the side and such. So, you cannot do everything at the same time.

Although he sees himself as a research-friendly physician who actively has research projects, there is a limit on how much time a resident can spend away from the clinical practice before becoming seen as a less competent physician. What is considered a reasonable amount of time to spend on research is typically not clear, although 50% is considered too much by Jonathan. Instead, finding the right balance is something that the resident must learn through their interactions with the senior members in the community. Similar to them having to understand that research activity is expected of them, they also need to pick up on what is considered a reasonable research activity level, without being seen as less committed to treating patients.

There is thus a contradiction between the expectation that residents should write a dissertation, and the prioritisation of the clinical practice. Yet, there is also an understanding that the patients always come first. Karl, a professor with an administrative position at the University-hospital to promote research, states this clearly,

> There is only one task that overshadows everything else, and that is providing our patients with efficient and safe care, that is what we are here for.

With that, all other activities become secondary, including doing research. This view is shared by all of my interviewees, where everyone emphasises that the patients always come first. Nevertheless, the contradiction can still be problematic for the residents, where they can experience that they should do both activities to a large extent, as Alice states,

> Either you have to say that "no, but we cannot do this much research", and then you should not demand this from the co-workers, or you have to say that "okay, but if we should do this much research, then maybe we cannot have these goals to have these waiting periods for different patient meetings and operations and such". You cannot max out both, you know.

As she argues, the idea of having high expectations on residents for research activity contradicts the formal goals, which prioritise the clinical responsibilities. Although there are probably few who would argue against physicians mainly spending their time treating patients, it can be understood to create the notion that research is an obstruction, albeit one that at the same time is considered necessary to learn the clinical instrument that helps the physician to provide the most advance care. To still manage to learn the scientific methodology without being seen as a less committed clinician, the residents are often expected to do much of the research on their own time. Connecting this to the membership requirement, in the next section, I will argue that research can also be understood as a membership fee.

Research as membership fee

I have so far argued that writing a dissertation can be seen as a membership requirement to be accepted in the clinical community of practice, where the research experience is primarily used as a clinical instrument. In this section, I will argue that research could also be understood as a membership fee, which relates to two different notions. First, the expectation placed on the residents to write a dissertation could be seen as being for the benefit of the senior members. By requiring the residents to write a dissertation to be accepted as members, the senior members at the same time assure that they have an influx of physicians carrying out their research projects. Secondly, with research being separated from the clinical work, the residents often struggle to get time

allocated for their research work. Instead, they are expected to do much of this work in their own spare time without compensation. As such, the residents pay the membership fee by giving up their own time.

Supporting senior members' research

Medical research is often arranged so that the principal investigator is mainly focusing on the more holistic aspects of the project, whereas the specific studies are conducted by a junior researcher. As a result, the senior members are dependent on an influx of doctoral students and postdocs to execute the studies, while they might be focused on the analysis and writing. Bengt, for example, explains,

> During the last year it's become more like, that I want to be hands on. I want to understand data myself. When you are used to that, it is difficult to take the step to only see, what to say, summaries of the results, without having been there yourself … but now I've come to that phase where I don't have the time to look at the data all the time, raw data that is.

As he has achieved more seniority, he does not have the time to be that involved in the hands-on part of the research activity any longer. Instead, he is dependent on having doctoral students to conduct the research, where his role has become more of a manager. This is often the case, where the senior person manages the research group by securing funding and having an overview of the work going on. As a result, the senior members are dependent on a constant influx of residents that can conduct the experiments, gather and process data, meet patients, or whatever else is required for the specific type of research being done. Thus, by recruiting residents into projects, the senior member acquires the necessary assets that they need to conduct their projects and get their publications.

Hence, residents can be seen to function more like factory workers, executing the work specified by the managers (e.g. Hackett, 1990; Weber, 1918/1958), which is something I will discuss more in the next chapter. Here, however, the focus is on how the senior members rely on managing to recruit residents into their projects. Dennis, for example, emphasises this need to advance within the academic system,

> You can continue to do research yourself, so to speak, but it is a sort of dead-end in the system. I mean to write your own work, do your own work and write your own article. But the route to success in academia is that you somehow

> acquire doctoral students; you have to. It's a strong merit to be a supervisor, if you want to progress in the system. So, you have to recruit good people, and there, you are rather exposed at the beginning of the career. You take the ones you manage to get, so to speak, and try to convince them to do something.

Thus, to advance in academia, you need to recruit doctoral students for your projects. Dennis emphasises both the necessity to have someone who can do the work and write up the articles, as well as getting the merit of being a supervisor. For the senior members in the clinical community of practice, the new residents are thus suitable recruits. As he states at the end, in the start of the career, this is a matter of convincing residents to become involved and do the research for the senior. Considering this, it is possible to assume that the expectations placed on the residents, namely that they should do research, do not just have to do with them becoming more scientifically competent, but also to support their senior colleagues' aspirations of doing research.

By making research a requirement for membership in the community, the senior members can take advantage of this by recruiting new residents into their research projects. Thus, by joining a senior member's research project, the resident can be seen as paying the fee required for becoming a member by executing their studies. With research as a membership requirement, this is typically understood as beneficial for both parties, where the resident can continue his or her movement towards full membership, and the senior member can earn scientific merits.

However, it should be explained that the benefit for the resident is mainly an outcome from the senior members making it a requirement. From a more critical perspective, the fee could be understood as a way to make it easier for the seniors to recruit residents into their projects. It could be seen as the clinical community of practice has made the requirement to be able to demand a membership fee from the residents, which they can then use for their benefit. While the dissertation is certainly a merit outside of the community of practice as well, it is seldom required if the resident were to leave the university-hospital. The membership fee is, however, not limited to carrying out the senior members' research projects. Depending on the senior member's availability of funding for the research, the residents are often expected to do most of the research on their own time with no, or limited, monetary compensation. As such, they are paying the membership fee by spending their own time doing research.

Paying with your own time

Besides doing the senior member's work, seeing research as a membership fee relates to the lack of compensation that many residents seem to get for their research work. Thus, the strength of these expectations and the recruitment become evident, in the sense that the residents should do most of the work on their own time. Furthermore, the research work that they manage to get compensation for results in them postponing their time as residents, which, in turn, delays them getting the salary increase from becoming a specialist. Thus, the residents could be seen as paying a membership fee by writing a dissertation.

With the residents being employed by the hospital to work clinically, research is not a part of their formal responsibilities. In order to do research during regular working hours, it is necessary to have research funding that can be used to 'buy out' time from the clinic, called "research leave" (forskningsledighet, in Swedish). However, it can be difficult to get research funding, as I will show in the next chapter, and several of my interviewees were recruited into research projects with no, or limited, allocated funds and as a result, they cannot get research leave from the clinic. Stella, for example, discusses what information she has received from her supervisors,

> I am registered as a doctoral student, which means that I have the right to apply for research weeks that give me time off from my schedule, from my clinical service. Then it is a bit confusing; in the beginning, they say that in order to apply for money, you should have a few articles published, and I don't have that much [information] that backs up anything else, really. Then, it is somewhat dependent on your supervisors, whether they have money for the project. My supervisors specifically do not have any funds, so that is a bit unfortunate. I have so far; I started this project about a year ago, but I have only been paid for three weeks.

Being recruited into a project without any dedicated funds to compensate the residents for time spent on research seems to be rather common. While there are opportunities for doctoral students to apply for funding from the region specifically for clinical research, Stella suggests that she must first get some publications. The evaluation of these applications considers the doctoral student's documented experience and skills (Skåne, 2020), which could require some publications. Regardless, as her supervisors have no funding available for her, she is expected to carry out much of the research on her own time. Asked about how much she spends on research, she later states,

> S: … I would say that I have done 70% outside, in my own spare time, of what I have done so far, as an estimate.
>
> Me: That is quite a lot…
>
> S: Yes, which probably is rather common; otherwise, it does not work.

Stella has thus been recruited into a research project by a senior member of her clinical community, who has planned a project without having any research funds. It can thus be understood as Stella, experiencing that she is expected to write a dissertation, is brought in to do the senior members' work, with no compensation. Instead, she is expected to spend her spare time outside of work doing research, which I argue can be seen as a membership that she is paying. Beatrice, also a recruited resident, confirms the notion that writing a dissertation involves spending your own time,

> I mean, I think everyone here is aware that when you get into this, as a researching physician, it means that you do it in your own spare time.

That a doctoral student should fund his or her own research might not be uncommon from an international perspective. However, in Sweden, there are regulations that mandate that secure funding for the entire doctoral period should be in place in order to register a doctoral student at the university. Considering that out of the 1,080 registered doctoral students at the medical faculty, 606 do not have any funding through the university.[8] Thus, it is uncertain how this is administered. These 606 are registered as having other employment, which is assumed to be at the hospital, even though this is not documented at the university. Without such data, it is not possible to determine the number of registered doctoral students employed by the university that actually have funding.

Regardless, finding the time for research can be difficult for physicians, which has been highlighted by Giglio (2009); it has also been a topic at a recent seminar during Almedalsveckan[9] (Lövtrup, 2017). Furthermore, according to a survey of residents at the university hospital in Gothenburg, the possibility

[8] Data from personal communication via email with: Research Education coordinator, Medical Faculty, Lund University, 2016-11-28.

[9] Almedalsveckan is an annual event, gathering actors from the public, private, and non-profit sector, for a public discussion of societal issues. See https://almedalsveckan.info/english for more information.

of scheduled research time was considered the most important motivational factor to do research or do more research (Gonzalez et al., 2010). Without resources to provide this, the usual suggestion seems to be that residents should use their on-call time, which is the compensation that physicians get after working night shifts. Beatrice, for example, explains that this is how she does most of her research work,

> So, it is the on-call compensation time [where you do the work], we have a work where you generate some time off and where you work irregular hours, so if I work nights then, we start at 4 in the afternoon and work until 8.30 [in the morning]. Then I sleep in and I can put in a few hours there during the day. Similarly, in the end, if you have been on several nights, you often get a few free days in connection with the weekend and so, so I've done that.

Even though on-call compensation can seem like ordinary working hours, they exist in order for the physicians to recuperate after long night shifts. Nevertheless, it seems that the senior members consider this as the ideal time to do research, as the residents have time off from the clinic. As such, the senior members can disregard that the on-call compensation is there for the physician, as well as for minimising clinical mistakes due to sleep deprivation. Stella indicates as much, emphasising her need to have this time to recuperate,

> Then, it has been suggested to me that I come in before the night [shift] begins and do research during the day, unpaid then, which is quite difficult because the on-call nights are quite tough. So, sometimes, you get the feeling that they have no perception that you also need to sleep. But there are plenty of innovative suggestions on when you should do research in your spare time, but few of them are realistic if you don't want to have a burnout.

Considering that the number of physicians on sick leave for mental health-related issues is increasing (Lövtrup, 2016), Stella's concerns should not be dismissed. Nevertheless, the senior members can sometime discard some of these issues, not appreciating the residents' spare time as their own. Instead, it is part of the membership fee to give up this time and do the senior members' research for them. With the strong expectation of writing a dissertation, the residents can struggle to oppose the situation, as that could jeopardise their movement to become full members. As a result, many residents seem to accept the situation and therefore pay the fee, incentivised by the benefits of membership.

Paying with extended residency

So far, I have primarily focused on the situation of residents who lack initial funding for their research. However, several interviewees have received funding during their doctoral projects, which I will briefly discuss now. I argue that, in most cases, they also need to pay a membership fee. Although it also relates to the resident's time, this can be translated more clearly into a numerical value. Through their research, they extend their residency, which also means that they postpone the salary increase associated with being a specialist. As such, they can be seen to pay the membership fee by earning a lower salary for an extended time, compared to their colleagues who do not have research funding. At the same time, according to a survey at the university-hospital in Gothenburg, having allocated time for research is considered the most important factor motivating physicians to do (more) research (Gonzalez et al., 2010).

I find it suitable to distinguish between residents who have long-term funding and residents with short-term funding. Those who have been recruited into a project, as illustrated above, typically belong to the latter group, where they have then managed to get funding sporadically. Residents with long-term funding are typically those who have research experience before they start their residency. Among my interviewees, they have usually gained this experience during the education, such as attending research summer school, working part-time in a laboratory, or expanded on their master's thesis project. Regardless, through this experience, they are often already connected to an established research group before they start their residency. The primary source of their long-term funding is either through the professor in this group, or them getting their own funds. These are then often in connection with the research group, or through ALF-funds.

With these funds, the residents can then take out 'research leave' from the clinic and still earn a salary. However, as they are not taking part in their residency training during their 'research leave', their residency period is extended with the same amount of time. As a result, they also postpone becoming specialist physicians. With the highest salary increase for a physician taking place when they finish the residency, they also postpone this salary jump, which can then be understood as a membership fee. Charlotte, for example, highlights how doing research comes with an economic loss,

> I was hired at the clinic and then, until I defended my dissertation, I was funded by the [research] group here. I mean the X Foundation. I got scholarships from

> the X Foundation to pay for my research, and it was a very important thing for you. That it was a large economical loss, to do research.

As Charlotte mentions, this financial loss can be rather substantial. In Region Skåne, the average annual salary of a resident is approximately 540 000 SEK (50 700 EUR[10]), compared to the approximately 820 000 SEK (77 000 EUR) you earn as a specialist physician. Even if we take into consideration that one might earn less than average after having just finished the residency, the 10th percentile of specialist physicians still earn approximately 748 000 SEK/year (70 300 EUR) (SACO lönesök). Thus, for each year that the physician extends his or her residency, they miss out on approximately 208 000 SEK (19 500 EUR) in salary. There is thus a rather substantial financial disincentive associated with taking time off from the clinic to do research, which could be seen as a membership fee. As a result, a study over lifetime earnings shows that physicians are the only group that does not financially benefit from writing a dissertation (Ljunglöf, 2011). Asked about this, Peter states,

> Yeah, it is stupid to do research. No, but you do postpone it [the residency], that is how it is, of course. If you then see that you get considerably better compensation, or salary, when you have finished your residency. Then I won't be finished with my residency, it will maybe take me twice as long a time as it did [for] my colleagues [who started at the same time].

By spending a considerable amount of time doing research, in Peter's case 50% of his working hours, there are thus financial disincentives. Worth noting here, however, is that all of my interviewees who had started doing research before their residency had a pronounced interest in doing so, rather than being recruited into it because of the community's expectations. Thus, the financial loss should not just be seen as a membership fee, as they most likely would have done research regardless of the expectations from the community of practice. Nevertheless, it is relevant to take into consideration, especially for those who are already paying with their own time and then manage to get short-term funding.

Although their supervisors might have limited research funds for them to use, the recruited residents can get funding for shorter periods. In addition to smaller private funds, the residents can apply for research support from the region, amounting to 210 000 SEK (19 700 EUR) for one year (Skåne, 2020). Beatrice, for example, received these occasionally,

[10] Using the exchange rate from the 24th of September, 2020: 1 EUR = 10.64 SEK

B: [I got] these R&D-funds, doctoral funds from the region for 2015. So then I used that. Then last year I didn't get that, so then it was on-call time, and now I have received it again for 2017, so I hope that I can finish with those, and that is then, it becomes approximately 40 days compensated each year.

Me: That's not, or that becomes 8 weeks. Do you feel that it is enough, or it requires that…?

B: No, it is not enough, no no. So, it is the on-call compensation…

This support provided her with 8 weeks of research, which, although helpful, still required her to use her own time. With short-term funding like this, it is also difficult for the resident to plan his or her research time in advance, as a result of the insecurity regarding the situation the following year. Nevertheless, through using them for 'research leave', Beatrice also extends her residency, further increasing the membership fee of paying with her own time.

As a last note regarding the idea of research as an activity to do on your own time, this also introduces the resident to the notion of research as a hobby. This is a perspective that has an impact on the situation for the physician-scientists throughout their entire career, which will be discussed further in chapter 8. Here, however, I will just briefly mention that by expecting the residents to do most of their research work on their spare time, the community can establish that research should be considered as separate from the clinical work. This can be inferred through the term 'research leave', which puts research activity in the same category as any other sort of vacation time. However, it is also a hobby that the community of practice can be seen to enforce on the physician, through the membership requirement. As a result, the expectations from the community of practice on the resident to write a dissertation extend outside of their paid working hours.

The power of membership

Building on the idea that residents write a dissertation as a membership requirement, I will here argue that the membership fee also illustrates the power relations in the clinical community of practice. Earlier in the chapter, I discussed how these expectations that residents experienced were related to becoming members in the clinical community of practice, through legitimate peripheral participation. With the residents also expected to pay a membership fee, it is relevant to consider how they are dependent on the senior members providing resources necessary for their continued development. Through this

dependency, their learning practices are embedded in relations of power and control (Contu & Willmott, 2003), where the residents need the senior members' approval. Hence, through the control over membership requirements and fees in the community, the unequal power relations within the community become apparent (Lave & Wenger, 1991).

In the clinical community of practice, the senior members have both a formal control – in the sense that they evaluate their competence in the specialty – and an informal power – in the sense that they determine their membership in the clinical community of practice – over the residents. While the former relates to completing the formal residency education, the latter involves being included in the community of practice where they are doing the residency. It is through this informal power that the expectation that the resident write a dissertation becomes prevalent, and the membership fee that the residents are paying reflects how strong this control can be. It highlights the power among those who determine whether or not a participant fulfils the movement to full membership.

The expectation expressed towards the residents to write a dissertation can, in itself, be interpreted as an exercise of power, through the notion of being accepted as a member of the community of practice. This becomes evident in the sense that those who do not meet this expectation could experience a sort of exclusion from the community. Referring back to the quote by Dennis from earlier in the chapter,

> There is an expectation in a place like this, at a university-hospital, you should do research; you should finish your dissertation. And it is a strong expectation as well. It can be quite agonising if you don't fulfil that expectation towards colleagues and the environment.

Phrasing it as agonising to not meet the expectations that were placed on them by the community highlights the considerable power that the senior members in the community of practice possess over the residents. This suggests that there are social power dynamics at play, where senior members have the capacity to withhold or enable access to resources, as well as the learning practices (Contu & Willmott, 2003). Even though residents might fulfil all the formal requirements of residency, they are still not meeting the expectations placed on them by the community of practice, unless they are writing a dissertation. Disregarding this expectation can then be understood as not appreciating the practice of the community, resulting in the resident struggling for full membership. Instead, they could be left in the periphery, where they have limited influence relating to the clinical practice. The expectations can

then be understood as an instrument to exercise power over the resident, where their aspirations of membership are dependent on meeting the senior member's expectations.

This indicates how the relations between the master and the legitimate peripheral participant are based on the former's power over the latter (Lave & Wenger, 1991), executed through the notion of membership. The exercising of this power is then further manifested through the idea of the residents paying a membership fee. Not only is this expectation that residents write a dissertation added to the formal requirements of the residency, but the residents also accept that this is often done outside of their formal employment. As the senior members determine the progress of the resident's movement towards full membership, this control can also lead the senior members to potentially take advantage of the residents. Hence, by controlling the resources, they can condition the resident's access to them. Dennis continues,

> It is easy to be taken advantage of as a young doctor, or maybe it is being young in whatever, but as a young doctor, if you want to work somewhere you know, "yeah sure, can't you do, yeah you can start working here soon but can't you look at, do some project's here first?", and then you have to sit and do that in your spare time for free somehow right. So it is easy to; you have to avoid that.

He illustrates the ease with which young doctors can be taken advantage of, where they are asked to do certain things, without compensation, in order to progress in their career. For the residents, this can be seen as a way to prove to the senior colleagues that they are prepared to go the extra mile and earn their respect. Nevertheless, this respect relates to activities that go beyond what they should formally do, where the expressed expectations can be seen to function as a way to exercise power and control over the residents. The fact that the residents are willing to spend their own time and/or extend their residency to meet the requirement indicates how membership can function as a way for the members of the community of practice to exert power over new, aspiring, members.

Summary

In this chapter, I have argued that research can be understood to have three different roles in the clinical community of practice: research as membership requirement, research as membership fee, and research as clinical instrument.

With no formal requirement to do research to the extent of writing a dissertation, these three roles are all connected to how residents understand research as a necessary aspect of being a specialist in their respective clinical community of practice. I have argued that this relates to the residents' need to be accepted by their senior colleagues where, in order to move from peripheral to full members, they are expected to write a dissertation. From this, I have suggested that the clinical community of practice uses the notion of membership as a way to exercise power and control over the residents.

As a final note here, these three different roles of research play an influential part in my conceptualisation of the hobby physician-scientist, as I will discuss in detail in chapter 8. Here, I find it sufficient to highlight how the hobby physician-scientist is the full member in the clinical community of practice as presented in this chapter. Thus, he or she is someone who values research as an essential part of being a member, while highlighting how it is mainly an instrument to support the clinical practice, and as such something that should primarily be performed outside of the regular work, where it does not hinder the clinical practice.

Dependence-independence paradox

In this chapter, I will illustrate the dependence-independence paradox, which many physicians experience during the period after they have finished their dissertation. I will argue that this paradox is created through three separate notions. First, the importance placed on the notion of independence and how this is a fundamental aspect that permeates the scientific community, especially within academia. Here, I will discuss what I mean by the scientific community and how it can be seen to exist on different spatial levels. Furthermore, I intend to show how the idea of independence is operationalised in the scientific community, mainly through being able to get funding. Secondly, I will illustrate how the young physicians tend to be trained to become dependent, rather than independent. This connects back to the recruitment that many residents experience in the clinical community of practice and their rather distanced relationship with the university.

Thirdly, I will argue that the operationalisation of independence tends to make the aspiring physician-scientist dependent on the support of the same people that they are supposed to demonstrate independence from. To become independent physician-scientists, and traverse the gap, they must learn how to balance this dependence-independence paradox. Finally, I will discuss how this creates the notion where attaining research funding becomes a device to validate the individual physician's independence.

Mind the gap

To continue doing research as a physician after the dissertation tends to be rather difficult. I argue that this is related to a gap period, where the physician needs to transition from being a doctoral student to being an independent researcher. Primarily, this is connected to attaining individual research funding, which is a prerequisite for being able to buy out research time from the clinic.

Defining the gap

Sofie, who is a career coach at the medical faculty, states,

> It is kind of many doctoral students' big dilemma, if you want to continue doing research after you have defended the dissertation, it is tough. Both to find resources, money, and then to get time away from the clinic, which also can be problematic.

While this gap period, to some extent, is apparent for all doctoral students, she identifies that it is especially problematic for physicians, as they, in addition to getting funding, must also be able to get research leave from the clinic. As I illustrated in the previous chapter, the clinical community of practice mainly appreciates research activity, in the sense of how it can improve the clinical practice. Once the dissertation is accepted and the physician has earned his or her PhD, the physician is sufficiently trained in the scientific methodology. Hence, continuous research activity is less relevant for the clinical community of practice. With that said, in this chapter, I intend to focus on physicians' experience as researchers. This will involve both their experience of being a doctoral student, as well as the time after the dissertation where they have to traverse the gap. I will argue that these are connected, in the sense that certain aspects of the doctoral period relate to being dependent on the support of one's research group, while the gap period then exists as a result of the physician's lack of independence.

As such, I will move away somewhat from the focus identified in the literature, and what was discussed in the previous chapter, of getting more physicians involved with research (SOU, 2009:43). Instead, I am here more interested in what happens after physicians have been awarded the PhD. I argue that the issue of how many of them continue doing research actively could be an equally relevant problem. Claes, a professor, emphasises this importance and how it could improve the situation for clinical research in the country,

> That which would lift the clinical research more, and which might to some extent be the difference to when Sweden flourished a bit more in the 70s and 80s, when it comes to clinical research, is just to continue doing research after dissertation, not maybe as a full-time researcher I mean; not 100% academic, but just to have these kinds of combinations of doing healthcare and clinic, but also to research.

While referencing how continued research activity was more common historically, his statement also suggests that there is a shortage of physicians

doing so today. This indicates that the metric of how many physicians earn a PhD is not necessarily indicative of how many physician-scientists there are, as he suggests that many seem to stop doing research after the dissertation. A similar sentiment is raised by Karl, the professor with a senior administrative position to promote research, who raises the lack of opportunities to continue doing research as the problem,

> The main problem is that there is a far too small proportion of those who have a PhD that have the opportunity to move forward, and both do research and benefit the operation [the clinic] with their knowledge and experience.

Karl emphasises two relevant aspects here. First, with too small a proportion of physicians continuing to do research after the dissertation, the decline in clinical research does not necessarily relate to the number of physicians that are awarded a PhD. As I illustrated in the previous chapter, the clinical community of practice tends to only appreciate doing research to the extent that it benefits the clinic. While this promotes physicians to write a dissertation, it also influences them to disregard research activity once they have achieved it. Secondly, Karl mentions the lack of opportunities to continue doing research after the dissertation, which I suggest relates to the existence of a gap period.

The lack of opportunities is mainly connected to the difficulties in acquiring the necessary funding to continue doing research. This is in line with some of the suggested structural barriers for physician-scientists, as noted in the literature (SOU, 2008:7; Sung et al., 2003). Individual funding is essential to be able to continue conducting research after the dissertation, as Dennis, a professor, underlines,

> What you need is cash. The money has to roll in; you have to be able to pay your own salary if you are going to have any chance. Otherwise, it becomes unsustainable if you don't have any research time yourself.

This is rather evident, as more or less all researchers are dependent on external funding, regardless of what sort of research is being conducted. In the Swedish setting, the first step is to get funding for your salary, which in the case of physician-scientists is used to buy oneself out from the clinic in order to conduct research. This highlights a distinction between physician-scientists and full-time researchers in relation to how this gap period is experienced, as the physicians have an established career track outside of academia. Dennis contrasts the alternatives that physicians have after the dissertation,

> In relation to many others that write a dissertation, we have a completely established career track outside of science; you can go back to your employment as a doctor, and for many [people] that is more attractive than to keep on with research. It goes forward quicker; you become a specialist quicker; you become a senior physician quicker; you earn more money quicker and you become more independent with greater freedom. You don't have to keep on applying for money to pay your own salary and stuff like that. So it is, it is not an obvious choice [to keep on doing research]; it really isn't, as there is such a strong alternative for us clinicians.

Partly, this can be seen as the physician-scientists enjoying a privileged position in comparison to other researchers, as they are not entirely dependent on progressing in their research career. At the same time, it means that the simple alternative to minding the gap is to discard research after the dissertation and focus fully on the clinic. Such a decision involves going the more established and easier career route, where the physician can advance more quickly and earn more money. However, for those physicians that do continue with doing research, and as such do not follow the typical physician career, they experience a precarious situation. This requires the physician to handle what I call the dependence-independence paradox, where they must demonstrate independence from their former supervisors, while at the same time, they are dependent on their support in order to demonstrate independence.

Independence required

The difficulty in getting individual funding is often related to the physicians not previously having shown that they are sufficiently independent. Although demonstrating independence is a key aspect for earning a PhD degree, it is seldom enough to be awarded funding. At the same time, the notion of independence is a rather illusive concept that is not easily measured (Van den Besselaar & Sandström, 2019). In this section, I will discuss how independence is understood with regard to physician-scientists and illustrate how it is portrayed as a crucial aspect for a physician to become a physician-scientist.

Although independence is a pervasive ideal within science (Hackett, 1990), it is seldom distinctly defined. Historically, an independent scientist (sometimes referred to as a gentleman scientist) was someone who pursued scientific research without affiliation with a public institution, and who was typically self-funded. Although there are certainly a few such independent scientists today as well, the term usually suggests other types of independence.

Within academia, one important example is to be independent from those who fund the research, such as companies, states, or other interest groups, in order to avoid conflicts of interests. This type of independence is a crucial aspect of medical research, where especially the relationship between pharmaceutical industry and academia can involve both moral and economic tensions (Wadmann, 2014). Although a relevant aspect, I will focus here on another example, which will be the focus for the remainder of this chapter. This pertains to being independent in the sense that one has the capacity of doing research without supervision. It relates to one of the primary purposes with the doctoral education, which is to develop new independent scholars (B. C. Rosen & Bates, 1967). That being said, what it actually entails to be an independent researcher is seldom clearly defined. Gardner (2008, p. 329), for example, states:

> 'Independent scholarship is therefore part and parcel of the socialization process in doctoral education, because it is what defines the degree and its potential recipient'.

While further highlighting the importance of independence, as it defines both the doctoral degree and the person who earns the degree, she does not specify what the independence entails. However, if we consider the formal definition of the word, it states that being independent means that one is 'not dependent', such as: not subject to control by others, not requiring or relying on something or someone else (Merriam-Webster dictionary). An independent scientist is thus someone who is not controlled by, nor reliant on, someone or something else. With this, I argue that it is hard to find a scientist who is completely independent, as most at least rely on some sort of financial support, either from the employing university or an external funder.

However, if we disregard such an exact interpretation of the word, it could be more beneficial to consider different types of independence. In the professional sense, it is thus possible to say that being independent means that no one controls the specific research that you conduct and/or how you do it, and that you do not rely on anyone else to help you. In other words, no one instructs what research you do, or how you do it, and you can do it on your own. Thus, an independent scientist is in control of his or her own research, decides how to do the research, and does not require help to execute the research project.

This type of independence is sometimes referred to as being autonomous, where the two terms are sometimes used interchangeably. While the two words can have somewhat different meanings, my definition of independence is

closely related to the way that autonomous is typically used when it comes to scientists. My preference for the word independence relates partly to it being the direct translation of the Swedish word used by my interviewees, which is "självständig", and partly to the idea that the dependence-independence paradox is a clearer phrasing for my argument, than the dependence-autonomous paradox.

Dissertation insufficient for independence

In this section, I will illustrate that the dissertation is often considered insufficient for a physician to prove that he or she is independent. To be awarded long-term individual funding, the physician is more or less required to have additional merits. The argument typically used for this is that one has to be more independent to be awarded funds, which the physician then demonstrates by additional publications. As a result, demonstrating independence has become operationalised as having published more research, after the dissertation.

Defending the dissertation is the final educational step in the academic system in Sweden, where the PhD is the highest degree. To conduct academic research at universities, it is necessary to have written a dissertation. Thus, the dissertation functions as an entry ticket into academia. This does not mean that one has fully learned everything, but rather that one is sufficiently knowledgeable to carry out research without supervision. Accordingly, it is sometimes referred to as a driver's license to conduct research (Strannegård, 2003), which once awarded, lets the individual continue his or her development independently.

For the physicians, however, it seems as though writing the dissertation is not considered sufficient to be able to conduct research independently. Or rather, it is not sufficient to be awarded the necessary individual funding to conduct research. Although formally, it is possible to get a position at the university, the medical faculty can only fund individual researchers to a small extent. Instead, it is expected that one gets funding externally, which is then used to pay for salaries, locales, and equipment. As a result, the physicians are required to apply for funding from various external funding bodies. With a myriad of different funders, from large governmental organisations to small local scholarships, learning how to successfully approach this is an important aspect of the gap period. Typically, it also involves competing for funds with non-physician medical scientists, who do not work full-time with something besides their research activity. Therefore, to improve the situation for

physicians interested in doing research, the ALF-funds allocate money specifically for young physician-scientists.

´ALF research space for younger clinical researchers`, often called ´Younger-ALF`, is created to support physician-scientist in the beginning of their career. It provides funding for physicians to conduct research at either 25% or 50% over three years, with the possibility of extending it twice. Through an agreement between the hospital and the university, the clinic must make it possible for the physician to buy him or herself out from clinical service to the stated degree. On the medical faculty's webpage, it states:

> 'It is considered particularly important that younger promising scientists are provided the opportunity to do research during longer coherent periods. A special investment is therefore made in regional employed younger clinical researchers within health care- and the hospital organisation'. (med.lu.se, 20-09-14)

The Younger-ALF grant is thus focused on providing young, promising, physician-scientists the ability to combine their clinical duties with research. Out of all of my interviewees that have been awarded this funding, they all emphasised how these three years of allocated research time have been crucial for their career success. The Younger-ALF funds can thus be seen as an important initiative to support physician-scientists. Michael, a professor who also holds an administrative position at the university, explains how these ALF-funds are allocated by a scientific committee,

> And they apply for it competitively; there is a specific priority group for that, which I'm personally not a part of. But it is then, there are actually only local reviewers in that one; there are no external reviewers from other universities.

Through the ALF-funds, the university and the hospital together provide opportunities for physicians to conduct research in parallel with their clinical duties after their dissertation. With the committee of reviewers being internal, the evaluation is done according to local ideas of what it takes to be awarded the grant. As a result, the university-hospital itself is in control of setting the requirements, as well as the expectations, for a successful application. The formal evaluation criteria for Younger-ALF states,

> 'The scientific quality is key to the assessment. Applicants' personal qualifications and possibilities to develop as researchers are significant. The committee especially considers that the applicant has shown independence,

> originality, and creativity in the research work and ability to complete planned projects' (Faculty of Medicine, 2019, authors translation).

Although the formal evaluation criteria for Younger-ALF do not state as much, it is somewhat implied that the applicant should have demonstrated additional work after the dissertation. By highlighting the personal qualifications of the applicant, emphasising the independence, originality, and creativity they have shown, the applicants' merits become decisive in the judgement. With the main currency in academia being publications, the dissertation quickly becomes insufficient compared to those who have additional published journal articles. However, with the competitive allocation of these funds, I argue that they are also one reason for the existence of the gap period. Dennis suggests this, stating,

> …you should actually have written that dissertation and the equal to one more and maybe even more and have to be sort of already started to be able to get Younger-ALF. So, there is a gap there, definitely.

He identifies the gap period, which is between having defended the dissertation and having earned the additional merits that are expected, in order to be a contender for being awarded the Younger-ALF grant. During this period, there is an expectation of research output, even though there are limited opportunities to get funding that would support the research activity. With a physician being required to have more publications, it becomes evident that the dissertation by itself is not deemed sufficient to apply for the grant successfully. Instead, it is expected that the physician perform the equivalent of another dissertation before he or she can be awarded individual funding. With a dissertation typically requiring four journal articles, the additional merits needed are rather extensive. As a result, the competitiveness for the available Younger-ALF grants creates the gap period, where the physicians are not yet eligible for attaining individual funding through ALF. Something Bengt also emphasises,

> But as a young researcher, being able to get money is tough … and for someone to give you that much money, you need to have something to show that you are independent. And to take that step to, without money first, be able to publish enough to get funding; it's difficult".

Discussing all sorts of individual funding that involves substantial monetary amounts, he brings forward both the gap period that physicians tend to experience and clarifies the connection between publications and

demonstrating independence. To be awarded individual funding, the publications from the dissertation are not considered sufficient to have shown that one is independent. Independence is instead proven through additional publications, which I argue can be understood as an operationalisation of independence. Relating back to the criteria for being awarded Younger-ALF, the independence that an applicant must show can thus be interpreted through this operationalisation, where additional publications after the dissertation become a requirement.

However, there is a caveat regarding these new publications, which relates to the choice of co-authors and the object of study. In order for the additional publications to indicate independence, they should typically have been conducted with people who were not involved with the dissertation project. These publications ought to show that one has developed as a researcher, through new research questions, different methods, or collaborations with new people. This leads to another operationalised activity of independence, expanding one's research network.

Expanded research network

With expanded research network, I mean working with people other than the former supervisors, which reflects that the physician is capable of doing research without their support (Van den Besselaar & Sandström, 2019). This shows that one can develop the knowledge acquired during the doctoral project and apply it in a different setting. As such, continuing to do research without the support of former supervisors illustrates that one is developing into an independent researcher.

Developing collaborations with other researchers typically starts through attending conferences, seminars, or courses, where you meet other scientists with similar research interests. It is not uncommon that such activities could then lead to a postdoctoral project and more intense collaborations. For example, Jenny started developing these kinds of relationships during her doctoral programme, where she attended meetings with other researchers,

> [I have attended courses and meetings that] are not about my doctoral project and, but it is about research in general, what you can do. But now that have led to me having… met people when attending these kinds of meetings, you get a small network… then I got invited to something that is called [group X] at the medical faculty and that was a collection on, collection of different people…but this was kind of a side track from my dissertation work, but in any case, and

> then I also met, at a meeting like this, I met this professor who I will now do a post doc with.

She emphasises that this activity was outside of her doctoral research project, and as such did not involve her supervisors. Jenny successfully applied for Younger-ALF directly after her dissertation, something she attributes to these collaborations. By already having this established expanded research network, she could prove sufficient independence to be awarded the grant. The fact that she is a rare case of having immediate success after her dissertation further supports the idea that additional activities after the dissertation are required. Furthermore, the significance of having an extended research network corroborates the view of it as an operationalising of independence. Jenny expresses as much,

> You should show that you are independent; so, it is like that you have to show a development there. That you can start having your own projects; then you have done your dissertation, you should kind of, so you should be able to show that you are a bit released from your supervisor and think new, a bit like that. And then I had already kind of started some projects during my doctoral period that were a bit kind of, what to say, my own so that I could motivate, so it went very easily.

As a result of her having initiated separate research projects during her doctoral education, in collaboration with other scientists, she demonstrated that she was capable of doing research without her supervisor's support, and hence considered to be independent. Although Jenny appears to be an exception to the rule with regard to avoiding the gap, others have managed to traverse the gap through doing a postdoc. Peter, for example, highlights some benefits of doing a postdoc in another research group,

> It is an amazing opportunity to develop, try new methods. So you become a better researcher, since I don't have this that research background really, and then it is also that it is an important factor then when you start applying for funds that you have; it is, what to say, it is a plus if you have done a postdoc so to say, preferably abroad or in another group.

While he also had a personal interest in moving to another country for a full year, the professional benefits were clear. The postdoc is a way for physicians to expand their scientific knowledge, both through extended training and to broaden their perspective by becoming part of another research group. Accordingly, the postdoc makes you a more proficient scientist where one can learn new methods and conduct more research. Furthermore, doing a postdoc

is a relevant merit for a future career, where doing it in another group could be seen as a way for a physician to expand his or her research network. Thus, doing a postdoc led to him expanding his research network and additional research output. With independence being operationalised as publications after the dissertation and an expanded research network, the postdoc becomes a suitable way to show independence.

While a postdoc is an established route for advancing in a scientific career within academia in general (Åkerlind, 2005), it can still be understood as problematic for many individuals. It requires physicians to get funding for the postdoc, either through the institution that they are visiting or by themselves. Having obtained funding, moving to a different country for a duration of 1-2 years can in itself be rather problematic, especially for those who have a family.

This is further complicated for physicians, as they have a full-time clinical job at the hospital. Thus, they need to secure a leave-of-absence for that period. Furthermore, by taking a break from their clinical work during this period, it also postpones their clinical progress, which can have an impact on their membership in the clinical community of practice. Thus, although a postdoc might be a suitable way to traverse the gap period, and demonstrate independence, for the aspiring physician-scientist, it is a considerable effort.

Whether these extra publications actually make the physician more independent is, however, unclear. To achieve these additional merits without individual funding, the physicians often rely on support from their former supervisors. As I will show in the next section, through the supervisor's support, many physicians become trained to become dependent during their doctoral education. Even though the formal learning outcomes for the doctoral education require the student to have shown independence, this is apparently not sufficient for the funding bodies. I will argue that one reason for them not being perceived as independent after the dissertation relates to how the doctoral projects that the physicians become part of do not prioritise them becoming independent. Instead, the focus is to get the physician through the programme, where they learn to be dependent on their supervisors. By understanding the context in which the physicians' doctoral research projects take place as scientific communities of practice, they learn to depend on the support from their supervisors.

Trained for dependence

I will here argue that the physicians, to a large extent, become trained to be dependent during their doctoral education. This is most clearly illustrated with their struggle to traverse the gap, which relates to their lack of having demonstrated sufficient independence. This can be attributed to them being considered as too dependent on other scientists in their research endeavours, typically their former supervisors and/or colleagues. As such, it connects with factors from the recruitment into research by their colleagues in the clinical community of practice, where they learn that research is primarily a clinical instrument. I will argue that because of the focus on acquiring a scientific methodology for the clinical practice, they do not get trained in becoming independent scientists.

This relates to the doctoral programme typically functioning as a community of practice, which socialises the physician to become a member of that small community. Consequently, the socialisation process to the broader scientific profession (Golde, 1998) risks becoming disregarded. This bond is amplified through the physicians' limited interaction with the medical faculty, making the research group their only connection to the scientific community. As a result, the physicians easily become dependent on their supervisors, as they have limited interactions with other scientists. Furthermore, as most doctoral projects are already developed and designed prior to the physician joining, their individual influence on their doctoral project is limited. Thus, they often do not get trained in developing studies themselves, which prevents them from developing into independent scientists.

Learning in the scientific community of practice

The doctoral period is often portrayed as an apprenticeship (Gardner, 2007), where the student is trained by the faculty through observations and interactions (Austin, 2002). The doctoral education involves a socialisation 'in which a newcomer is made a member of a community—in the case of graduate students, the community of an academic department in a particular discipline' (Golde, 1998, p. 56). So, entering a doctoral research project can in many ways be understood as becoming a legitimate peripheral participant, where the group is a community of practice, learning the craft of doing research (Lave & Wenger, 1991). However, as a legitimate peripheral participant, the emphasis is on how to become accepted by the community of practice. Hence, the

physicians are trained into members of the community of practice, which is not necessarily the same as being trained to become scientists.

Although the physicians are registered as doctoral students at the university, almost all medical research is primarily conducted in separate research groups. Consequently, the academic department, which Golde (1998) argues the doctoral student becomes a member of, barely exists for many physicians. Instead, the community that the physician enters is the research group. Dennis, for example, explains this structure as,

> But the faculty is very, there is some office somewhere I mean. It is, you barely have a manager that, I mean you have that formally, formally I have a manager, but I barely know who it is, kind of. Yeah, I have, and that is, the organisation is like that. You have research groups; normally, it is a lot of small research groups.

These research groups tend to be only loosely connected to the university, and they operate rather independently. As the faculty itself has limited research funds, the groups need to get their own external funding. Hence, the faculty also has limited influence on the various groups' operation, as Dennis stresses. This gets further accentuated in the way most of my interviewees mainly talk about their research group, rather than the medical faculty or department. Through this separation of the research from the faculty, the research groups operate rather freely as communities of practice. While they are a part of the university structure, and thus certainly influenced by regulations and guidelines from the university, they develop their own ideas of what it means to be a scientist in their community.

As such, the physician can become socialised into different roles and views on science, depending on what community he or she becomes a part of. Thus, despite certain standardisations of the doctoral education, 'no two graduate and professional programs are identical, and no two students experience graduate or professional school in quite the same way' (Weidman et al., 2001). While some of my interviewees have worked in larger research laboratories with many colleagues, others have had limited interactions with other scientists than their supervisors. Alice, for example, was in a project that had some connection to a larger group, but she mainly only worked with her supervisors,

> I have been part, a little bit in the outskirts of a research group…but it has not just been dedicated to my area but a little bit of other areas as well…but otherwise, we haven't been, otherwise, it has been me and my supervisors.

Niklas, on the other hand, is part of a large research group where he regularly meets other colleagues and discusses their work,

> We have cake once a week… and coffee every day, there are set coffee breaks. You don't have to go, but you know that there is probably someone who goes at the same time… and you talk with someone else in the group. There are plenty of areas to connect on during those occasions, that you share ideas. I think that is very good.

With such different experiences, their view of what it means to be a scientist can also be assumed to differ. Understanding the research group in which the physicians experience their doctoral education as communities of practice, the idea of them being trained to become dependent is rather evident. Through their participation, they learn how to become members of the community of practice, and they are socialised into this role. This socialisation is then specific for the community of practice to which the physician becomes a member, making him or her dependent on the acceptance from the senior members. I argue that it is partly due to this dependence on the community of practice that the physicians are not considered independent by the scientists outside of that specific community.

With the doctoral education being understood as an apprenticeship, the question of what practice they are supposed to learn becomes relevant. The doctoral education is often suggested to involve several socialisation processes simultaneously: the role of a doctoral student, the academic life and the profession, and the specific field or discipline (Austin, 2002; Golde, 1998). With most physicians doing their research in parallel with their clinical training, I argue that they struggle to have time to experience all these socialisation processes. In combination with the expectations in the clinical community of practice, where learning the scientific methodology is adequate, for many physicians the practice is limited to the craft of conducting research. With this, I make a distinction between the practice of being a scientist within the community of practice, and the practice of being a scientist outside.

Before illustrating how the physicians can learn to become dependent on their supervisors, I find it necessary to discuss briefly what the doctoral education should involve. This will highlight how independence is part of the learning outcomes for being awarded the PhD-degree. Thereafter, I will use these aspects as an argument for how the physicians tend to learn to be dependent instead.

The doctoral education

The doctoral education is the final step within academia, making the PhD degree the highest educational level in Sweden. All university education is regulated in the Swedish Higher Education Act (1992:1434), which also specifies the requirements for being awarded the PhD degree. The doctoral study programme comprises 240 ECTS, which corresponds to 4 years of full-time studies, or 8 years of part-time studies. Based on the regulation, the medical faculty at Lund University has decided on a general study plan for doctoral studies in medical science. This states that,

> The principal aim of the doctoral programme in medical science is to train researchers who can drive development within medicine and health forwards, through their own discoveries and through the critical review and introduction of new experiences and methods within the healthcare system. (Lund University, 2018)

The purpose of the doctoral education is thus to train a new generation of scientists, who can continue to develop the medical field. In order for the students to become these researchers, they 'shall develop the knowledge and skills required to be able to undertake autonomous research' (Higher Education Swedish Higher Education Act, 1992:1434). Thus, to earn a doctoral degree, the physician should be ready to conduct research independently. From this, I argue that once a physician has defended the dissertation, he or she should, in theory, be considered sufficiently independent to carry out research on his or her own. However, as I illustrated in the previous section, this is seldom the case.

The general study plan then separates the learning outcomes of the doctoral education into four themes, specifying ten goals that the doctoral student must meet. Three of these relate to the student's demonstration of independence, namely:

> For the doctoral degree, the doctoral student shall:
>
> 1. demonstrate the capacity for scholarly analysis and synthesis as well as to review and assess new and complex phenomena, issues and situations autonomously and critically
> 2. demonstrate the ability to identify and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods to undertake research and other qualified tasks within predetermined time frames and to review and evaluate such work

3. demonstrate intellectual autonomy and disciplinary rectitude as well as the ability to make assessments of research ethics (Lund University, 2018, p. 2).

These criteria thus require that the physician, through the dissertation, have proven independence in all of these aspects to earn the PhD degree. How these goals should be demonstrated is up to the grading committee chosen for the dissertation defence to determine. However, with the typical dissertation containing a number of articles that in most cases are co-authored by the student, it tends to be problematic for these external reviewers to conclude the doctoral student's contribution. Therefore, the supervisor shall provide them with a written statement, specifying the student's individual contribution pertaining to planning, follow-up, practical work, manuscript writing, and own initiatives (med.lu.se, 20-09-15). Thus, in practice, it is the supervisors that evaluate the physicians' demonstration of independence.

Comparing these learning outcomes to the evaluation criteria for the Younger-ALF presented earlier, they are almost the same, emphasising the student's autonomy, creativity, and critical ability. Yet, the dissertation is considered insufficient to be awarded the grant, on the basis that the physician has not shown enough independence. There must then be a discrepancy in what is meant by independence. I argue that this relates to the community of practice having a more lenient view of what it takes to show independence, which those who evaluate the applicants are aware of. As a result, they require the physician to earn additional merits, in order for them to demonstrate their capacity without the support of the community of practice.

In the next section, I will argue that the way that most doctoral research projects are structured is related to the community of practice training the physicians to be dependent. Primarily, this happens through two notions, where the supervisors both steer and pull the physicians through their dissertation project.

Steering them through

Almost all of my interviewees joined a research project which was already planned and designed before they became involved. This is typically the way that medical research is conducted, regardless of the size of the community of practice. As a result, I will argue that how most projects are developed is that the physicians are steered through the research project by their supervisors. So, the physicians have limited opportunities to 'demonstrate the ability to identify

and formulate issues with scholarly precision critically, autonomously and creatively, and to plan and use appropriate methods' (Lund University, 2018). Instead, they learn the practice of conducting their supervisors' research, which has already been planned. With limited influence on the project design, the physician learns only certain aspects of doing research, in line with the practice that is beneficial within the community. Steering the physicians through their doctoral education is as such one way that they become trained to be dependent.

With limited influence on their research project, they are trained into executing their supervisors' ideas, who in turn steer the physicians through the doctoral education. Although the amount of influence my interviewees have had on their doctoral project has varied, the vast majority have not been involved in developing the research question or planning the project. The limited influence that the doctoral student has on creating the research question and designing the study is a somewhat systemic problem. Kajsa, for example, discusses how the current system limits the influence of the doctoral student,

> The system now is that you, as a supervisor, first write a project plan and then you should look for doctoral students for a project; it becomes a bit difficult then when you perhaps already, since I think the best way to recruit a doctoral student is to get a connection with a student, get this person interested and they are involved a bit on the side and, then get to participate and develop their own doctoral project. Then it becomes a bit strange to announce that position in open competition.

She refers here to the regulation in place for funded doctoral projects, where they must be announced publicly so people can apply. Thus, positions are dependent on having long-term funding, already acquired by the supervisor. In order for them to have been granted funding, the project has already been planned concerning the research question, method, and, sometimes, expected results. Once a doctoral student is then chosen, he or she has limited influence on these aspects of the projects. Accordingly, the practice that they learn involves being dependent on having someone senior to provide them with research questions and what method should be used. Oscar, who was part of a larger research group, refers to how the doctoral student joins the professor's project,

> Our way is that the professor has an idea or vision, and then you become a member and work on his or her project. That's how it is initially, you could say.

The way that he refers to the role of the doctoral student as working on the professor's project indicates that he had limited ownership of his doctoral project. Instead, it appears that he was there to do the work for the senior members, rather than him learning to become a scientist, which is the purpose of the doctoral education. Robert shares a similar view,

> When I was a PhD-student, then I worked on a project that my supervisors had created and planned already. That's how it works when you're a PhD-student, so it wasn't my own. I mean, I had my own input, of course, but it wasn't a project that I had created.

Clearly stating that his dissertation project was not his own, he relates this to how medical research is usually structured. Following the experiences of my interviewees, he seems correct in that assertion. With the projects already created and planned by the supervisors before the physicians become involved, they are excluded from the first steps in the research process. This exclusion often results in them having inadequate training in developing a relevant research question and designing their own studies. Instead, they become dependent on other people in their community of practice, typically the supervisors, providing this competence.

This system is not new, although it seems to have increased over the last few decades. Weber (1918/1958) argued that large medical institutions were 'state capitalist' enterprises, where the younger scientists were workers similar to factory workers. A similar illustration is provided by both Etzkowitz (1983) and Hackett (1990), where the structure of research groups within medicine is compared to that of a firm. With a professor in charge of the necessary resources to conduct research, everyone else must provide him or her with their labour to progress in the scientific community. Thus, physician doctoral students are dependent on meeting the senior member's expectations of them as workers, in order to make the movement from peripheral participant to full member.

With the expectation placed on residents from the clinical community of practice that they should conduct research in order to acquire a scientific methodology, learning to be dependent is not necessarily problematic for the physician. If one has limited interest in continuing to do research, being steered through it and mainly learning the scientific methodology appreciated in the clinical community of practice can be advantageous. Stella, who was recruited by a senior colleague at the clinic, suggests that the fact that the project she joined was already planned was the most important factor for her,

> Interesting research project is actually not that important. It might sound strange but, well yes, they are; although a good setup is almost more important. I mean that it is doable. My arrangement is actually really good, because when I started it was "here is the patient group … here are the papers on the ones who got [treatment X] … here is a questionnaire". It was very structured like this; it obviously weighs more to me than an interesting project.

Thus, for her, the already developed setup was beneficial, as she could immediately start collecting the data. Without any allocated time for research, being steered through the dissertation made it easier for her. At the same time, it illustrates the practice that she learns, where she is a worker in someone else's project, with a limited influence on the actual study. As a result, she is trained to depend on the senior members in her scientific community of practice.

This notion of the senior members steering them through becomes further evident through the limited time that many spend to write their dissertation. As mentioned earlier, the doctoral programme in Sweden corresponds to 4 years of full-time studies or 8 years of half-time studies. However, among my interviewees, it does not seem unusual to finish the PhD quicker than that, or at least spend less time on it. Patrik, for example, states,

> I mean, I worked full-time clinically, so it was 5 years on the side of a 100% clinical career.

Spending approximately 10% of his time on research, he still managed to complete a 4-year programme in only five years. While he seems like an outlier, both Jonathan and Beatrice finished their PhD in 7-8 years, despite only spending 10-20% of their time on research. This further indicates that the physicians do not participate in all aspects of the doctoral education, where they have limited opportunities to become independent researchers. Instead, they become trained to be dependent on their supervisors for much of the work.

Through this, the physician has limited opportunities to demonstrate the independence with their dissertation that they should, in order to meet the learning outcomes. It is thus not necessarily a matter of them not being capable of doing it, but rather that they are not provided the opportunity to learn it. Instead of learning how to be independent researchers, they learn to depend on others to provide this competence for the research project. This then creates the notion that the dissertation is not sufficient to prove that one is independent, because many of them have not been able to learn it. As this is part of how medical research is often structured, the senior scientists evaluating the

applications for individual funding are aware of this situation. The additional merits that they require can thus be understood as a response to the physicians being trained to be dependent during the doctoral education.

A consequence of this is that the doctoral degree becomes devalued, as holding it does not necessarily mean that the physician is prepared to be an independent scientist. The uncertainty regarding what level of scientific competence and skill a physician that has written a dissertation possesses creates the need for this being shown with additional work. In the next section, I will expand on this, where the possibility of supervisors pulling through physicians that may not have earned the degree, risk further devaluing the PhD degree.

Pulling them through

I have so far argued that being steered through the doctoral project limits the physicians' influence, and it makes them dependent on their seniors. I will now illustrate how the physicians can also be pulled through their doctoral education by their supervisors. Although appearing to be rather unusual, it typically happens when a physician has been recruited into research, with the only purpose of becoming accepted as a member in the clinical community of practice. As they have no interest in continuing with research, being further trained to depend on the support of their supervisors has little impact. However, the more relevant aspect here is what I argue could be interpreted as a devaluation of the PhD degree. Regardless of their continuous interest in pursuing an active career as physician-scientists, their existence as PhDs can be a reason for funding bodies finding that their dissertation does not sufficiently show that they are independent.

As illustrated in the previous chapter, the clinical community of practice appeared to focus on the physicians acquiring the scientific competence necessary to provide the most advanced care. To do so, they had to understand and critically assess scientific papers, which they learn during the doctoral education. For the doctoral student who partly got recruited to meet these expectations and acquire that knowledge, a pre-developed setup is beneficial. Developing a research question and designing a study can be complicated, where excluding that part of the research process makes it quicker. According to Dennis, this group of physicians exist,

> And there is still a, maybe a bit smaller and smaller, group, but they do exist, among researching physicians that do this, they want to finish as quickly as possible; kind of want to do it, if you say so, as easily as possible, and preferably

> compress it all and work clinically as much as possible in the meantime, because that is what they plan to become. And that is a rather, it becomes quite unsatisfying for the PhD-student and also for the supervisor, who is supposed to pull it through.

While he confirms some of my previous arguments, my interest here lies in the end of his quote. Suggesting that the supervisor is supposed to pull the project through indicates situations where the physician is not capable of finishing the dissertation by him or herself. This suggests that rather than the physician leaving the doctoral education, the supervisor pulls them through it. Although attrition rates among doctoral students have been highlighted as a problem within academia in general (Golde, 1998, 2005), there is still not an expectation that everyone that starts a doctoral project will finish it. Ultimately, this creates situations where individuals that might not have earned the PhD degree are still awarded it. Anna provides ample examples of this,

> A: and I have colleagues that perhaps, I do not think should have defended their dissertation.
>
> L: No, and where other people have written the dissertation?
>
> A: Yes, or that, I know that the person in question has received a lot of help, and that can also be the case with some of my doctoral students, but you feel that it is not… it is particularly unusual that you do not pull them through anyway. I had a colleague, not at our clinic, but at the defence party where the person said "well, if you had put in as much time on your dissertation as on the party, it would have gone wonderful". And it is… I have spoken to many of my doctoral students who say that "well, well, but you know how it is as a clinical supervisor; that 50% is written by the doctoral student and 50% you write yourself'.

As suggested by Anna's examples, pulling through physicians does not appear to be uncommon. Although her reference to the statement from the dissertation party ought to be understood as somewhat sarcastic, it nevertheless implies that it is possible to be both steered through the doctoral project and pulled through it, with limited individual efforts on the part of the physician. As supervisors often have a certain level of personal stake in the project as well, it is in their interest that the physician manages to defend his or her dissertation. This creates a situation where it is in both the physicians' and the supervisor's interest to finish the project.

It is with this knowledge that physicians can expect that the supervisor should write half of the dissertation, as they are equally dependent on having doctoral students carry out certain parts of the project. For the specific individuals, such an arrangement can be beneficial for both parties. At the same time, it also means that there are physicians that hold a PhD degree, even though they may not have fulfilled the goals required to be awarded it.

As such, the effect of pulling physicians through the doctoral education, where they are awarded the PhD degree although they might not have earned it, can be attributed to devaluing the PhD degree. Since they have the same degree, on paper, as someone that has spent four years of full-time studies without the same level of support, the value of the degree itself decreases. An individual with a PhD degree does not necessarily have 'the knowledge and skills required to be able to undertake autonomous research', which is stated in the Swedish Higher Education Act (1992:1434). The indications of this kind of devaluation of the PhD degree are further supported by other reports.

In their critique of the 'perverse incentives' and 'hypercompetition' of academia in the 21st century, Edwards and Roy (2017, p. 52) argue that an overproduction of PhDs can lead to the situation where '[p]ostdocs often required for entry-level academic positions, and PhDs hired for work MS students used to do'. Considering the lack of independence that some of my interviewees had during their doctoral project, such a statement rings close to the situation illustrated here. Much of the work on certain doctoral projects seems to be more in line with something a master's student, or a research assistant, should do. In line with their argument, the first long-term individual funding, which could be equated with an entry-level academic position for physicians, as there are almost no such positions at the medical faculty, often requires a postdoc. As I have illustrated, the grants developed to support aspiring physician-scientists at the beginning of their career often find a defended dissertation as insufficient.

In this section, I have argued that physicians tend to be trained to be dependent during their doctoral project. This is related to the idea that they are legitimate peripheral participants throughout the project, learning the practice of that specific scientific community of practice. With that as a backdrop, I have argued that they become dependent on their supervisors, who steer them through the project by designing the study, developing a research question, and suggesting what method to be used. As a result, the physicians miss out on these aspects of the research process and learn the practice of doing someone else's work. Hence, they learn to become dependent on others who perform these aspects of research.

Becoming independent through dependence

Here, I will argue that in order for the physicians to prove independence, they are dependent on support from their former supervisors, which creates what I call the dependence-independence paradox. It relates to balancing the support that the physician receives during the gap period, while at the same time doing work that demonstrates that he or she prepared to not be dependent on support. This is because to be able to get the additional merits after the dissertation needed to attain individual funding, the physicians tend to be dependent on the support from their supervisors. However, while this kind of support appears to be necessary for a successful career, it can also be understood as preventing the physician from becoming independent. This creates the situation where physicians become independent through continuing to being dependent, hence the paradox. At the same time, managing this paradox is necessary to be considered an independent scientist and, as such, essential to become an active physician-scientist.

Dependent on support

Most of my interviewees emphasise how the support they have received from their former supervisors has been essential for their career advancement after the dissertation. As a result of the gap period, where physicians are not yet considered sufficiently independent to attain funding, some support is necessary to be able to get the additional merits that are required. Without support, the physician is restricted to carrying out research entirely during their own spare time, with limited, or no, access to the infrastructure and resources that most need to carry out the research. Such is the case for those physicians whose supervisors cannot offer any support, as I will discuss later. First however, I will argue that the support can be divided into three different types: monetary support (e.g. funding research time), provide resources (e.g. infrastructure, such as access to locales), or mentorship (e.g. writing funding applications, social support). I will discuss each one of these separately.

Monetary support

As should be rather clear at this point, having funds to buy oneself out from the clinic is vital to be able to conduct research in parallel with the physician's clinical obligations. The gap period exists because of the physician's lack of individual funding. To carry out research and get the additional publications needed, the physicians must rely on someone else providing the monetary

support for their salary. Most of the professors I interviewed, therefore, provide their former doctoral students with some funds to give them time to do research. Dennis, now a professor, mentions how he was supported in this way,

> Well, it was, it was the difficult period after the dissertation, my supervisor had quite a lot of money, or a lot of money, so I could stay there and sit, and have the infrastructure, and have a room and computers and such … I received some support from my second supervisor as well. I had a second supervisor who also had a lot of money, so there I had a day every week for a year or two.

While he highlights that he experienced the gap period as difficult, he managed to come through it with the help of his supervisors. Besides providing him with an infrastructure, which I will discuss later, they supported him with 20% research time for around two years after the dissertation. During this time, he managed to get sufficient merits to be awarded the Younger-ALF grant, so he could then fund himself and start his own research group. The support he received was as such essential for him being able to become an active physician-scientist. With the knowledge of the difficulties during the gap period, and the impact such support can have, he now does the same for his own doctoral students. Karl also offers monetary support to his former doctoral students, arguing that it is necessary in order for them to get started,

> I have had as a principle for all my doctoral students that they get funding up to one year after [the dissertation], but then they don't get, but they get it anyway. But be realistic, in one year you don't have the time to get that platform so you can support yourself; you can probably support yourself in best case, but you can definitely not start a research group. You need 3 or 3+3 years to have time to do that.

Although his intention is to provide them with funding for one year, he often extends it, as it is seldomly enough for them to be able to attain their own funding. Arguing that it takes at least three years to get one's own research group started, which is what Younger-ALF provides, further illustrates the difficulties faced by physicians to manage the gap period without monetary support from their former supervisors. However, with this support, there also tends to be expectations that the supervisor should be a co-author. With the importance of funding within medical research, the standard practice is that the scientists that used their funds to support a project also get another publication under their belt. Kajsa states this,

> [my supervisor] has been co-author on a lot of articles and such. Partly because I got both financial and also, kind of other types of support when I was starting to publish on my own. So, that is immensely significant, I would say.

While the monetary, and other types of, support have been crucial for her being able to continue doing research, most of her publications have also included her former supervisor as co-author. As indicated earlier, for the physicians to demonstrate independence, it is necessary for them to show that they have extended their network and accordingly decreased their dependence on their supervisors. By continuing to co-author publications with supervisors, their independence can be questioned. As such, the support from supervisors can prevent the physician from becoming independent, which I will discuss further in the next section.

Provide resources

Another common way that supervisors support their former doctoral students is to provide other resources that are needed to conduct research. Typically, as Dennis mentioned above, this involves the infrastructure surrounding a research project. By using their supervisors' established infrastructure, it becomes possible to access the necessary resources to conduct research. This includes formal resources such as office space, computer, library and data access, but also more informal aspects such as being part of a research environment and taking part of the knowledge they possess. Bengt emphasises the importance of this type of support in order to get started,

> B: I cooperated a lot with the established research groups that were here actually and got both financial and other types of support, such as input from them. That's what made it possible for me to get large allocations myself.
>
> J: Okay, so both to get funds and for how to build a (research group)?
>
> B: Yes, I borrowed their infrastructure until I could get my own allocations, and that made it possible for me to have an output along the way.
>
> J: Do you think it has been somewhat of a prerequisite that you can get this support in order to succeed?
>
> B: Yeah, I almost think so, it, yeah absolutely, you need support from established colleagues in order for it to work, I would say. It would probably be very difficult to stand completely alone.

For him, the support that he received from his research environment made it possible to get those important publications that are required to demonstrate independence, which then makes it easier to get individual funding. As he states at the end, being able to do research after the dissertation without this type of support would be very difficult. Hence, the possibilities to traverse the gap period is also dependent on the availability of such support. For the individual physician, this means an insecurity regarding whether he or she will be able to get it. Furthermore, this increases the dependence on their supervisors, as well as the necessity to follow their instructions, since not meeting their expectations could mean that these resources vanish. Oscar discusses this insecurity, emphasising the dependence on the senior members that support you,

> I should probably have to work in a context from which I receive help. I mean the infrastructure that is at the lab; otherwise, I won't be able to do it. Being young means you are quite exposed; you almost always need support from the clinic, the department, senior research colleagues and such, and it is not entirely sure that it can be solved, but if it is possible [to continue], it is almost provided that [the support] exists… But that depends on the senior researcher's good will, yeah that's kind of how it is, and so is, it, a few young researchers can get in some form of very large start-up grants. They have it easier to establish themselves. Otherwise, you are almost indirectly dependent on maybe a more established senior researcher who supports you, and I guess that's the reality we face today.

While Bengt discussed how the support helped him, Oscar is considering the conditions that he is about to face as he is entering the gap period. While aware that this type of support is crucial for him to continue doing research, he emphasises the insecurity associated with the period. The way that he discusses being exposed can be interpreted as emphasising the need for receiving this support, but also how this support could be used to exploit him. With the support being dependent on the senior member's good will, the limited power that the physician has during the gap period becomes evident. Accordingly, they are completely dependent on the senior scientists' capacity to provide these resources, as well as their interest in providing it to them specifically.

Furthermore, those physicians that write a dissertation in a smaller community of practice, where the supervisors might have limited funding themselves and therefore no capacity to provide resources, will find it even more challenging to acquire the additional merits. These challenges make Beatrice, for example, question whether she will continue doing research at all,

> Because it is like that after you have finished the dissertation, that you should apply for money all the time, and it takes so much time to do that. I mean, I think quite frankly that it is such a factor that makes me perhaps choose to not do research later.

Although she refers to the issue of funding in general, it is stated in relation to her main supervisor retiring. As a result, she has limited opportunities to receive this type of support during the gap period, increasing the challenges to get individual funding. While her supervisor was not able to provide resources, he will however remain involved in a more informal capacity as a mentor, which is the third type of support that the physicians tend to receive.

Mentorship

Receiving help from former supervisors in an informal capacity is probably the most common form of support, especially as it does not require the supervisors to provide resources other than their time. This is a type of mentorship or sponsorship, where the supervisors help and guide the physicians through their career. Receiving support from senior colleagues has been shown to be an important factor for advancing one's academic career (e.g. Long & McGinnis, 1985, see also; Zacher, Rudolph, Todorovic, & Ammann, 2019), which has also shown to be beneficial for physician-scientists (Iversen, Eady, & Wessely, 2014). Peter, for example, mentions how his former supervisor is available to discuss his research with, as well as provide more practical help,

> When you should start writing applications and your own research plan, and well, there are a lot of things there that must fit, and then you need to have this support; you need to get help, and applications are read in a specific way and it is not that easy to write a focused research plan and see what is important, what they will evaluate. Then it is important to have someone that can help you… And it is not like you are a finished researcher because you have defended your dissertation, but I still need to discuss my findings with someone and it is not always like, it is never someone who has all the answers, but together you can often find an interesting theory or how you can move forward.

His supervisor supports him when he faces tasks with which he has limited experience in himself, such as funding applications and research plans. Furthermore, he explicates that he is not a 'finished researcher' yet, and therefore requires this support. I argue that some of this relates to how he was trained to be dependent, where he was not part of developing his research project for his dissertation. This is not to say that one should be a 'finished researcher' after the dissertation; certainly situations will appear where the

physician should need this type of help. Nevertheless, I suggest that certain things, like writing a research plan, is a competence that should have been demonstrated through the dissertation.

With that being said, mentorship does not just relate to supporting the physician through the gap period. Ideally, the mentor can function as an advisor throughout the physicians' career, supporting them in different ways. Dennis suggests mentorship as a way to help physicians to progress in their career, or provide advice when they face obstacles,

> Mentorship is perhaps about how you should move forward and how to solve, "now I have problems with my doctoral students, what should I do?", [or], I don't work in a laboratory, but I can imagine "how do I set this up?"

Thus, mentorship does not involve providing the physician with resources, other than the supervisor's time. Although managing time is a crucial aspect of being a physician-scientist, as I will discuss in the next chapter, many of my younger interviewees highlight that their supervisors do take this time to support them. This could be attributed to the physician and the supervisor often developing a friendly relationship during the research project, making the mentorship a natural way to continue this.

In order for physicians to manage the gap period, they are more or less reliant on receiving some of these types of support. From the quotes, it is also evident that often these types of support are combined, where the physician gets support with both funds and other resources. Continuing to work within, or in connection with, the supervisor's group also offers an easy way to develop the relationship into more of a mentorship. However, through this support, the physicians also continue to depend on their supervisors, which can make it difficult for them to prove their independence. There is a risk that the support contaminates the physician's demonstration of independence, as they are dependent on this support. In the next section, I will discuss this aspect in more detail, including how this creates the paradox that the physicians need to manage.

Support contaminating independence

Although the physicians need support from their former supervisors to move forward with their scientific career, this support can also contaminate their independence. By continuing to work with their former supervisors, it tends to

become problematic for the physicians to demonstrate that they are developing into an independent scientist, as suggested by Dennis,

> It [the support structure] is very important, or important, it is not ideal, because at the same time it, at the same time, one should liberate oneself from one's supervisor; it is absolutely crucial in order to succeed later and apply for your own funds and progress in the academic world… many times, it is natural that one continues in that environment for a year or two or three, and some never leave that environment, but then it's hard to become independent.

He clearly problematises how the supervisors' support can also become an obstacle for the physician's later, as it hinders their progression to independence. Furthermore, he elucidates how these two factors can clash, where the support is very important, at the same time as demonstrating independence is crucial. This requires a balancing act, where they manage to take advantage of the support, while at the same time limiting their ties to the supporters. I argue that for the physicians, this becomes paradoxical, as they need to relate to these two opposites simultaneously.

Dennis continues this line of thought, and how he attempts to take his responsibility as supervisor to not make the support into a disservice for his doctoral students,

> But it is also sensitive; as a former supervisor, you also have to make sure that you don't do your doctoral students a disservice, because you can't. I, for me, it has always been important to not step in and by like second supervisor for the doctoral students and such, not be part of their projects and such, because then one contaminates it a bit for them.

Thus, the physicians' demonstrated independence risks becoming contaminated by the supervisors' support, where the additional merits are insufficient, as they show that the physician continues to be dependent on support. While his awareness illustrates that the physicians are required to manage this paradox, it also means that the former supervisors need to be cautious during the gap period. Providing too much support might be perceived as generous by the physician, while the reviewers consider it as an indication that the applicant is not independent. However, Dennis also distinguishes between the types of support, where mentorship does not have the same level of contamination,

> Mentorship… There perhaps, it is more uncomplicated to get help from your former supervisor.

The problematic aspects of the support thus seem more related to staying in the same research group and being dependent on the supervisor's resources. This is, however, not necessarily only the case during the gap period. Kajsa, for example, resonates about how staying in her former supervisor's research group even after she acquired individual funding can be a problem for her to demonstrate independence in the future,

> I could have my own research orientation then, but then I stayed in my old supervisor's lab, but he is working with [disease X] and I started working on [disease Y], that way I could get my own funding by having my own line [of research] like that. Then, I'm not sure if it would have been, sort of strategically better to search for another lab to show that one is more independent or so, but for me it felt, I enjoyed being in that research group, and since I was going to do it half-time, I felt that I had no possibility to start building my own.

Although she was awarded individual funding, she emphasises the difficulty in building her own research group, which is the expected next step in the scientific career. By continuing to work with her supervisor, even though she had started her own separate line of research, it was easier to get started. However, this also meant that her former supervisor was a co-author on many of her publications,

> [having former supervisor as co-author] is something that is a bit tricky, because you should still show that you are starting to become independent. Regarding the funding bodies, it is not directly beneficial to have your former supervisor on publications, but I still thought that it clearly has been worth it to stay [in his research group]. Because as I said earlier, if you should do something half time you cannot start from the beginning and build your own research lab, that does not work.

Relating to this situation as tricky, she is aware of how her lack of demonstrated independence can be perceived as negative when she applies for funding. Nevertheless, she experienced that the support benefited her more than it hindered her. While this could be the case in the beginning, it could still impact her negatively later. The paradox amplifies with the time aspect, where support is required at the moment, perhaps to even be able to continue doing research at all, while the issue of demonstrating independence happens later. Thus, it tends to be difficult for the physician themselves to determine how to balance the support appropriately, which further increases the supervisors' responsibility as to the support they provide. With the difficulty of managing the paradox, however, there are also indications that it can be manipulated.

This relates to the supervisors sometimes pushing the physicians towards being independent, by providing the support without taking credit.

Manipulating the paradox

The dependence-independence paradox that the physician's need to manage relates to demonstrating that they are becoming independent, while at the same time relying on the support from their former supervisors, from whom they are supposed to become independent. This requires a complicated balancing act, receiving the right amount of support without it contaminating their independence. Another possible approach is to manipulate the paradox, in the sense of the physician concealing the support. By doing so, the physician receives the necessary support, while the supervisors do not take credit for providing it. Alice's supervisors offer to provide such support,

> A: Then I got started and had some collaborations with quite a lot of other centres, with that I mean being a part of larger studies and such, but it is difficult to just start and drive a study by yourself. It is still difficult to feel that you know enough to trust that you are doing things correctly, or what do I say.
>
> J: Do you have anyone you can go to then?
>
> A: Yeah but, and I have my former supervisors also, and they are great you know, so when you say that "I will need to have some articles in the coming years where I'm the last author" and they just "of course, you should", and some just express "yeah, but we will solve that, I mean I don't have to be on the publication if you don't [want to]", I mean they are very, very nice.

Her former supervisors support her when she faces difficulties, as well as when she questions her capacity and how to move forward. As such, they can be seen as guiding her through the gap period, supporting her capacity to show independence. However, they also seem to take this support one step further, where they, even though they have been involved with a project, take their name off the publication. Thus, this is an interesting example where the support needed to demonstrate independence can, to some extent, be manipulated, concealing the support. I argue that this ought to be seen as an attempt to manipulate the paradox, where the difficulty for the physician to demonstrate independence and traverse the gap period compels the individuals to find ways around it.

While this is helpful for Alice when applying for individual research funds, it can also be interpreted as another situation where the supervisors pull the physician through. Or rather, in this case, push them through the gap period, where the supervisors hide the work that they have done, in order for the physician to appear more independent. As I previously argued, pulling the physicians through the doctoral education could be seen as devaluing the degree, which could be a reason for the existence of the gap period. This way of pushing the physician through the gap period could lead to a further increase in additional merits to get individual funding.

The idea of pushing the physician through the gap period indicates the existence of the dependence-independence paradox. Demonstrating independence is not necessarily about being independent, but rather about appearing to be independent. As discussed previously, independence is a lucid idea that is difficult to define. Therefore, in order for an external reviewer to determine whether someone is independent or not, it has been operationalised as having additional merits than just the dissertation. However, by operationalising it in quantitative measures, such as more publications without former supervisors, it has also become possible to manipulate. In Alice's case, they are aware that in order for her to demonstrate sufficient independence to attain funding, she needs publications where she is the first author. As it would be difficult for her to produce this without their support, they instead take their names off the publication.

Summary

I have illustrated in this chapter that the aspiring physician-scientist experiences a gap period after he or she has finished the dissertation. It relates to how the physicians are not considered as having shown sufficient independence to attain individual research funding. I argue that this can be seen as a result of different interpretations of independence between academia and the scientific community of practice, which is a formal requirement of a doctoral student. I have discussed the lack of a clear definition of independence, and how it has been operationalised as expanding one's research network through more publications. One reason for this operationalisation can be that physicians tend to be trained to become dependent during their doctoral project, as legitimate peripheral participants in a small scientific community of practice.

Through their recruitment into writing a dissertation, which I illustrated in the previous chapter, the residents tend to join an already developed research project. They therefore do not learn the relevant steps in how to create and plan a relevant project, instead learning to be steered, and occasionally pulled, through research. Although it is not always the case, the prevalence of it can be understood as devaluing the doctoral degree, which in turn creates the notion that having written a dissertation is not considered a sufficient demonstration of independence. However, to acquire the additional merits needed to get funding, the physicians are dependent on the support of their former supervisors, who are seen as the ones that they should be independent from. I have argued that this creates a dependence-independence paradox, where the physician-scientists must balance this support, in order to not contaminate their independence.

Being a physician-scientist

This chapter will focus on the situation of being a physician-scientist. First, however, I will suggest re-defining physician-scientists into three different types: the hobby physician-scientist; the serious physician-scientist; and the professional physician-scientist. This distinction is based on the different conditions that the physician-scientists in this study tend to have, which depends on their level of research activity. I will then put these three types in relation to each other, arguing that the hobby physician-scientist, as full members in the clinical practice, set the norms with regard to research, as illustrated in chapter 6. As a result, the serious and the professional physician-scientists are perceived as the 'odd ones out', where their research activity is seen as them rejecting the joint enterprise of the clinical community.

Consequently, they are perceived as clinically inexperienced, adding a pedagogical task of defending their relevance to the community. However, this tends to make them into a problem, as they challenge the mutual engagement in the clinical community. Furthermore, I intend to show how this can result in the serious and professional physician-scientists struggling in their hybrid role, which can involve being caught in a liminal state, as they are not accepted in either community.

Three types of physician-scientists

So far in this thesis, I have discussed the process of becoming a physician-scientist, where I have treated the situation in the clinical and the scientific community rather separately. However, in this chapter, I will focus on the situation of being a physician-scientist, bringing together the experience of trying to be present in both communities at the same time. First, though, I find it necessary to distinguish that there are different ways to be a physician-scientist. Although the idea of becoming suggests that there is something like an end state – when you have become something – this is somewhat more complicated in the case of the physician-scientists. Based on the experiences

of my interviewees, I argue that there are three different types of physician-scientists that one can become. This distinction is based on the different conditions that the interviewed physician-scientist tend to have, which seem to depend on their commitment to research. These differences are relevant in order to understand the situation for physician-scientists, but also necessary to consider regarding various initiatives to improve their conditions.

Lack of definition problematic

One of the main reasons for dividing the physician-scientists into three different types is due to the lack of a clear definition of a physician-scientist. As I illustrated in chapter 2, there is a lack of consensus in the literature pertaining to the different definitions. Contrary to the rather strict definition of someone who spends 'all or a majority of their effort' on research (Rosenberg, 1999, p. 1622), and 'the physician who is simultaneously a serious scientist, and far less to the clinician who may occasionally also do some research' (Wyngaarden, 1979), I have taken a rather inclusive view. Following the definition presented in SOU (2009:43), I consider all MD/PhDs who actively conduct research as physician-scientists. In the Swedish context, this is as a more suitable definition, as it includes physicians in the earlier stages of their career, where it is typically more difficult to spend considerable time on research compared to the clinic, as shown in the previous chapters.

Nevertheless, the lack of a definition in the literature is problematic, albeit not necessarily surprising, as it relates to academic debates. Interestingly, however, the lack of a clear definition is equally apparent among my interviewees, where there are various ideas on what it means to be a physician-scientist. As a result, it becomes difficult to say who is a physician-scientist. Or rather, it becomes difficult to talk about the physician-scientists in any kind of general sense, as there are diverging views on who is a physician-scientist. These variations, as well as the different experiences among my interviewees, thus suggested the need to divide them into different categories or groups, to make sense of my material.

By building on the various definitions in the literature, my categorisation is mainly constructed based on the physician-scientists' level of research activity. However, I infer that the time spent on research relates to their commitment to doing research. Thus, the research activity is relevant in the sense that it tends to translate into how the physician-scientists are perceived to prioritise between clinical practice and research. This means that, depending on how

much time they spend on research, their role in both the clinical community of practice and the scientific community differs.

The categorisation is therefore made based on these differences, where I suggest labels relating to their research activity. Two of these labels then correspond to the phrasing of the various definitions suggested in the literature, and one refers to a theme suggested by several of my interviewees. The three different types of physician-scientists I suggest are: hobby physician-scientist, serious physician-scientist, and professional physician-scientist. In the next section, I will briefly discuss each of these separately, and my reasoning for the distinction between them.

Hobby physician-scientist

With hobby physician-scientist, I refer to someone who does some research occasionally, although to a rather limited extent. Although it is difficult to make precise distinctions on how much research this actually entails, I suggest here approximately 5-20%. This relates to the notion of research being secondary to the clinical practice in the community of practice, although sufficiently valued to spend some time on it. Thus, spending limited time on research indicates the commitment to the clinical community, which I will illustrate later. This also means that the hobby physician-scientist is a physician that neither Wyngaarden nor Rosenberg would consider a physician-scientist, according to their definitions above. Nevertheless, I find it relevant to include the hobby physician-scientist for several reasons.

First, as illustrated in the previous chapter, with the difficulty of attaining the first individual funding, most physician-scientists are required to start at a lower activity level. Thus, by including the hobby physician-scientist, the situation that many physician-scientists face in their early career is not neglected. Secondly, although the hobby physician-scientist might not be involved in the great scientific breakthroughs, their typically smaller studies can have a more direct impact on the clinical practice in the short-term. As such, they still play a relevant role as translators between the bench-and-bedside. Thirdly, and possibly most importantly, the presence of hobby physician-scientists also affects the situation for the other types of physician-scientists. Through accepting hobby physician-scientists, I will argue that the clinical community of practice can be seen to have appropriated the physician-scientist title, which has consequences for how the serious and the professional physician-scientists are seen within the community.

The idea of labelling those who do research to a rather limited extent for hobby physician-scientist comes from my interviewees and can be seen as in vivo coding. For example, Robert, who is categorised as a serious physician-scientist, differentiates between his situation and that of physicians who do research in a hobby capacity,

> There are physicians who do research as a hobby; they don't have their own funding, so they have no pressure to publish to maintain the funding; they have no employees; they have no doctoral students or their own postdocs here, and then they can do research kind of as a hobby.

Although he talks about those that have no funding at all, I argue that the notion is similar for those who have some, but limited, funding. While research activity was expected to the extent of earning the doctoral degree, once that is accomplished, there is limited pressure to continue. As a result, those that do continue mainly seem to do so out of interest and enjoyment, similar to a hobby. According to the Merriam-Webster dictionary, a hobby is defined as 'a pursuit outside one's regular occupation engaged in especially for relaxation' (Merriam-Webster.com). The distinction of research as a hobby thus separates the research activity from being work, which highlights how the clinical practice is the fundamental part.

Serious physician-scientist

With serious physician-scientist, I refer to an individual that has funding for doing research, and thus actively divides his or her time between clinical practice and research. In line with the typical funding structure for physician-scientists, especially younger-ALF, their research activity is typically between 25-50%. This indicates a commitment to doing both tasks seriously, which differentiates them from the hobby physician-scientist and the notion that research is secondary to clinical practice. The serious physician-scientist is close to the ideal role of the translator (Balaban, 2008), an individual well versed in both science and patient care, and closely related to Wyngaarden's (1979, p. 415) definition of a 'physician who is simultaneously a serious scientist'.

Being a serious physician-scientist involves having a double role, both as a serious physician and a serious scientist. While still employed by the hospital, and as such primarily being a physician, they also spend considerable time doing research. For many of my interviewees, this kind of division between the two roles is enjoyable, as they get to do the two things that they want

simultaneously. At the same time, it often creates a difficult position, where they are struggling with not being fully focused on either, similar to the chimeric creature that does not belong on land or at sea (Goldstein & Brown, 1997). Thus, many suggest that it is necessary to separate it as two different jobs, in order to handle the fact that by dividing their time, their progression in either job is also slower. Peter, a serious physician-scientist, emphasises the need for this,

> I see it as you do after all two different jobs, because then the development can also be a bit slower in the clinic; otherwise, you will become broken.

For the serious physician-scientist, research is more clearly distinguished as a job, similar to their physician role. This is the notable difference compared with the hobby physician-scientist, where research is more of a side-activity. With the serious physician-scientist considering the research activity on the same level, or close to, as their clinical work, the two tasks often become more clearly opposed to each other. This is because there are only so many hours in a day, and it is only possible to be at one place at a time. Alice, a serious physician-scientist, states this clearly,

> It is the reality as such, it is kind of, it is about where my hands and my head are, if they are sitting at a computer doing research or in a lab doing research, or if they are with a patient. Those are the two alternatives there are, so it is always put against each other.

As such, the serious physician-scientist is often caught between the two roles, which, in turn, are often contradictory to each other. More time spent on research also means less time working clinically, which then limits their clinical experience. Through their research, the serious physician-scientists are absent from the clinic to a larger degree than the hobby physician-scientist; this aspect tends to make them somewhat problematic in the clinical community of practice. This relates to the idea of the community of practice having a mutual engagement in the joint enterprise (Wenger, 1998), which is to provide the most advanced clinical care to the patients, as previously stated by Jonathan. Spending considerable time away from the clinic to conduct research can, to some extent, then be perceived as disregarding this.

At the same time, in their research role, there are certain pressures relating to their progression. Having been awarded funding, they are expected to have something to show, typically through journal publications, in order to attain additional funding. To manage this, the serious physician-scientist is required

to start building his or her own research group, typically by recruiting doctoral students and postdocs for the projects. This comes with additional responsibilities, where the serious physician-scientist has other people dependent on them. Thus, in parallel with the clinical obligations, the serious physician-scientist is also in a rather challenging position in their scientific role. Henrik, a professional physician-scientist, thinking back on this experience, highlights,

> H: But then, there is also the problem that you perhaps are still in the education phase. You should become a good clinician; you should conduct research simultaneously. And it is a rather difficult balance to what you should, how you should handle it.
>
> J: Yes.
>
> H: If you are lucky, you get 3 more years, but then there are fewer who receive [that extension], and then there are those who get 3 years more, totally 9 then, but it is a tough existence to balance".

The experience of having to find a balance between the clinical and scientific role is probably the most descriptive attribute for being a serious physician-scientist. While they are splitting their time between the two roles, their colleagues on either side often do not think this is sufficient because they expect them to be available to a larger extent than possible. Even though the younger-ALF funds, which Henrik refers to, is specifically tailored for dividing the time between clinical practice and research, the serious physician-scientists often experience their colleagues expecting them to progress quicker. It is therefore not just a question of finding a balance for oneself, but also to prove to their colleagues that this balance does not hinder one's development.

Professional physician-scientist

With a professional physician-scientist, I refer to those who have what is called a combined appointment,[11] which means that they are employed by both the university and the hospital. This is a unique employment structure, where the professional physician-scientist combines a full-time position at the university with a 1/3 position at the hospital. This is seen as the final point of the physician-scientist career, which many serious physician-scientists strive

[11] Kombinationstjänst, in Swedish

towards. The professional physician-scientist is primarily a researcher, where their commitment is predominantly to conduct research, although they are still an active physician. The professional physician-scientist is the one suggested in Rosenberg's (1999) definition, namely a physician that spends 'all or a majority of their effort' on doing research.

With the university now being the primary employer, the professional physician-scientists are instead evaluated on their research activity. As Claes, a professional physician-scientist, states clearly,

> I [now] report, if you say so, through producing good science. That is kind of my main production, so to speak.

In other words, what matters now is scientific output. Although this provides more freedom in how to distribute their schedule, it also more or less requires them to continue developing their research group. Increasingly, the professional physician-scientist becomes a group manager with more holistic responsibilities in the research group. Michael, a professional physician-scientist, highlights some of the work associated with managing a research group,

> As research group leader today, you have responsibility for your own budget, partly pay salary … the co-workers in your group, you often have to pay salary for … laboratory locales, you get to pay if you should have statisticians, … you get to retain like consultants for what you need, you get to pay everything yourself, just that part. And then, it is funding … my research group has a budget of about 5-6 million, where I have from VR, I have Cancerfonden, I have ALF, I have regional research funds. I have had EU-projects in several rounds, and I have also a lot, yeah other foundations, and such.

A large part of being a professional physician-scientist is thus related to managing the research groups, especially to apply for grants continually to fund the research projects. Furthermore, they are expected to build international networks, recruit doctoral students and postdocs, and take on academic duties, such as sit on grading committees, be reviewer or editor of journals, as well as administrative positions at the university or committees. Although some of these responsibilities start when one is a serious physician-scientist, they tend to become more elevated for professional physician-scientists. With increased research activity, typically associated with larger research funds, the expectation from the scientific community also increases.

At the same time, the professional physician-scientists still have some clinical obligations. These tend to decrease drastically, however, as they are no longer primarily employed by the hospital. As a result, their increased absence in the clinical community of practice appears to be accepted by the colleagues. Contrary to the serious physician-scientists, the professional physician-scientists' further movement towards the scientific community appears to clarify that they are not part of the joint enterprise of the clinical community of practice. Thus, they are perceived as having chosen to be peripheral members, and therefore are not expected to contribute to the clinical practice to the same extent.

Re-defining the physician-scientists

In this section, I have argued that there are three different types of physician-scientists, depending on the level of research activity, where each type has their own attributes, as summarised in table 2. The reason for this categorisation is due to the lack of a clear definition of what is a physician-scientist, both in the literature and among my interviewees. Through a more inclusive view in my approach, these different types could be identified. By categorising different types, I argue that it is possible to have a more fruitful discussion with regard to their situation. This relates to three main points of my categorisation.

First, I include those who only do a limited amount of research, the hobby physician-scientists, who are typically neglected in the literature. This leads to the second point, which relates to how my categorisation can be understood as the typical career progression of a physician-scientist. By considering these types as individual physician-scientists' gradual movement, from a 'hobby' to a ´serious´, and finally to a 'professional', it becomes apparent how their experiences are continuously changing throughout their career. Distinguishing these are thus relevant in the debate about the career of the physician-scientists. With the possibilities and problems associated with each level being different, a diversity in the initiatives to increase the number of physician-scientist is warranted.

Thirdly, this categorisation is necessary for my continuous analysis. This is because I intend to show in the next section that the different types of physician-scientists affect each other in different ways. As should be apparent, the physician-scientists cannot be understood as a homogeneous group, who can be discussed in a general sense. Instead, their different experiences indicate that the different types compete with each other, to a certain extent. This competition is not just about research funds and prestige, but also about the

control over what physician-scientists should be, and what they should do. It relates to questions of inclusion and exclusion, about the power of meaning, and about the definition of identities.

	Hobby physician-scientist	**Serious physician-scientist** (Wyngaarden, 1979)	**Professional physician-scientist** (Rosenberg, 1999)
Research activity	Ca: 5-20%	Ca: 25-50%	Above 50%, typically ca 70%
Clinical CoP	Full member - Accepted research activity - Mainly clinically focused - Break from hectic clinical schedule	In-between membership - Seen as clinically absent → Considered a researcher - Lacking clinical experience - ´Odd one out´ → problematic	Peripheral member - Other main employment - Bonus at the clinic - Provides prestige & status to clinic
Scientific community	Passive - Rather individual research, or on the outskirts in a research group - No, or short-term, funding	In-between - Building own research group - Long-term funding (younger-ALF) - Additional academic responsibilities	Active - University employment, typically as professor - Research group manager - Long-term funding

Table 2.
Three different types of physician-scientists

Being the ‘odd one out’

The different types of physician-scientists tend to have, as mentioned earlier, rather different experiences of their situation. In this section I will discuss these

separately, highlighting how these different experiences relate to the norms established in the clinical community of practice. While all types have their own different struggles and benefits, being a serious physician-scientist seems to be the most exposed type. I will illustrate how his relates to them differing the most from the norms set in the clinical community, creating the notion that they are the 'odd one out'. Furthermore, I will connect this to the different types having divergent notions of the role of brokering across the boundaries between the clinical and scientific communities.

Hobby physician-scientist as full members

In the clinical community of practice, research is typically valued to the extent that it benefits the clinical practice, as I argued in chapter 6. This relates to the joint enterprise of the community, which is to provide the most advanced care to the patients, which all members are expected to be mutually engaged in (Wenger, 1998). In order to provide the most advanced care, the physicians are expected to spend most of their time in the clinical practice, while also having some research experience. Thus, I argue that the hobby physician-scientist sets their role as the norm in the community, as a result of them being full members of the clinical community of practice, in accordance with the joint enterprise of the practice. This also suggests that the norm entail a certain level of boundary crossing between the clinical and scientific community, where the hobby physician-scientists function as brokers.

As discussed in the previous section, I define hobby physician-scientists as those physicians who have some research activity, although always prioritising the clinical practice. Thus, they are primarily working with patients, and are as such engaged in the joint enterprise of the clinical community. This becomes apparent in how Jonathan, a hobby physician-scientist, relates to how colleagues perceive of his absence when he is doing research,

> No, but it is probably viewed as good; in some way, it is like this that at a university-hospital you get respect for being a good clinician, which is basically what we are; we are physicians, which is what you are measured against, I would say. Then people see, I mean research is also something that gives respect, it is something that eases the fast-track to senior positions and such, as well. I would probably say like this that, the problem does not lie with someone like me, who then has done a little bit of everything at the same time. There, I don't think that it is seen as a disadvantage at all, because some are on leave leave, and I am on research leave, so then they don't really think about it, really. Instead, they possibly see if you publish or something, then they see "oh, that

> is great" and then you get a pat on your shoulder. But, on the other hand, if you are more one of those half-time researchers or three quarters researchers, then the clinic suffers a bit.

He raises a few relevant ideas here concerning the views in the clinical community of practice which can be considered to have been negotiated and decided by the members (Wenger, 1998). First, he highlights that being a good clinician is the thing that gives respect, and which is highly valued in the clinical community. This enforces the notion that the clinical practice is the joint enterprise of the clinical community, where the physician role is the primary one. At the same time, research can also give respect, although slightly less than the clinical expertise. This suggests that a certain level of research activity can be understood to be part of the joint enterprise, thus indicating that crossing the boundary from the clinical community of practice into the scientific community is appreciated.

However, there seem to be limits to the appropriate level of research activity that falls within the joint enterprise. In Jonathan's case, his level of research activity, which is about 15-20% and thus in line with the notion of the hobby physician-scientist, is perceived as suitable in his community. At this level, his absence from the clinic for doing research is barely noticeable; it can be compared to how other colleagues are on regular leave. Nevertheless, this does involve an occasional role transition, where the hobby physician-scientists physically leave the clinical community of practice and enter the scientific community, thus also taking on the role of the scientist. However, as this is done in the accepted hobby capacity, it typically does not involve a change in their role identity. With the occasional boundary crossing mainly being done to improve their clinical practice, they remain in the physician identity.

As a result, the hobby physician-scientist can thereby still be considered as mutually engaged in the clinical practice. Consequently, the hobby physician-scientist is more up-to-date with the latest scientific findings, in a way that a non-researching physician in most cases is not. This relates back to the need for the residents to develop a scientific competence in order to participate in clinical discussions, as illustrated in chapter 6. Through continued research activity, regardless of what type, the physician-scientist can contribute more to such discussions, as they are informed about the latest scientific developments. This also connects with the positive response that Jonathan receives from his colleagues for his research, which indicates that it is seen as something that the clinical community of practice appreciates. With research activity in a hobby capacity being considered as beneficial for the clinical community, the hobby

physician-scientist can be seen as the norm in the clinical community of practice.

This norm becomes more evident considering Jonathan's statement of emphasising that he is not considered a problem, which indicates that other physician-scientists could be. By distinguishing himself from the serious and professional physician-scientists, they become understood as different, as the 'odd one out'. Jonathan phrases it as problematic and making the clinic suffer, which are possible consequences of this notion, as will be discussed further in the next section. Here, however, the point is that this distinction between different types of physician-scientists can be understood as the community constructing the hobby physician-scientist as the norm. It is then in relation to this norm that the serious and professional physician-scientists are seen as the 'odd ones out'. This becomes further emphasised by Dennis, a professional physician-scientist,

> A physician-scientist is often not the thing that I am. Instead, it is those who perhaps get a few working weeks here and there or, they can get out of the schedule for a project, or so. That is more like the normal.

To him, the hobby physician-scientist is considered the typical physician-scientist, even though his level of research activity is closer to the suggested definitions in the literature (e.g. Rosenberg, 1999; Wyngaarden, 1979). While this indicates the notion of the hobby physician-scientist as the norm in the clinical community, it also illustrates that there is a discrepancy between the theoretical idea of the physician-scientist, and how the term is used in practice. This brings us back to the issue of a lack of clear definition of who should be considered a physician-scientist. With an ambiguous definition, it is possible for a community to develop their own interpretation (Ahmed, 2012). Thus, in the clinical community of practice, a physician that does research in a hobby capacity is seen as a physician-scientist.

Through this, I argue that by establishing the hobby physician-scientist as the norm, the members of the clinical community of practice can be seen to co-opt the physician-scientist title according to their own definition. This does involve them taking on a hybrid role as the broker between clinical practice and science, which differentiate them from the professional role of a physician that does not have the same scientific competence. Contrary to the typical view of the hybrid role being a result of adapting to changes in the professional work (Noordegraaf, 2015), the hobby physician-scientist hybrid role is developed by themselves to differentiate them from the physician professional. In their

hybrid role, they portray themselves as the ones who have the competence to bring in knowledge across the boundary between the scientific and clinical communities, with what can be understood as mental brokering. Mental brokering is here understood as them employing knowledge from the scientific community, although they do not actually cross the boundary physically. This refers to how they use the scientific knowledge in their clinical practice. By making this part of the practice in the clinical community of practice, they can avoid the uprootedness typically associated with brokering (Wenger, 1998).

Consequently, they are also not experiencing a competition between the role identities, as they are willingly co-opting the notion of the hybrid physician-scientist as the norm in the clinical community. Even though they occasionally do physically cross over the boundary and engage in the scientific practice, they do not employ the scientific identity. As their main interaction with the scientific community happens through the mental brokering, they can be seen to delegate most of the scientific work that they use in their practice to scientist. As a result, similarly to the academic scientists, the hobby physician-scientists retain the physician identity as their focal identity through selective engagement with science (S. Jain et al., 2009).

However, with the clinical community of practice establishing their own definition of what is a physician-scientist, they can also define whether or not other members meets that definition. As a result, the serious and professional physician-scientists are not considered as physician-scientists in the clinical community. With their higher level of research activity, they are instead seen as scientists rather than physicians, which thus establishes them as the 'odd ones out'.

Serious physician-scientist rejecting the joint enterprise

In relation to the hobby physician-scientist defining themselves as the norm, those physician-scientists that do more research are seen as the 'odd one out' in the clinical community of practice. This is most explicitly stated by Michael, now a professional physician-scientist,

> I mean, I have always felt that I've been a bit odd in the clinic, for wanting to do so much research in parallel with the clinical work.

Through this in-vivo coding, I will use the notion of being the 'odd one out', defined as 'a person who differs from the other members of the group'

(Merriam-Webster.com), as a frame to understand the experience of being a serious physician-scientist.

Being a serious physician-scientist involves spending a considerable amount of time on research activities. My suggested interval, 25-50% research activity, is based on the younger-ALF grant, which provides funding for either 25% or 50% research. With most of my interviewees, who are, or have been, serious physician-scientists, having been awarded younger-ALF funding, this seems a suitable interval. As illustrated in the previous chapter, this means that the serious physician-scientists have demonstrated to the scientific community that they are ready to become independent researchers. As a result, they have considerable freedom in their research activities, where they start developing their own line of research and establishing a research group. However, in the clinical community of practice, their research activity level stands out from the norm.

With their higher research activity, the serious physician-scientists regularly cross the boundaries between the clinical community of practice and the scientific community. This physical brokering mean that they are absent from the clinical community on a more regular basis, which then exceeds the notion of research as a hobby. Furthermore, their higher research activity mean that they interact more with the scientific community, thus being exposed to the scientist role to a larger extent than the hobby physician-scientist. As such, they are seen more as the hybrid physician-scientists simultaneously being physicians and scientists, where each role is separated (Hendriks et al., 2019).

However, as such a hybrid, rather than being seen as both a physician and a scientist, the serious physician-scientists are typically seen as either one or the other. With the hobby physician-scientist, who primarily seen themselves as physicians, being the norm, this division between the roles is prevalent within the clinical community of practice. For example, as stated by Alice, a serious physician-scientist,

> A: …then it is a balancing act in a way, like you can get comments about it sometimes, that one should balance how much, like "do you want to be a clinician, or do you want to be a scientist"?

This balancing act that she refers to, which I also illustrated earlier, highlights the lack of a hybrid physician-scientist role that connects the two roles further than in a hobby capacity. Instead, the serious physician-scientists are faced with the question whether they want to be a physician, that is a hobby physician-scientist, or a scientist. This question signals that research activity

that exceeds the accepted hobby level, mean that one is not mutually engaged in the clinical practice. Instead, due to their higher research activity, they must be portrayed as scientists by the clinical community of practice. Consequently, by labelling the serious physician-scientists as scientists, the full members can be seen to also contest the serious physician-scientist role as physicians.

Even though Alice emphasised that the clinical practice and treating patients was her main priority, her clinical colleagues did not necessarily accept that. With her spending more time on research than the hobby physician-scientists, she was considered as different from the other members. As a result, she becomes portrayed as being the 'odd one out', where her clinical commitment was questioned, as well as her membership in the community. Due to their research activity, the serious physician-scientists are then perceived as being less interested in the mutual engagement of the joint enterprise (Wenger, 1998), and as such reject the established trajectory toward full membership. By doing so, they are instead perceived as peripheral members of the community (Lave & Wenger, 1991).

The serious physician-scientists are thus often labelled as being researchers more than physicians by their clinical colleagues. Even though they might perceive of themselves as physician-scientists, that role is already occupied by the hobby physician-scientists, who have incorporated that role into the notion of being a physician in the clinical community of practice. As a result, there is no available accepted role for the serious physician-scientist in the clinical community of practice. Thus, they become labelled as scientists by the other members in the community, which cements their position as peripheral members. Such was especially the case for Charlotte, now a professional physician-scientist,

> My identity was much that "I want to be a physician". I have always wanted to be a physician for as long as I remember. So, I had an identity problem that "but I'm not a researcher; I do that in my spare time. I think it is enjoyable" … [but] at the clinic, they viewed me as a researcher and within the research [environment], they viewed me as a clinician. I see myself as a doctor, but one who also does research, but as a doctor deep down. So, it was complex for me, and complex in the way how people viewed me, colleagues viewed me, and the manager.

Charlottes attempts to portray herself as a physician that does some research can then be seen as her trying to connect herself to the hobby physician-scientists norm. However, even though she saw herself as a hobby physician-scientist, that is primarily a physician who also does research, she experienced

that she was not considered as such by her colleagues. This created an identity struggle, where the view she had of herself in relation to the community was not precipitated. As illustrated in chapter 6, the identification as a member is a crucial aspect in learning to become a practitioner, where control over membership represents a way for full members to exercise power. As the serious physician-scientists are not considered mutually engaged in the clinical practice, their identity as physicians becomes different from that of their colleagues.

By repeatedly physically crossing the boundaries between the clinical community of practice and the scientific community, they often go through role transitions (Ashforth, 2000). However, through their research activity, and the resulting peripheral position, the serious physician-scientists struggle to identify as members, as the role that they are supposed to transition into is typically rejected by the community. Even though the serious physician-scientists attempts to manage their hybrid role through emphasising that they are physicians first, this then gets rejected by their physician colleagues.

Charlotte's situation can thus be indicative of the experience of not being accepted as a potential full member, as her identity as a physician was rejected by the other members. As such, the serious physician-scientists struggle to identify with that they see as the focal identity in their hybrid role (S. Jain et al., 2009), as it is not supported by their colleagues. However, they typically do not identify with the scientist identity either, as they only spend some of their time in the scientific community. Furthermore, even though Charlotte felt more welcomed in the scientific community, as she expresses, her colleagues there did not typically see her as a scientist either.

Through them labelling her as a scientist, she also experienced bullying and exclusion from the clinical community of practice. As she was seen to be more interested in conducting research than treating patients, from their perspective, she rejected the joint enterprise, and could thus not be seen as a physician. Furthermore, by not accepting her as a physician, the other members used her research activity as an argument for excluding her from participating in both professional and social activities. Labelling her as a scientist then functioned as a way to motivate this exclusion, creating an identity struggle for her.

Thus, being the 'odd one out' in a community of practice tends to involve an identity struggle, where there is a discrepancy in how one is perceived by others and how one sees oneself. While they try to connect to the notion of a hybrid, connecting the two communities, this identity is already appropriated by the hobby physician-scientist. As a result, the serious physician-scientists

tend to experience identity problems, as there is no available role to identify with in the clinical community of practice. Or rather, they are seen as physicians in the scientific community and as researchers in the clinical community, not belonging in neither (Goldstein & Brown, 1997). In other words, they become caught in-between their two roles (Beech, 2011; Turner, 1967), seen as neither-physician-nor-researcher.

This situation relates to an external rejection of their identities, where they struggle to belong in either community. Experiencing liminality is typically associated with going through a transition, where the original conception involved going through rites of passage in the transition from-boy-to-man. During this transition, the individual is perceived to be undefined, being neither of these two solid identities (van Gennep, 1908/1960). However, for the serious physician-scientists, this experience of liminality appears to be more perpetual (Ybema et al., 2011). By continuously crossing the boundaries between the communities, they are stuck in this liminal state of not fully belonging to, or being a full member of, either community. Claes, a professional physician-scientist, suggests how combining both roles fully does not work,

> It can become fragmented if you think you can be the anchor in both places. I mean it is not possible to keep that up; to be the physician that takes all the on-calls and always has clinical reception and really invests at the clinic *and* invests highly in research. That doesn't work.

From this, it appears that it is necessary to make a decision as to which community one is mutually engaged in, and to what role to pick and identify with. Either one should follow the norms in the clinical community of practice and be a hobby physician-scientist or move into the scientific community as a professional physician-scientist. However, in order to become a professional physician-scientist, it is required to first be a serious physician-scientist, where the respective colleagues have these expectations on their commitment. Anna suggests that the prospect of becoming a professional physician-scientist was an essential aspect in handling the liminal identity,

> I mean to have to constantly keep up and motivate yourself. Why, and defend yourself for why you do what you do, that no. That, it would not be worth it.

To her, the experience of being a serious physician-scientist involved a struggle to motivate her existence in the clinical community, defending her role as a hybrid combining both roles. However, this also had a cost, which she

was only willing to accept for a certain time period with the notion that it would change when she became a professional physician-scientist. As I will show in the next section, while the professional physician-scientist also tend to experience a certain struggle between the identities, it is different from the situation of the serious physician-scientists.

At the same time, while experiencing liminality is typically associated with discomfort, it can also involve an acceptance of this state. Oscar, a serious physician-scientist, suggests that it involves a combination of positive and negative feelings,

> So, I think that I combine the best of two worlds, and I would love to continue with that, but it does result in one being inferior in both as well. So, there is always a certain, you are a bit ambivalent constantly. But in general, I think it is amazing.

Ambivalence relates to a coexistence of positive and negative emotions, which generally is considered an uncomfortable and aversive state (Ashforth, Rogers, Pratt, & Pradies, 2014). However, contrary to Charlotte, Oscar highlights the benefits associated with this uprootedness, as he can combine the 'best of two worlds'. For some, such as Oscar, ambivalence can thus be an intentional part of identity construction (Hoyer, 2016b), where he successfully aggregate (Pratt & Foreman, 2000) the hybrid identity and his multi-membership becomes part of the identity. Even though it is challenged in the clinical community of practice, he is comfortable in the role. These two different examples thus highlight how liminal identities can involve the traditional notion of not being in either role, or how they can instead perceive it as being both (Ibarra & Obodaru, 2016).

As a final note, I want to highlight the influence of the community of practice in setting these boundaries for the serious physician-scientists. Considering the strength of labels and language in the community of practice (Barton & Tusting, 2005), this illustrates how the meaning of a physician-scientist as a hobbyist in the clinical community of practice is reified. The language that members use has power, which, in turn, relates to the notion of meaning in the community of practice. The negotiation of meaning takes place in a process where the community members continuously reify meaning through their participation (Wenger, 1998). Hence, through participation in the community, certain meanings can become formed between the members, such as labelling the serious physician-scientists as scientists.

By defining the hobby physician-scientist as the norm, at the same time defines the serious physician-scientist as breaking the norm, i.e. being the 'odd one out'. This is then enforced through labelling the serious physician-scientists as a scientist, thus further differentiating them from the negotiated meaning of the hobbyist being what a physician-scientist should be in the community. The community has thus reified this notion as part of the negotiated meaning within the clinical community of practice. This is in line with Tusting's (2005) argument on how the process of labels is significant for how meaning is reified in the community of practice. Having the power to assign meaning through simplifying something, a certain statement, for example, can develop into an established truth with limited nuance and perspective (Wenger, 1998). In this sense, the language used to differentiate the serious physician-scientists as the 'odd one out' can create a meaning in the community of practice, where research is good as long as it is within the norms.

Since descriptions are not neutral, a certain language can be mobilised differently by the actors in various settings (Ahmed, 2012). The notion of the serious physician-scientist being considered as purely a scientist, despite them working clinically at least 50% of the time, can thus be understood as a reified meaning in the community of practice. It is possible that this was not an intentional way to devalue their clinical contribution; nevertheless, it has become reified that the serious physician-scientist is not really a physician. Or at least, the language used signifies such a meaning towards the serious physician-scientist, where they are constantly being portrayed as the 'odd one out'. Later, I will illustrate how this also tends to create the notion of the serious physician-scientist being a problem.

Professional physician-scientist as a peripheral member

Even though the professional physician-scientists spend more time on research than the serious physician-scientists, their situation in the clinical community of practice is typically better. With their primary employment having moved from the hospital to the university, the formal requirements at the clinic decrease. However, as they still have a 1/3 employment at the clinic, they still have certain obligations there, which somewhat negates that reasoning. Instead, I argue, it relates to the professional physician-scientists having, by choice, confirmed their position in the clinical community of practice as peripheral members. With no intention of moving towards full membership, their limited participation in the joint enterprise is expected. Thus, rather than

being perceived as absent, their occasional presence is considered as an addition.

With the hobby physician-scientist being the norm in the clinical community of practice, the professional physician-scientist, with their extensive research activity, is also considered as 'odd one out' by the other members. Despite that, they seem to be perceived in a more positive way compared to the serious physician-scientist. Dennis, a professional physician-scientist, states,

> I notice that when I come in my white clothes, then people are a bit like positively surprised that I will work with patients and such, not in any derogative way, but then one thinks "Oh yes, how nice and fun".

It is relevant to consider how he emphasises that the surprise of him working clinically is positive, which indicates that this has not always been the case. As Dennis had only recently become employed by the university, he noticed a difference in how he was perceived in the clinical community of practice since he became a professor. This could relate to the combined employment at the university and the hospital, which means that the clinical requirements have decreased. As a result, the absence from the clinic is formally motivated. Another possible aspect is that the clinical colleagues label of the professional physician-scientist as purely a scientist, is now a rather accurate description of their role. However, I argue that both of these aspects could also be interpreted as the clinical community of practice now perceives the professional physician-scientist as a stated peripheral member; thus, they have limited expectations on their participation.

With the combined appointment, the professional physician-scientists have formally established that they prioritise their research role. As such, they are no longer expected to be mutually engaged with the joint enterprise (Wenger, 1998) of the clinical community. This becomes evident with the lack of expectations on their contributions in the clinical community of practice. Rather than being considered absent because of their research, they appear to be seen as a valued addition in the clinical practice during the short time that they are present. For example, Claes experienced this as he transitioned from a serious to a professional physician-scientist,

> C: Since I now have my employment at [the] university primarily, it is seen kind of more as a bonus in some way when I'm at the clinic… I mean, now I'm not absent for 6 months; now I'm there as a bonus for 20-30%.
>
> J: Okay, so it is not really expected of you anymore?

> C: I mean, in these combined appointments, it is very fluid what the clinical part, what it should entail… we have examples on that, on some professors who only kind of get a salary without doing anything really… then the motivation has then been that "yeah, but I supervise doctoral students at the clinic, and I help the clinic in other ways with goodwill and such".

Thus, while the professional physician-scientists are still absent from the clinic for extended periods, their absence is expected, as they are no longer seen as intent to move towards full membership in the community. Instead, their limited presence can be understood as temporary visits of a peripheral member, who primarily is a member in another adjacent community. Through their connection with the clinic, they are accepted as physical boundary crossers between the clinical community of practice and their own scientific community of practice. As they are there primarily to help out with the clinical work, they are not necessarily involved with brokering between the communities. Or rather, they primarily do this through mental brokering, similar to the hobby physician-scientists. Thus, the professional physician-scientist can be seen as an occasional peripheral participant in the clinical community of practice, where they are perceived as welcomed visitors.

Nevertheless, this tends to involve a certain amount of identity work for the professional physician-scientists. After all, they have moved from a rejected identity as physicians, into an accepted role identity as a scientist in the scientific community. Referring back to the statement by Claes in the previous section, it is important to accept that you cannot '*be the anchor in both places'*, he highlights the need to make that movement. However, as they still have a hybrid role where they physically cross the boundaries between the communities, they tend to maintain a physician identity even though they have accepted the identity of primarily being a scientist. Considering that they started as physicians, and still work in the clinical community occasionally, they cannot completely give up on the physician identity in their hybrid role. Managing this, Dennis finds comfort in relating to the notion of a decathlete,

> Sometimes you get a bit dejected about the situation that you don't do anything properly. I had a colleague doing the same thing, and he described it as being a decathlete; you don't jump the furthest and you don't run the furthest, but you are quite good at both, you know, and I think that is a bit comforting.

In a similar fashion to how Oscar handled the ambivalence, Dennis emphasises the necessity of considering the benefits of being a liminar. Consequently, it relates to how the individual handles the social context. This suggests that it is possible to accept certain aspects of the perception of being the 'odd one out',

and to remember that they provide something different from the others. Thus, highlighting the benefits that the professional physician-scientists can provide with their considerable scientific experience in the clinical practice, and remembering that they are allowed to combine the best of two worlds, can create the positive experience of being a physician-scientist.

Even though the serious and professional physician-scientists are both seen as the 'odd one out', their experiences in relation to the full members thus differ. While they both appear to reject the joint enterprise of the clinical community of practice, being positioned in the periphery is acceptable for the professional physician-scientists. This relates to them having officially stated that they are now primarily members of the scientific community, and thereby have no intention of moving towards full membership. The serious physician-scientists, on the other hand, are still considered being on the trajectory towards full membership. As such, their research activity can be seen to question the mutual engagement in the joint enterprise. As a result, the professional physician-scientists' limited presence in the clinic is appreciated as an added bonus. The serious physician-scientists, on the other hand, experience that they have to defend their absence to their clinical colleagues. In the next section, I will expand on this, illustrating how the members of the clinical community of practice perceive the serious physician-scientists as a problem.

Being a problem

In this section I will develop the notion of being the 'odd one out' further, illustrating how it can also create the notion of being a problem. Being the 'odd one out' can mean different things, depending on the context. In an individualistic society, for example, where many strive to be special or unique, it has a positive connotation. In a collectivistic society, on the other hand, where there is an inherent strive for homogeneity, the individual that stands out from the group tends to become problematic. This latter idea is apparent in a community of practice, where the mutual engagement is one of the distinctions that makes a group of colleagues a community (Wenger, 1998). It is therefore in such a context that the serious physician-scientists being the 'odd one out' must be considered, where their difference from the other types creates the notion of them being a problem. In this section I will illustrate how this relates to their perceived lack of clinical inexperience, which in turn add a pedagogical task for the serious physician-scientists, where they defend this inexperience. Paradoxically, this pedagogical task further distinguishes their

difference, while also challenging the hobby physician-scientist role as physician-scientist. Building on this, I connect the experience of the physician-scientist to the phenomenon of being a problem, as shown in situations where organisations attempt to develop diversity (Ahmed, 2012).

Clinical inexperience

As a result of their research activity, the serious physician-scientists have less experience of meeting and treating patients, compared to the other members in the community. This seems to create the idea that they are less competent physicians, which results in them being problematic in the clinical practice. Experience is an essential aspect in the CoP literature, where 'understanding and experience are in constant interaction – indeed, are mutually constitutive' (Lave & Wenger, 1991, pp. 51-52). With the idea of situated learning, every experience provides an increased understanding of the world. Thus, each experience of treating a patient increases a physician's understanding of the clinical practice, making them more competent. Correspondingly, each missed experience of treating a patient, because of research activity, means a missed understanding, which in turn makes the serious physician-scientist, at least perceived as, less competent.

This relates back to Jonathan's quote earlier, claiming that the clinic, to some extent, 'suffers' because of the serious physician-scientists' research activity. Later in the interview, he explicates this further,

> J: If I were to have a colleague who is gone 50% or more, then my usefulness decreases for that colleague in the lab, for example. It means that they get worse clinical competence and so forth. So, based on this, I have to adjust what tasks they get and such. Not to disadvantage them, but simply based on where they are in the clinical ladder.
>
> M: So, if [you] do a lot of research, you can become negatively affected in the clinic?
>
> J: That you can become, simply because you cannot do everything at the same time…

Here, the serious physician-scientist's clinical inexperience is portrayed as making him or her less useful in the clinical practice. With experience equalling competence, the clinical community of practice labels the serious physician-scientists as less competent physicians. Consequently, they can also

become excluded from certain areas in the clinical practice, as Jonathan mentions, which further limits their clinical experience. This illustrates how the full members have the capacity to deny access to learning (Lave & Wenger, 1991), using their position of power to diminish the serious physician-scientists' inclusion. Additionally, it cements the idea that the community cannot count on the serious physician-scientists' clinical expertise to the same extent as that of other members. Thus, the notion that they are somewhat problematic in the clinical setting is reaffirmed.

With the joint enterprise of the clinical community of practice being to provide patients with the most advanced care, competence and experience in the clinical practice are something that warrant respect. As a result of their more limited clinical experience, the serious physician-scientists, therefore, tend to be perceived as less competent physicians. Bengt, a serious physician-scientist, acknowledges this view,

> B: …there is a widespread perception that researching doctors are bad clinicians… you don't really get the same respect.

The way in which he phrases this, *a widespread perception*, indicates that this is more of a general idea that has become established in the clinical community. Certainly, many interviewees acknowledge that they are less experienced than their colleagues, and possibly also less competent physicians. However, there is a difference between being a less experienced physician and a bad physician. Nevertheless, such perceptions can create a negative cycle. When full members discard the serious physician-scientists as such, and therefore might not work with them, as Jonathan mentioned, there are limited avenues for this perception to change. So, the notion of the serious physician-scientist as being a problem becomes perpetuated, where the notion of them as being a problem makes them into a problem. This becomes more evident in how the serious physician-scientists struggle to defend their existence in the clinical community of practice, which creates a pedagogical task for them.

Pedagogical task

With the clinical community of practice questioning their clinical competence, the serious physician-scientists often experience that they have to defend their existence in the community. This could be understood as them being assigned a pedagogical task, which is then an addition to their current tasks of doing both research and working in clinical practice. It includes continuously arguing

for their relevance in the clinical community, as well as convincing their colleagues that their research activity is relevant. At the same time, with this pedagogical task, the serious physician-scientists risk to further differentiate themselves from the other members. Thus, through their attempts to not be problematic, they become a problem.

Due to their absence from the clinical practice for research activity, the serious physician-scientists are often required to explicate that they are still committed to being physicians. This can be understood as attempts to manage their hybrid role by emphasising their commitment to clinical work, where the pedagogical task is a strategy to try to aggregate the scientist role into the physician role, creating links between them (Pratt & Foreman, 2000). Thus, even though they are not as mutually engaged in the joint enterprise as their clinical colleagues, they are still engaged in the clinical practice and in treating patients. Anna, now a professional physician-scientist, suggests as much,

> But it was a problem to maintain confidence towards the colleagues. When you weren't there, so that they knew that you still did a good job and that you still were among the best residents. So, I thought it was very important for me to mediate this, "it's residency that's important; it's [specialty X] that is important, but I can manage to do research on the side of that".

The need to maintain confidence and mediate commitment towards colleagues illustrates the pedagogical task that comes with being a serious physician-scientist. In this case, it relates to proving that even though she is more absent than other members, she is still dedicated to the clinical practice. Furthermore, even though she has less clinical experience, she attempts to neutralise the notion that she therefore is a less competent physician. This requires a continuous communicative burden, which is created from the notion that they differ from their colleagues.

However, there is only so much that the serious physician-scientists can do through communication. Bengt highlights how he, as a serious physician-scientist, struggles to meet the expected solidarity towards colleagues in the clinical community,

> B: … it should be solidarity, we are not a, because the physician profession is somehow, it is not really possible doing it from 9 to 5. It spills, it always spills over and, and then we must be able to share with each other, "if you take my on-call that weekend because I really need to do something else, and I can take your next one" and such. There are a lot of expectations that you cover beyond the working hours, stay longer during the days, take extra on-calls… it became

> more difficult for me to do such things, and if I didn't succeed with that, then, if it is like that "I have to leave now because I have a meeting here with an important research colleague". Then, there can be some whining and, yeah.

These kinds of situations, where the serious physician-scientists need to prioritise their research activity over the clinical practice, further illustrate their perceived limited mutual engagement towards the other members in the community. With such expectations of solidarity having developed as an aspect of being a member in the community, the serious physician-scientists not being able to meet them makes their rejection of the membership more evident. This can be perceived as the serious physician-scientists prioritising the scientific role over the physician role, thus confirming that they are closer to the scientific community than what is accepted in the clinical community of practice.

This also supports the notion that they are a problem, as they cannot be counted on to help their colleagues. Thus, the serious physician-scientists can, to a certain extent, be understood as problematic due to their clinical inexperience and lack of solidarity. However, at the same time, it appears to be more about the perception of them being a problem, rather than them actually being a problem.

Perceived as a problem

My conceptualisation of the serious physician-scientists as being a problem initially comes from an in-vivo code, where the experience of being perceived as problematic was brought up by several of my interviewees. Charlotte expressed this most clearly,

> I mean, I would have been more appreciated by colleagues, more popular with colleagues, perhaps with the boss, if I had not done research. But I was a little bit the problematic girl because I wanted to do research. I was odd.

She connects here the notion of being different to being problematic, where her clinical colleagues saw her as a problem due to her research activity. Emphasising that she was neither appreciated nor popular among her colleagues indicates that the notion of being a problem is, to a certain extent, constructed socially in the clinical community. In this section, I will elaborate on how the notion of being a problem is constructed, which tends to be a combination of practical and social aspects. Employing the concept of being a

problem (Ahmed, 2012), I will expand on the ideas of inclusion/exclusion within the community of practice literature.

Despite the serious physician-scientists' struggling to meet the expectations of their clinical colleagues, I argue that the main aspect of them being a problem relates to perceptions. Hence, the serious physician-scientists being a problem is less about their actual shortcomings, and more about how they are perceived by their colleagues. Due to them being different from the other members in the clinical community, certain assumptions about them seem to develop, which are not necessarily accurate. Nevertheless, with them being absent from the clinic for extended periods, some of these assumptions seem to develop into established truths in the clinical community of practice. Anna provides an example of this,

> You have an increased freedom when you do research; you can sometimes leave earlier; you can sometimes go to the hairdresser at lunch, but you know, if you do that one day and someone finds out, it's like "but she always goes to hairdresser', or "you're doing nothing else". When you are then not there [they assume] "but she is probably at the hairdresser again".

Here, the serious physician-scientists' possibilities to allocate their working time differently from the tight clinical schedule are used to question their mutual engagement in the practice. Regardless of the work that she does during her research time, it is trivialised through these kinds of assumptions. As a result, her absence from the clinic can create the notion of her as a problem, with colleagues assuming that she would rather go to hairdresser than help with treating patients. Defending the research activity can then further emphasise this notion.

With their communicative attempts, the serious physician-scientists can be seen to challenge the hobby physician-scientists' role as being involved with both research and clinic. Through continuously communicating that they are still engaged, and successful, in the clinical practice, the serious physician-scientists can be seen to diminish the other members' lower research activity. Thus, it involves challenging the definition of the hobby physician-scientist as a physician-scientist, illustrating that other types of physician-scientists exist within the community. With that, the notion within the clinical community of the serious physician-scientist as being primarily a scientist can be seen as a way to deflect this. By labelling the serious physician-scientists as scientists, emphasising their lack of clinical experience, can then be seen as a way to make them into being a problem. And as a problem, it is okay to exclude them from the community. Charlotte suggests as much,

> There are a lot of differences, these subtle differences. Sometimes, it is enough that I enter a room and all of a sudden, they no longer talk about research when I enter, because they know that I will defend it a lot … it has happened to me that they are talking shit about something, about a study. Then I came in thinking, "yeah, but you can gladly keep talking" [but then] "no no, we know that you, what you are going to say", "no, but I can see pros and cons, I won't", but, they want to be surrounded by people who talk exactly like themselves.

Simply by her presence, her colleagues become uncomfortable talking about research, which Charlotte sees as them being worried that she would just start to defend research in general. Consequently, the sheer existence of the serious physician-scientists can be seen to challenge the negotiated meaning of a mutual engagement in the joint enterprise. Thus, by demonstrating that they are still contributing members in the community, they disturb what the clinical community stands for, which makes them into a problem (Ahmed, 2012). Rather than being open to renegotiate the joint enterprise, the full members use the serious physician-scientists' peripheral position in the clinical community of practice to make them into the problem.

The idea of "being a problem" relates to how describing a problem can mean that one is seen to have created the problem (Ahmed, 2012). In other words, by highlighting the problems experienced by a minority, they themselves become the problem, as a result of them problematising the current situation. So, it can be related to the idea of being the 'odd one out' in a community, where the odd one becomes perceived as a problem because they differ from the established norms. Creating the notion of the minority being the problem, rather than the structure that creates the problem for the minority, the community ascertains that it does not need to change (Ahmed, 2012).

With the serious physician-scientists being a minority in their clinical community of practice, this concept is applied to interpret how their notion of being the 'odd one out' at the same time makes them a problem. I argue that this relates to how the serious physician-scientists can be seen to challenge the established idea of the hobby physician-scientist as the norm. Through their elevated research activity, and the pedagogical task they must do to defend it, they raise a potential problem in the clinical community of practice. However, rather than adapting to this, the full members enforce their established perception on research and make the serious physician-scientists into the problem. Thus, the serious physician-scientists become perceived as the problem, as that is an easier explanation (Ahmed, 2012), compared to renegotiating the role of research in the clinical community of practice.

As the clinical community of practice have already 'solved the problem' of keeping the clinical practice up-to-date with the latest scientific finding, through the notion of the hobby physician-scientists, there is no purpose to consider the serious physician-scientists' argument. This can serve as an illustration of the conformist aspect of communities of practice, where once the mutual engagement in the joint enterprise has stabilised, change becomes difficult (Wenger, 1998). Those with different ideas, and thus diverging from the joint enterprise, are denied access to full membership, and as a result, lack the influence to promote change.

Summary

In this chapter, I have discussed the experience of being a physician-scientist, highlighting the experience of combining research and clinical practice. I have argued for re-defining the physician-scientists into three different types: the hobby physician-scientist, the serious physician-scientist, and the professional physician-scientist, where each type has their own attributes. This characterisation highlights the different ways one can be a physician-scientist, and the specific situation that each type faces. I argue that this is necessary for a fruitful debate on physician-scientists, as it has become apparent that they cannot be understood as a homogeneous group. Instead, their different experiences indicate that the different types compete with each other, to a certain extent. This competition is not just about research funds and prestige, but also about the control over what a physician-scientist should be.

With the hobby physician-scientist being full members in the clinical community of practice, they can establish what the appropriate level of research activity should be in the clinical practice. It is in relation to these norms that the serious and professional physician-scientist are seen as the 'odd one out'. As the hobby physician-scientists can be seen to have appropriated the physician-scientist role, the serious and professional physician-scientists' elevated research activity is perceived as them rejecting the mutual engagement of treating patients. While they both appear to reject the joint enterprise of the clinical community of practice, being positioned in the periphery is acceptable for the professional physician-scientists, as they have made a decision to focus on the joint enterprise in the scientific community. The serious physician-scientists, on the other hand, experience that they have to defend their absence to their clinical colleagues.

I have argued that this relates to them being perceived as problematic in the clinical practice. As a result of their research activity, they are often absent from the clinic, which, in turn, generates the notion of them being inexperienced physicians. This requires them to take on a pedagogical task, where they are forced to justify their membership in the clinical community continuously. However, this further highlights how they are the 'odd ones out', as they appear to challenge the joint enterprise of the community, which turns them into being perceived as a problem. Through this exclusion, their identity as physician is questioned by the other members, making them caught in a liminal state, where they are seen as neither physician, nor scientist.

Conclusions and discussion

As I stated in the introduction, the purpose of this thesis is to contribute to a deeper understanding of the physician-scientist career by answering the empirical question of *how do physician-scientists experience their career?* In this concluding chapter, I will return to this initial purpose by connecting the findings from the three empirical chapters. Having illustrated that there are three different types of physician-scientists, I will summarise the key findings of the thesis by connecting them to each of these types of careers. Thus, I further connect the three types with the three separate questions that I asked in the introduction. Following that, I will discuss the contributions that I make in this thesis. Connecting first to the literature on physician-scientists, I discuss the influence of the social barriers and possibilities that I have illustrated in this thesis. I then discuss the contributions that this study makes to the communities of practice literature, specifically to the notions of boundary crossing and the role of power. Following that, I discuss some of the implications of the study, emphasising how my re-defining of the physician-scientists makes it possible to have a more fruitful debate on their situation and their purpose. Finally, I end the chapter with discussing the limitations of the thesis, and suggestions for future research.

Key findings

In this section, I argue that the key empirical finding in this thesis is the broad variation in experiences among physician-scientists, which leads to my suggestion of re-defining them into three different types. Hence, I challenge the idea that there is one single physician-scientist career structure that would automatically make more physicians involved with research (e.g. Ley & Rosenberg, 2005), and instead highlight how there are various ways both for becoming and being a physician-scientist. While I find this re-definition necessary to make the general discussion of physician-scientists more precise, it is also essential in order for me to answer my research question. In this part

of the chapter, I will focus on this latter point, and how the experience of being a physician-scientist differs depending on what type one is.

Since James Wyngaarden (1979) famously labelled the physician-scientists as an 'endangered species', their role in medical research has received ample attention within the medical field. Although this has involved various definitions of who is a physician-scientist, mainly regarding the division of time between the two tasks (e.g. Rosenberg, 1999), most studies seem to assume that physician-scientists are one generic group. With that follows the notion that they face the same barriers and obstacles, where structural changes could improve the situation for all physician-scientists. However, having identified that there are different types of physician-scientists means that they also have different experiences and challenges. In the remainder of this section, I will discuss the experience of each of these types separately, starting with the type that I label the hobby physician-scientist.

Hobby physician-scientist

The type that I call hobby physician-scientist relates to those that are primarily physicians, although they have written a dissertation and have some research activity similar to a hobby. As they spend a majority of their time at the clinic treating patients, they do not meet the common definitions used in the literature on physician-scientists (e.g. Rosenberg, 1999; Wyngaarden, 1979), and are thus often neglected. This can be a bit confusing, considering that one way to measure the decline in the number of physician-scientists relates to data that fewer physicians earn a doctoral degree (e.g. M. K. Jain et al., 2019; SOU, 2008:7). These studies seem to assume that all physicians who write a dissertation are interested in becoming, what I label, serious physician-scientists. However, as my study shows, this is not necessarily the case. On the contrary, the hobby physician-scientists appear content with being primarily physicians, who have some research activity on the side. Consequently, they play a pivotal role in the translation of new scientific findings into clinical practice (Drolet & Lorenzi, 2011), as they work closest to the patients. The notion of physician-scientists providing better care (Stendahl, 2012) can also be closest attributed to the hobby physician-scientists, as they connect the scientific knowledge with extensive clinical experience.

More relevant for this study, however, my findings show that the hobby physician-scientists play a crucial role in the experience of being any type of physician-scientist. The perception among my interviewees is that they are the most common type of physician-scientist at the university-hospital, and as a

result, they become the norm of what a physician-scientist is in the clinical community of practice. Thus, they can be conceptualised as the full members in the clinical communities of practice, and as such, they have the power to influence the mutual engagement in the clinical practice (Wenger, 1998). Accordingly, the hobby physician-scientists can define what role research should have in the clinical community of practice, as well as what research activity is deemed acceptable. In other words, they are influential in deciding what group values (Borges et al., 2010) are guiding the clinical practice.

The experience of the hobby physician-scientist career is thus in many ways related to being the norm, both in their clinical community of practice and at the university-hospital in general. Consequently, the hobby physician-scientists tend to not experience the struggle to belong in either community suggested by Goldstein and Brown (1997), as they are primarily committed to the clinical practice and identify with the physician role. This is further evident through them being full members of the clinical community, where they are influential in negotiating the joint enterprise, mutual engagement, and shared repertoire of the community (Wenger, 1998), which, in turn, reifies the practice according to their values.

For the residents joining as new peripheral members (Lave & Wenger, 1991), it is through their participation with the hobby physician-scientist that they learn the different roles of research in the clinical community of practice, as illustrated in chapter 6. The expectation that residents should write a dissertation to learn the scientific methodology, similar to mastering a clinical instrument, thus relates to learning what it takes to become a full member, that is, to become a hobby physician-scientist.

The process of becoming a hobby physician-scientist is thus associated with the experiences of becoming a member in the clinical community of practice, which I described in chapter 6. Thus, it typically involves recruitment into a senior colleague's research project, where the young physician experiences that doing research is a sort of membership requirement. This direct recruitment by the senior members of the clinical community has not received much attention in the literature previously. Accordingly, it provides one answer to the question of how physicians become involved with research, while also illustrating the influence of the group values on the individual's decision to do so (Borges et al., 2010).

At the same time, the residents learn that research is something that ought to be done to a limited extent, so that it does not impede their clinical development. Through that, the notion of research as a hobby becomes part of

their understanding of the clinical practice, where they learn that full members are engaged in research to the extent that it benefits the patients. As a result, this view also becomes perpetuated in the clinical community, which enforces the norm of the hobby physician-scientist as the definition of what a physician-scientist should be. This further highlights the relevance of values in the group and how they affect the individual physician getting involved with research (Borges et al., 2010), as the values learnt when entering the community tend to become internalised by new members.

In line with this, the challenging parts of the process of becoming a hobby physician-scientist are also preserved. This especially relates to the common situation where they are required to spend much of their own time doing research, which is in line with findings from previous studies. Gonzalez et al. (2010), for example, showed that scheduled research time was the most important thing that would make residents start doing/do more research. While my interviewees also would have preferred scheduled research time, my findings illustrate that they still do research despite having to do it on their own time. As I argued in chapter 6, this can be conceptualised as a membership fee that the LPPs must pay to be accepted in the clinical community of practice.

Illustrating the power and control that senior members exercise over the LPPs (Lave & Wenger, 1991), this can also serve as an example of how certain aspects in a community of practice can be anachronistic. The supervisors appear to argue that since this was how it was done when they wrote their dissertation, new members are supposed to do it the same way. Or, as they paid a membership fee when they entered the community, so should new entrants. Consequently, as the new generation becomes socialised into sharing this idea, they could likely create the same expectations for the next generation.

With regard to becoming an independent physician-scientist, this is typically not warranted for the hobbyists. As I illustrated in chapters 6 and 7, physicians that are recruited into research are largely trained for dependence, which is considered sufficient for the clinical community of practice. With them not being expected to do as much research as hobby physician-scientists, achieving independence to the degree required by the scientific community is typically not needed. On the contrary, for the residents that aspire to become full members of the clinical community of practice, this dependence can be rather beneficial. With the limited focus on demonstrating independence, the dissertation project is typically easier and can be completed faster. As a result, their dependence reduces the membership fee, as they do not have to spend as much of their own time conducting research.

At the same time, this makes it more difficult for those that are, or become, interested in doing more research after, as they then must manage to traverse the gap period that I labelled the dependence-independence paradox. Nevertheless, this creates a situation where the hobby physician-scientists tend to stay dependent on others, at least in the sense that they are not considered independent according to the scientific community. That is not to say that they need to remain dependent, but rather that if they were to become sufficiently independent in the scientific community, such as attaining individual funding for a more long-term research project, they would no longer be characterised as hobby physician-scientists. Instead, they would gradually be leaving the role of a hobby physician-scientist and starting the journey of becoming a serious physician-scientist.

What is perhaps most interesting regarding the hobby physician-scientists, at least from a theoretical perspective, is how they experience and manage the brokering of knowledge between the clinical and the scientific community. The clinical community of practice has, rather successfully, established a certain level of boundary crossing between their community and the external scientific world, which has become incorporated as part of the practice. In other words, they have developed a path for translating knowledge from bench-to-bedside (Drolet & Lorenzi, 2011), with the hobby physician-scientists as translators. As a result, they have also developed their own hybrid role where science and clinical care become integrated, rather than two separate notions (Hendriks et al., 2019). Thus, with the joint enterprise of the clinical community being committed to providing the most advanced care to the patients, allowing the transferring of new knowledge into the community is crucial.

Consequently, the clinical community of practice can be seen to have developed according to the ideal suggested by Wenger (1998), where they bridge boundaries to develop. To avoid the risk of the practice becoming obsolete, a certain amount of boundary-crossing is required. Furthermore, making both physical and mental brokering part of the practice, where the full members actively engage with the scientific community, the hobby physician-scientists do not appear to struggle with issues of belonging (Goldstein & Brown, 1997). Instead, their role in the clinical community of practice remains at the core, establishing that the connection to the scientific community should be peripheral (Wenger, 1998).

As this peripheral connection is shared among the hobby physician-scientists in the clinical community of practice, it seems to limit the issues associated with being in the periphery. However, if they were to become drawn closer to

the scientific community, this tends to change. This is apparent for the serious physician-scientist type, as I will discuss further in the next section.

Serious physician-scientist

The serious physician-scientist refers to a 'physician who is simultaneously a serious scientist' (Wyngaarden, 1979). With the ambition to divide his or her time between the clinical community of practice and the scientific community, the serious physician-scientist is closest to the ideal – the individual that can seamlessly move between treating patients and conducting research (Daye et al., 2015). Consequently, serious physician-scientists also experience many of the structural barriers and obstacles presented in the literature (Borges et al., 2010), especially during the gap period after the dissertation is finished. However, my findings suggest that once they establish independence, the serious physician-scientist tends to have a rather privileged position in the organisational structure. However, in line with the suggested struggles of belonging (Goldstein & Brown, 1997), the main issues they face instead relate to the social consequences of their double membership.

Contrary to the hobby physician-scientist, the serious physician-scientists typically divide their time between clinical work and research and, as a result, they are also absent from either community for considerable periods of time. With the scientific community typically having a less strict organisation, where researchers enjoy certain freedoms as to when and where they work in line with the norms and values (Hackett, 1990), their absence there is typically not as discernible for their colleagues. Nevertheless, a few of my interviewees expressed a certain rejection of their researcher role in the scientific community, where they are not viewed as "real" researchers because of their clinical work. Although this is less articulated than in the clinical community of practice, it can be experienced as a lack of belonging in the scientific community.

Primarily, this relates to demonstrating independence, in the sense of getting individual research funding, as I illustrated in chapter 7. This results in the aspiring serious physician-scientists experiencing a gap period, which I argue is a result of the somewhat arbitrary idea of independence (B. C. Rosen & Bates, 1967). There appears to be a discrepancy between how independence is interpreted by the scientific community of practice in which the physician writes his or her dissertation, and the broader scientific community. This relates to the notion of the scientific community as both cosmopolitan and local (Gouldner, 1957) and how the students understanding of the scientific

community and its expectations is transmitted in the local community through the daily experiences (Hackett, 1990).

Although having demonstrated independence is a requirement to earn the doctoral degree in the local community, the dissertation is typically not deemed sufficient by the cosmopolitan scientific community. Instead, independence tends to be operationalised as having additional publications and/or having expanded one's research network, similar to the suggestions of Van den Besselaar and Sandström (2019). Thus, the aspiring serious physician-scientists must manage the paradox where they have not shown sufficient independence to acquire funding, while also lacking the funds to be able to meet the operationalised idea of independence.

I argue that this could relate to how the physicians tend to be trained for dependence during their doctoral training, rather than independence. While almost all of my interviewees had limited influence in planning and designing their research projects, this was especially the case for those recruited into the senior members' projects. With the residents' role in the project primarily being to learn the scientific methodology as a clinical instrument, it is sufficient to carry out the research that their supervisors have planned. This typically means that the resident is not involved with certain aspects of the research project, and thus does not learn to become an independent researcher. As such, they are socialised into the scientific community (Golde, 1998; Hagstrom, 1965) by supervisors that steer the resident through the doctoral education, or sometimes even pull them through, as they need the project to lead to publications. I argue that this indicates that physicians are often trained to be dependent on the support of their supervisors.

Consequently, I argue that this leads to a devaluation of the doctoral degree, where it no longer implies that the PhD-holder is ready to become an independent scientist. Similar to the notion of the young researcher as a factory worker (Weber, 1949), the physicians are not trained to become independent scientists. My findings are thus in line with Edwards and Roy's (2017, p. 52) suggestion, where an overproduction of doctoral students leads to '[p]ostdocs often required for entry-level academic positions, and PhDs hired for work MS students used to do'. This creates an uncertainty regarding what level of scientific competence and skill is possessed by a physician that has written a dissertation, which, in turn, creates the need for this being shown in additional work.

However, as the additional work requires research funds, which they struggle to get, they are often dependent on support. Thus, the aspiring physician-

scientists face, what I call, a dependence-independence paradox. This entails that, in order to demonstrate independence from their supervisors, they are dependent on support from said supervisors. Here, I do not just mean informal support through some sort of mentorship, which is an established approach within academia and has been shown to be beneficial (Iversen et al., 2014). What is more problematic is when this involves monetary support (paid research time) and access to infrastructure (office and lab space, computer and library access), which are crucial for gaining the additional merits needed for the physician to acquire funding.

While this type of support tends to be necessary, it also risks 'contaminating' the physician, as working with former supervisors is typically not seen as demonstrating independence. The gap period thus involves balancing this paradox, where the aspiring serious physician-scientists' need for support should not limit their independence. Sometimes, this can involve a certain level of having to manipulate the paradox, where the supervisors remove their name from the publication, in order to not 'contaminate' the physician. I argue that such action both confirms the existence of the paradox, as well as illustrates the complexity associated with becoming an independent physician-scientist.

This serves as an interesting example of how the formal structure always involves some type of local interpretation (J. S. Brown & Duguid, 1991). Although the formal requirements for earning a doctoral degree are the same, there is a discrepancy in how it is interpreted between the local scientific community of practice and the broader scientific community. As there is no formal definition of independence, whether or not it has been demonstrated becomes circumstantial. For the aspiring serious physician-scientist, this leads to the gap period, where the local interpretation is no longer sufficient. Having to adhere to a different interpretation with regard to acquiring funding, they are faced with the paradox of becoming further dependent on the same people from whom they are supposed to demonstrate their independence. Those who manage to traverse the gap period then become accepted as independent serious physician-scientists by the scientific community. However, with this movement towards the scientific community, their experience in the clinical community of practice tends to change drastically.

In the clinical community of practice, my findings suggest that the experience of the serious physician-scientists is, in many ways, the experience of being stuck in the periphery, struggling with being accepted as a member in either community. As such, it is associated with a sense of being excluded, the 'odd one out', where they experience that other members consider them to be a problem (Ahmed, 2012). By connecting their experience to the community, I

highlight the impact that the group values have on the individual (Borges et al., 2010). Thus, I suggest that the serious physician-scientists' experience must be understood in relation to the hobby physician-scientists, who have established a norm as to what a physician-scientist should be in the clinical community of practice. With the serious physician-scientists' extended research activity, they can be seen to question the mutual engagement in the joint enterprise (Wenger, 1998).

As a result of their absence from the clinic, the serious physician-scientists tend to be perceived as less interested in the clinical work by their colleagues. As such, they can be excluded from learning opportunities to extend their clinical competence, which, in turn, confirms their limited interest. Consequently, having less practical experience from treating patients, their clinical skills are questioned by their colleagues. With the notion of the serious physician-scientists being less clinically competent, they can become excluded from partaking in the more advanced types of treatments. Ultimately, their perceived lack of interest can limit their opportunities to develop and become more competent physicians, resulting in them being less competent than their colleagues. In other words, by being seen as rejecting the joint enterprise of the community, where they are not mutually engaged in the clinical practice (Wenger, 1998), they become rejected by the community.

Thus, I argue that the serious physician-scientists struggle to belong as a result of them not being accepted as full members in the clinical community of practice. With the perception of them not being fully engaged in the clinical practice, they experience an exclusion from the community. This is most apparent through their experience of being seen as the 'odd one out', which is constructed due to their lack of mutual engagement. As the odd one out, they become caught in the periphery, where they then lack influence to change the perception (Wenger, 1998). The serious physician-scientists' experience of being the 'odd one out' is constructed through them being different from the norm. As such, the serious physician-scientists' situation should be understood relative to the hobby physician-scientists.

This relates to how the serious physician-scientists' struggle to belong in the clinical community of practice is predicated on them being different from the established idea of what a physician-scientist should be. As discussed above, the hobby physician-scientists can be seen to have determined an appropriate research activity as being part of the clinical practice. This also involves the clinical community of practice establishing the notion of a physician-scientist being a hobbyist. By exceeding that level of research activity, the serious physician-scientists can be seen to challenge the idea of the hobby physician-

scientist as an actual physician-scientist. Thus, although unintentional, they can be perceived as both rejecting the mutual engagement in the joint enterprise, and challenging the full members' identity as physician-scientists. As a result, their role in the clinical community of practice can be seen as a threat to the status quo in the community.

Paradoxically, I suggest that this becomes further accentuated through the added tasks they perform, trying to defend their membership in the community. By continuously highlighting their relevance as clinicians, they can appear to problematise the role of the hobby physician-scientist as a physician-scientist. In line with the ideas presented by Ahmed (2012), their presence can in itself be perceived as a problem, where the clinical community of practice can instead portray them as problematic and reject their membership. Through their rejection, the serious physician-scientists never complete the trajectory towards full membership (Lave & Wenger, 1991). Instead, the full members perceive the serious physician-scientists to be in the periphery of the community, similar to a newly arrived resident. As a result, the serious physician-scientists also have limited capacity to influence the community of practice, as the other members do not accept them.

The professional physician-scientist

With the professional physician-scientists, I refer to those that spend all or a majority of their time on research. With their high level of research activity, they can be seen as primarily scientists, who sometimes participate in the clinical practice. Meeting the definition suggested by Rosenberg (1999), the professional physician-scientists have received the most attention within the literature. Or rather, the identification of barriers and obstacles in the literature often relates to why the number of professional physician-scientists are decreasing. As such, it is possible to interpret that the professional physician-scientist is seen as the ideal type, which becomes further evident in articles highlighting the stories of individual prominent physician-scientists (e.g. Archer, 2007; Goldstein, 1986; Goldstein & Brown, 1997). A similar notion seemed to exist at SUH, where the professors appeared to enjoy an elevated position in the clinical community.

At the same time, I would argue that this notion of an ideal type seems to come from a scientific perspective. While the professional physician-scientists might be influential, their limited time at the clinic can obfuscate their role as translator from 'bench-to-bedside' (S. Wolf, 1974). Their clinical experience is certainly valuable in the scientific environment, but unless they are actively

participating in the clinical community of practice as well, their position as a peripheral member can hinder translation. Although all of my professional physician-scientist interviewees strived to participate in the clinical practice, there were some indications that clinical activity could be disregarded. As the professional physician-scientists are competing for funds with full-time scientists, they are required to produce the equivalent scientific output, despite their clinical obligations. There is thus a risk that the professional physician-scientist can become a pure scientist who used to work clinically.

Nevertheless, becoming a professional physician-scientist is the career goal for most serious physician-scientists. This is not surprising, as it comes with a number of privileges, both structural and social. Being employed by the university provides a security that they have previously been lacking, where their double employment comes with considerable financial benefits. Furthermore, their academic title seems to provide a certain respect in the clinical community of practice. Here, however, the main difference is that the professional physician-scientist is no longer perceived as rejecting the joint enterprise of the community. Contrary to the serious physician-scientist, who is considered as an absent member that is not mutually engaged in the practice, the professional physician-scientist is an accepted peripheral member that from time to time engages in their practice. As a result, the professional physician-scientist is not perceived as a problem in the clinical community and is therefore not required to do the pedagogical task of motivating his or her research activity.

Contributions

In this section, I will discuss the contributions of the thesis regarding the physician-scientists situation. First, I will relate my findings to the literature on physician-scientists, and the ways in which this study expands on our current understanding of their situation. Primarily, I emphasise the impact of social values of being a physician-scientist (Borges et al., 2010), and how the notion of membership in a clinical community of practice seems to influence physicians' research activity. Secondly, I discuss the contributions that this thesis makes to the community of practice literature, specifically regarding boundary crossing and the role of power.

Social barriers and possibilities

While there is an idea that the formal structures can determine the success of aspiring physician-scientists (Daye et al., 2015), despite the number of studies focusing on these structures, it does not seem to provide an answer to how and why physicians start doing research (Borges et al., 2010). Therefore, I approached this study from a different perspective than most previous studies, where the individual physician-scientists' experiences are at the core. Through interviews, the idea was for the physician-scientists to express their own career narratives, in order to get a better understanding of how they experienced their double role. As a result, I argue that the empirical material is a contribution in itself, where my interviewees illustrate the experience of being a physician-scientist. By using their perspective as the focal point, this study also includes the social context in which they operate (E. C. Hughes, 1937). Conceptualising this context as a community of practice, where the informal aspects and the social relations are emphasised (J. S. Brown & Duguid, 1991; Lave & Wenger, 1991), the individual experiences are interpreted in relation to the group of people with whom they work.

Hence, while this study might only present the different experiences of my interviewees, by illustrating the influence that the clinical community has on the individual, I highlight how the social context has an impact on the view of research at the clinic. Furthermore, I argue that this view can be seen as a decisive aspect regarding how and why physicians start doing research, thereby answering the call from Borges et al. (2010) for studying how the values of the group and the organisation can influence the physician-scientists situation. As I illustrated in chapter 6, by emphasising the community of practice that they operate within, I illustrated how the informal expectations that were expressed towards the residents could be interpreted as requirements. Thus, while there are no formal requirements for writing a dissertation, the community has developed it into a part of their non-canonical practice (J. S. Brown & Duguid, 1991). In this practice, research could be seen to function in three different informal roles, which a new member of the community had to learn. This indicates the necessity to understand individual experiences, as they diverge from the formal guidelines (canonical practice), in relation to the social environment in which these experiences take place.

Thus, one contribution of this dissertation relates to the need to consider the formal structures concerning how they are interpreted in the clinical community. For example, SOU (2009:43) made a suggestion to transform the university-hospitals into university medical centres, with shared ownership between the state and the region. This indicates a belief that a different

organisational structure, where the leadership is shared, should automatically lead to research becoming more integrated in the clinical practice. While it would certainly lead to some sort of change, I argue that it would not necessarily change the perception of research in the clinical community, which I argue is the most relevant factor. For example, while it could make the formal structure for physician-scientists clearer and remove some of the barriers, it could at the same time be seen as a threat to the mutual engagement in the clinical practice. The full impact that such a change would create for physician-scientist is then dependent on how the clinical community interprets it.

Similarly, there is often a notion that by providing a better career structure for physician-scientists, more physicians will become interested in doing research (e.g. Forska!Sverige, 2020; Glavey et al., 2013; Goldhamer et al., 2009; Sheridan, 2006; SOU, 2008:7). With the reported high interest in research activity among medical students (Association of American Medical Colleges, 2015; Schober & Björk, 2018) as a basis, Ley and Rosenberg (2005, p. 1343) argued for an improved physician-scientist career pipeline, 'build it, and they will come'. Most studies follow such an argument, where the structural barriers and obstacles are considered the main reason for why the number of physician-scientists is decreasing. While this study attests to the existence of structural obstacles for aspiring physician-scientists, my findings also illustrate that the social context that they experience plays a pivotal role in their careers.

This was most evident in how residents were recruited into writing a dissertation by their senior colleagues, despite the lack of funding and research time. Even though there was barely any formal structure in place for them to get involved with research, they did so, nevertheless, in order to meet the expectations put on them by their senior colleagues. As should be evident by now, this is not a clear and structured career. Instead, it is a career that goes up and down, with twists and turns, success and rejection, which requires a strong dedication, support, and elements of luck to be successful. Although the variation among my interviewees' career tracks, to some extent, supports such an argument, it also illustrates the difficulty in developing such a career track. This is because there are a number of different ways to be a physician-scientist, as I suggested in chapter 8, which does not necessarily fit in the same "career pipeline" (Ley & Rosenberg, 2005).

As the ALF-funds at SUH can be seen to function as a career structure, my findings suggest that this comes with both advantages and disadvantages. While it provides individual physician-scientists with the opportunity to develop into independent physician-scientists, it also tends to make them perceived as problematic in the clinical community of practice. Thus, it serves

as a relevant example of how improved formal structures for a specific type of physician-scientists can also be interpreted as something that creates problems for the clinical community of practice. Thus, the calls for more funding specifically tailored for physician-scientist (Nathan & Schechter, 2006), do not necessarily create a better situation for the beneficiaries. At the same time, if such funding created opportunities for more serious physician-scientists, this could possibly have an impact on the view of research activity in the clinical community of practice.

With this, I do not argue that changing the organisational structure is not a valid strategy to make a change, which could improve the situation for physician-scientists. However, I do argue that such a change by itself is not sufficient, unless it also includes a plan for how it will impact the non-canonical practice (J. S. Brown & Duguid, 1991). It cannot be assumed that such changes create the results that were expected, without understanding in how they become part of the clinical practice (Wenger, 1998). This is further illustrated in the next section, where I argue that there is a need to re-define the physician-scientists. Suggesting that there are three different types, implementing new structures would impact these differently.

Communities of practice

While I have primarily used the communities of practice literature as an analytical framework, here I suggest how this study also contributes to the concept, specifically in regards to boundary crossing and the role of power. Through the notion of the hobby physician-scientist I illustrate how boundary crossing can become a part of the practice in a community, where a certain amount of brokering across the boundary is necessary for the joint venture. Furthermore, by connecting the rather underdeveloped notion of multimembership with the literature on hybrid identities, I extend our understanding of the broker role. Through this, I also illustrate how the negotiated meaning in the community of practice involves relations of power, where the full members develop the norms that all members must adhere to. With the serious physician-scientists portrayed as the 'odd ones out' and a problem in the community, the mutual engagement in the joint enterprise become reified, further strengthening the full members control in the community.

As explained in chapter 3, the concept of communities of practice was developed from ideas on how learning occurs as a situated activity. Through legitimate peripheral participation, a newcomer learns to become a member of

a community (Lave & Wenger, 1991). As such, it relates to learning both practical and social aspects, both to conduct the practice and perform as a practitioner associated with the community. One crucial aspect of the concept of legitimate peripheral participation is that learning, per definition, becomes conformist. As situated learning means that newcomers should learn the practice from the senior members, they are expected to conform to the full members' idea of what the practice is. In other words, they learn the things that their senior colleagues deem necessary for them to learn. As a result, dispersing new knowledge in communities of practice is often a slow process (Wenger, 1998), as there is no clear way for this knowledge to enter the community.

This is typically not the case in the clinical community of practice, however, where there is both a need and support for new knowledge. Especially in order for the clinical practice to provide the best and most advanced treatment to the patients, which is a crucial aspect of their joint enterprise. Thus, attaining new knowledge is part of the clinical practice, which could be seen as the reason for the hobby physician-scientists being the ideal full member. Through their scientific competence, they are capable of crossing the community boundaries (Wenger, 1998) and interacting with the external scientific community. As such, the clinical community can be understood to have made a certain level of boundary crossing part of the practice. This study thus contributes to empirically illustrate how a community of practice can develop an openness to the outside world, as long as it is relevant for the joint enterprise.

At the same time, they can be seen to have developed clear limits on how this boundary crossing should take place. This is most apparent in how the serious and professional physician-scientists are considered as interacting too much with the outside, with their higher research activity. Doing research in such a capacity is seen to neglect the mutual engagement, rejecting the joint venture of providing the most advanced care with their more limited clinical experience. As a result, they become the 'odd ones out' in the community, seen as a problem, who lack legitimacy as members. Wenger (1998) suggests that boundary crossers could be seen as brokers, translating and aligning different perspectives across the boundaries. Here, both the hobby and the serious physician-scientists can be seen as brokers, with the distinct difference that the hobby physician-scientists do so with the legitimacy from the community. The serious physician-scientists, on the other hand, are considered as having crossed too far, where their research activity instead is seen to have a negative impact on the joint venture, making them into peripheral members.

So, this serves as an example on the control and power that the full members have in the clinical community of practice. Thus, my study, to some extent,

answers the call from Contu and Willmott (2003) for empirical studies that show how power can be used in communities of practice. Here, it is illustrated in how those that are perceived to reject the joint venture become excluded. By not accepting them as full members, their legitimacy in the community of practice is limited, which thus restricts their influence in determining the joint venture. As a result, the community of practice tends to become conformist, where certain new ideas are rejected automatically, as they are suggested by peripheral members, who lack the power to influence the practice.

Thus, the serious physician-scientists can function as an illustration of continued peripherality, which is what the residents, as legitimate peripheral participants, would experience if they diverge from the expected trajectory. Accordingly, this indicates the power that the full members have over the legitimate peripheral participants, as their progress is dependent on the full members' acceptance. While Lave and Wenger (1991) suggested that the concept involved an unequal distribution of power within a community of practice, they acknowledged that it was underdeveloped in their writing. The limited interest in power relations within the literature has been raised by several writers (e.g. Barton & Tusting, 2005; Contu, 2014; Contu & Willmott, 2003, 2006; Corradi, Gherardi, & Verzelloni, 2010; Cox, 2005; Gherardi et al., 1998), arguing for a need for more studies illustrating how power is an inherent aspect of communities of practice. In this study, I attempt to do so, arguing that the expectations expressed towards the residents can be understood as a way to make the legitimate peripheral participants conform to the ideas of the senior members in the community.

This is apparent from my empirical material, which illustrates the strength of this type of conformist learning. The expectations expressed towards the residents, as legitimate peripheral participants, can be understood as a way for the senior members to use their power to make sure that they conform to their perceived joint enterprise. Although there are no formal requirements for residents to write a dissertation, it is a requirement for them to be accepted as members of the clinical community. Thus, the senior members of the community of practice can be understood as using their influence in determining the legitimate peripheral participants' role in the community as a way to exercise control and power over their actions. As a result, the learning process in the community of practice becomes conformed in accordance with the senior members' definition of the practice. With them having followed the same trajectory when they were new members, the community in certain ways stays the same over time.

As a result, the community of practice tends to involve an anachronistic socialisation, where the new members are expected to accept ideas that might not be up to date with their generation. This is apparent with the membership fee, where the residents are expected to spend their own time on their research activity. This is often suggested by their supervisors, who argue that this was how it was when they wrote their dissertation, e.g. using the on-call compensation for research activity. However, this tends to ignore certain societal changes, such as parents are expected to spend more time with their children, that the on-call compensation time is there to guarantee that the physician recuperates after long night shifts (which also is a patient safety issue), and that work is not necessarily the most important thing in people's lives. Thus, although society changes over the generations (A. Brown, 2009), the conformist learning of a community of practice can be seen to obscure such changes, where the expectations relate to the previous generation's experience. There appears to be an idea, among some full members, that the new generation of residents should have it as tough as they had. So, the residents tend to become socialised into internalising anachronistic ideas, in order to meet the expectations of their seniors.

Summing up, the case of physician-scientists illustrates how a community of practice can be both conformist and open to new ideas, at the same time. By acknowledging the need for new knowledge in the joint venture, they have made crossing boundaries a part of the practice. At the same time, the new members are expected to conform to the ideas of how much boundary crossing is reasonable. I argue that this serves as an example of how the full members of a community of practice can use their power and control, where they determine the appropriate amount of boundary crossing for the practice. This power is then exercised by excluding those that are seen to disregard the joint venture, which, in turn, also functions as a way to express to the legitimate peripheral participants what they should do to become accepted as full members. Thus, through the power of determining the membership status in the community of practice, the full members can influence the actions of the peripheral members.

Implications

Having emphasised the influence that the communities have on the individual physician-scientist, this study have both contextualised the structural barriers that the physicians face in practice and highlighted the complexity in how these

structures are interpreted through social relations. Thus, contributing to a deeper understanding to how physician-scientists experience their career has in many ways involved problematising the notion that a typical physician-scientist career exists. By re-defining the physician-scientist into these three types, I suggest that it is possible to have a more fruitful debate on their situation and their purpose. With a more specific terminology, it is possible to clarify what type of physician-scientist is being discussed in each specific case.

I argue that this is most relevant when we consider the purpose of the physician-scientists. Often they are portrayed as both better physicians and responsible for rescuing clinical research, at the same time (Stendahl, 2012). Following the experiences of my interviewees, these two are seldom compatible. While writing a dissertation is relevant to become a more scientifically competent physician, the physician does not necessarily become a competent scientist, as I illustrated in chapter 7. Those that do are, in turn, typically considered problematic in the clinical community, due to their limited experience in treating patients.

The decline in clinical research is often referred to as a translation problem (Lenfant, 2003), where the physician-scientists should function as a translator between 'bench and bedside' (S. Wolf, 1974). This relates to the idea of the physician-scientists moving seamlessly between research and clinic, where they bring new scientific findings into clinical practice, and relevant clinical questions into the scientific practice. Although this notion of the physician-scientist as a "triple threat", translating both from bench-to-bedside and from bedside-to-bench is prevalent in the literature, the role mostly seems to serve as an ideal. Following the experiences of my interviewees, their role as translator in both directions could be questioned.

This relates to how it seems that either one is a more competent physician, not necessarily contributing that much to clinical research, or one is a more competent scientist, not necessarily providing better care to the patients. Following my suggested re-definition of the physician-scientist, the hobby physician-scientist is the former, while the serious and the professional physician-scientists are the latter. With the difficulties associated with becoming an independent physician-scientist, it seems difficult to also be a better physician, compared to the hobby physician-scientists. Thus, I argue that there are few physician-scientists that can successfully fulfil both suggested purposes, but rather the two purposes are met by different types of physician-scientists.

Hence, it is necessary to consider the need for having both hobby physician-scientists and serious and professional physician-scientist, as they have different functions. Accordingly, I argue that it is relevant to specify which of these purposes is being considered when debating the physician-scientists' role. If the emphasis is to have more scientifically competent physicians, then the type of training for dependence, which I illustrated in chapter 7, is perhaps sufficient. However, if the purpose is to have more physician-scientists that can improve clinical research, then it could be relevant to consider how physicians are trained in the sciences.

Specifically, using the measure of the proportion of physicians that have written a dissertation (e.g. Rydgren Stale, 2019; SOU, 2008:7) does not necessarily have relevance for the state of clinical research. Especially considering the way that some students are both steered and pulled through, limiting their training in independence and devaluating the doctoral education. This seems to relate to an idea that the more physicians that enter into research, the more will automatically also continue to be active physician-scientists. However, if those that do write a dissertation are primarily trained for dependence, there are few who will manage to become independent physician-scientists.

Thus, somewhat contrary to SOU (2009:43), I argue that the problem is less about getting physicians started with research, as it is to train them differently and support continuing research after the dissertation. Certainly, this could improve with an increasing number of physicians that write a dissertation, although considering the current problems of continuing to do research, they would not decrease with even more physicians competing for the limited resources. Furthermore, to regain Sweden's success in clinical research, there is a need for improved circumstances for serious and professional physician-scientists. This does not just relate to financial aspects, although that would certainly help, but rather the situation the physician-scientists experience as a result of their decision to pursue both crafts actively.

If the emphasis, instead, is placed on guaranteeing that the country has a large proportion of physicians, who have the necessary scientific competence to guarantee that we can provide the most advanced healthcare (Stendahl, 2012), the response needs to be different. If that is the purpose, I argue that it is not necessary that all physician-scientists should become independent, as it is sufficient that they learn research as a clinical instrument that improves the clinical practice. Based on this study, however, this appears to be less of a problem, at least at the university-hospital studied here. While I can certainly not generalise on a larger scale, the type of internal recruitment of young

physicians into research that I have shown appears to be successful. Although this recruitment might not necessarily be ideal for the resident's situation during their doctoral studies, it is obviously efficient from a purely governance perspective, as they mostly spend their own time doing research and thus does not require much resources.

Thus, perhaps the 'end of the physician-scientist' (Gill, 1984) has come, at least for the idealised version of a "triple threat" individual. Although this study cannot show if this is definitely the case, it does indicate that it is necessary to consider that different types of physician-scientists can participate in the translation of knowledge in different ways. If the three types of physician-scientists that I have suggested here can be confirmed to be a general phenomenon by future research, it would probably be possible to make improvements for the separate types to hopefully improve both the translation of knowledge from science to practice and from practice to science. Accepting that hobby physician-scientists play an important role in the former, could possibly make the scientific education become more institutionalised in the professional community. This would not mean that all physicians should write a dissertation, but perhaps extend the scientific requirements in their training. However, any such change must involve internal discussions within both the professional community and the smaller communities of practice, ideally developed from the ground up.

Limitations and future research

As with all research, this study has certain limitations that should be raised. Most of these limitations relate to methodological choices that I have made, which I will here illustrate in relation to my findings. However, I will here omit discussing the main limitation that comes with using a qualitative approach, that of not being able to generalise my findings. As that has been discussed in chapter 3 where I motivate my interpretivist approach, the focus will be on what limitations this approach has on the study, primarily discussed based on the theoretical perspective that I have used and my own interpretations.

Using a certain concept, such as communities of practice in this thesis, offers a conceptual lens that helps in the analysis of the empirical material. However, this lens can also limit other perspectives, leading to certain aspects being omitted. For example, the emphasis put on the community and the practice, can in some ways limit the attention to individual agency in the analysis. With

an interest in understanding the influence of the group and how it exercises control and power over members, using communities of practice could portray the individuals as not having any control over their situation. That is of course not the case, after all the community is constructed by the members and there are spaces for discrepant views in the joint venture, which I have tried to illustrate. Nevertheless, using a different framework could possibly elevate the individual agency in the analysis, which is not as apparent in my study. Future research looking at the social factors influence of the physician-scientists could possibly take this further into account.

As I have argued for the need to consider the influence of social aspects regarding the physician-scientists, rather than the structural barriers and obstacles, this study could possibly to some extent be seen to ignore the structures. While I have tried to include them through the notion of how they are understood by my interviewees, and the interpretations of them made in the communities of practice, they could sometimes be modulated in the analysis, as so much have been written about them earlier. Even though I argue that they should be understood in relation to how they are understood by the communities, this is based on my interpretations of what is relevant. Another theoretical lens, combined with another researcher's different perspective, could perhaps highlight the impact of these structures more in relation to the social aspects that I have focused on.

Another consequence of the theoretical framework relates to the issue of gender, which I have not really included in my analysis. This is due to two reasons. First, many of my interviewee's did not mention gender issues as an important factor, even when asked about it. Yet, some people did discuss it in different ways, which if this study had been influenced more by a critical perspective, could have been part of the analysis. Especially considering that the increase of women in medicine can be attributed to certain changes in the values and ideas prioritized (Jagsi & Tarbell, 2009). However, this leads into the second reason, which relates to the communities of practice literature and its focus on the power relation between the old-timers and the newcomers. While gender can be included here, it has not been a major focus in my analysis. Considering the indications in my material that gender does matter, I suggest that future research could put further attention on this and make interesting contributions to our understanding of the physician-scientists.

A final limitation is my own background as an outsider in the medical field, and the associated lack of understanding of the natural sciences. While I argue that this has in many ways been an advantage, such as entering the field with few preconceived notions, being able to hold a distance from the field, and

provide a different theoretical framework and a different approach, it also has certain limitations. Especially in my understanding of how the science and clinical practice impact each other, where I cannot understand how the translation occur in practice. Although I argue that this is not necessary for answering my research question, it should be acknowledged as a limitation.

The findings of this study could also shed light on other instances of how individuals manage being member of different communities. The perspective used here could be applied to any individuals that do jobs, or hobbies, in parallel that influence each other. Considering my own experiences, one such example is that of the academic teacher/researcher, who in some sense is caught between the high expectations on academic output, as I have shown here, and being a good teacher for the students. There are potential overlaps between the gradual separation of clinical practice and science, and the separation of teaching and research, that could be interesting to study through the same lens that I have applied here.

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