Exploring Fatigue as a Social Construct:

Implications for Work Hour Reform in Postgraduate Medical Education

Taryn Taylor
The research reported here was carried out at

Maastricht University

in the School of Health Professions Education

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Sleep by Artem Kovyzin from the Noun Project

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Exploring Fatigue as a Social Construct
Implications for Work Hour Reform in Postgraduate Medical Education

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Postcall

Postcall you come home diminished, wan, your hands faltering at the lock. You feel the need to tell me each patient’s history before you sleep, the progress of each malignancy, the way the family spoke to you, the suffering that makes each death a release.

I understand. But I wait for you, Isabelle, not your stories of the progress of the dying.

I lead you to bed like a child, almost crying with fatigue and despair these anaemic mornings when you have donated all your strength and then come home to me, stricken, empty and grateful for the smallest gesture of tenderness, my easing your heel from your boot as you undress, holding you while you try to reclaim your membership as one who sleeps. Your limbs twitch like a dog’s, hurrying into dreams, your lips part with sighs. I soothe you with my weight, whisper about the snow piling up outside.

Your eyes close, it’s late afternoon, slow repose beckons. But even in dreams your fingers pleat the quilt as if gathering the flesh of an arm before a shot.

I understand. Accountability never leaves your hands.

-Rachel Rose
McGill/Queen’s University Press
(excerpt from Giving My Body to Science)
Table of contents

Chapter 1  Introduction  9
Chapter 2  Reflexivity, Theoretical Framework and Methodology  23
Chapter 3  To Stay or Not to Stay? A Grounded Theory Study of Residents’ Postcall Behaviors and Their Rationalizations for Those Behaviors  33
Chapter 4  Recovery of Sleep or Recovery of Self? A Grounded Theory Study of Residents’ Decision-Making Regarding How to Spend Their Nonclinical Postcall Time  45
Chapter 5  Principles of Fatigue in Residency Education: A Qualitative Study  61
Chapter 6  Work Hour Regulations Complicate Residency Education: Lessons About the Social Construct of Fatigue in Europe  73
Chapter 7  Discussion  87

Summary  105
Samenvatting  109
Valorisation  115
Acknowledgements  119
Curriculum vitae  121
Chapter 1

Introduction
Regulation of resident work hours remains one of the most hotly debated issues within medical education over the last decade. These regulations challenge the long-standing tradition in which residents routinely work shifts longer than 24 hours during their training. In this tradition, working extended hours is a rite of passage\textsuperscript{1} and a proxy for dedication to professional ideals such as altruism.\textsuperscript{2} Unregulated work hours have been criticized for being outdated and dangerous in light of evidence that prolonged sleep deprivation may compromise patient safety and resident wellbeing.\textsuperscript{3-5} Public accountability has been another driving force that has led the United States (U.S.) and many jurisdictions in Europe to institute resident work hour regulations.\textsuperscript{6} In spite of these pressures, Canada has chosen not to adopt national work hour regulations and existing work hour policies in the U.S remain controversial. Researchers have invested a tremendous amount of resources into resolving this controversy. Increasingly, research efforts are focused on proving whether restrictions are good or bad for medical training and patient care. There is now growing concern that fewer and fewer studies favour work hour restrictions. Many of these studies fail to account for the social milieu that shapes how these work regulations are enacted; influences trainees’ perceptions of and adherence to the regulations; and reinforces potential barriers to implementation. We need to broaden our focus from trying to prove whether restricting resident work hours is good or bad, in order to develop a more nuanced view of why existing regulations outside of Canada may have fallen short of expectations. In particular, understanding how the social learning environment shapes behaviours and offers insight into the limitations of policies that focus solely on work hours.

**Duty Hour Controversies**

The current body of literature that explores the impact of resident work hour regulations contains multiple lines of inquiry. Below I summarize four key debates that are most relevant to my program of research.

**Is Sleep Deprivation Dangerous?**

One position within this debate asserts that sleep is a physiologic need, and the drive to sleep can be as overpowering as hunger or thirst. There is evidence that fatigue from excessive sleep deprivation can lead to cognitive impairment.\textsuperscript{3,7} Studies have shown that increased rates of motor vehicle collisions and percutaneous needle-stick injuries correlate with prolonged sleep deprivation in medical trainees.\textsuperscript{4,8} Although some studies indicate that individuals can accurately self-assess their level of fatigue, they inaccurately estimate the negative impact of fatigue on their performance.\textsuperscript{9-11} In the setting of resident work hours, empirical data raises concerns about performance impairment for residents who are providing patient care after prolonged periods without sleep.\textsuperscript{5}

Skeptics assert that sleep deprivation is less dangerous than earlier studies suggest.\textsuperscript{12} This emerging, contrary position is reflected by a new wave of research, which questions the link between sleep deprivation and impaired clinical performance. Psychomotor function\textsuperscript{3,13} and
situational awareness, for example, may be unaffected by sleep deprivation. Others have demonstrated that certain operative complications are not increased after working a night on call. These results affirm the popular stance that long working hours enable trainees to build stamina and learn how to withstand prolonged periods of wakefulness. The controversy has inspired resource-intensive, large-scale studies that suggest prolonged work hours and subsequent sleep deprivation may not affect patient outcomes as profoundly as was once thought.

There are many ways to reconcile the contradictory positions within the knowledge claim that sleep deprivation is dangerous. Firstly, most research that highlights the dangerous impact of sleep deprivation in non-physician subjects is situated within tightly controlled laboratory settings that may not reflect the realities of medical training. Secondly, when this type of research is performed with medical trainees, it is usually not feasible to provide a well-rested control group, due to the ubiquitous nature of chronic sleep deprivation amongst trainees. Finally, it is exceedingly difficult to identify tasks in the laboratory setting that replicate the complexity required of medical trainees when providing patient care.

The inherent complexity of patient care makes it difficult to parse out the impact of fatigued and sleep deprived individuals on medical errors. Researchers often rely on individuals’ self-reported measures of fatigue or perceived error. Other studies use second-hand, non-blinded observer judgments of apparent alertness or decision-making quality for individual trainees. In practice, however, seldom do the erroneous actions of a single physician or trainee reach the patient in a simple, linear fashion. More commonly, clinical error results in an adverse outcome due to breakdown within a dynamic, interrelated system of individuals, protocols, and tools. And while a fatigued clinician may influence team functioning and working culture, the impact of the individual is difficult to isolate from the system in which he or she is embedded.

Thus, the lack of consensus about the impact of sleep deprivation results from a combination of artificial study environments, insufficiently rested controls, subjective measures, and a focus on the individual as the exclusive source of danger.

**Does Resident Training Suffer From Work Hour Restrictions?**

In part, the elimination of long duty periods and excessive sleep deprivation in training was intended to improve trainees’ skill acquisition and knowledge retention. In a laboratory setting, research supports this notion. Sleep deprivation interferes with complex cognitive demands; it makes learning harder.

Contrary to this position, there is medical education research that questions whether working long hours affects learning or cognitive performance. Moreover, there is a growing
fear that reducing consecutive work hours is harmful to medical training. Surgical specialties have been particularly vocal about these concerns; however, the negative impact on operative case volume may be overstated. One source of distress is the prevalence of time-based educational models. When clinical competence is implied by duration of training, work hour regulations are an obvious threat to competence. Perhaps the shift to competency based educational frameworks will alleviate some of these concerns. Medical training also relies heavily upon ‘education by random opportunity’, as it is nearly impossible to ensure each trainee is exposed to the exact same constellation of clinical problems and procedures. In some ways, the math is simple: in the current system, fewer hours at work mean fewer random opportunities.

Unfortunately, measuring the educational impact of reduced work hours has proven challenging. Some researchers have looked to standardized test scores and pass rates. But comparing scores pre- and post-duty hour regulations, whether they are better or worse, tells only part of the story. Test scores are invariably the product of many influential features of the clinical learning environment. It is also unclear what constitutes an educationally relevant difference. Another approach to assessing the educational impact of work hour regulations has taken the form of surveying preceptors and trainees. While this is valuable information, it does not account for the cultural influences and confounding factors at play. For example, it is hard to imagine that residents might report a positive impact of work hour restrictions if they are simultaneously receiving a “constant stream of tacit messages about the substandard quality of their educational experiences” from preceptors who trained in an era before such restrictions. (p497)

While medical knowledge and procedural expertise are important considerations, we cannot afford to overlook the impact of work hour restrictions on professional identity development. Green speculated that the strongest argument in favour of reducing hours is that it will create space for trainees to develop professional integrity. He suggests that this space is otherwise difficult to access when long working hours are the norm. This concern is echoed by Gaba and Howard who caution that, “fatigue-related depression and anger result in detachment and a lack of compassion for patients.” In contrast, others question whether these restrictions threaten to extinguish residents’ sense of altruism, commitment and accountability. Work hour restrictions are further problematized as an ethical dilemma, wherein residents are faced with the choice between following the restrictions or doing what they believe is in the patient’s best interests.

Do Work Hour Restrictions Compromise Patient Care?
One unintended consequence of fewer consecutive working hours is an increased frequency of patient care handoffs. Handoffs occur when patient information is passed from one team member to another during transitions of care. Many preventable adverse events have been attributed to communication failures during handoffs. Fortunately, enhanced handoff
interventions have shown great promise in reducing medical error and adverse event rates. These interventions focus on team continuity of care and shared situational awareness, rather than relying on a single individual to maintain continuity. Unfortunately, antiquated notions of professionalism detract from enhanced handoff interventions in the era of work hour restrictions. Arora et al define nostalgic professionalism as “consistently placing a patient’s or the profession’s needs above one’s own personal needs.” As long as individual continuity is the gold standard, handoffs are likely to remain the weakest moments in patient care, which is exacerbated by work hour restrictions.

Many researchers are invested in measuring the impact of duty hour restrictions on patient care outcomes. As Baldwin et al caution, much of the research to date has focused on the clinical outcomes that are easiest to measure. They suggest that, while acute renal failure rates and surgical site infections are meaningful outcomes, the specific impact of work hour restrictions is more likely evident in outcomes such as percutaneous needlestick injuries or delays in patient care. Others argue that the most important outcome is patient death or serious morbidity. After the first three papers in this dissertation were published, Bilimoria et al released a landmark trial in the United States. The trial compared traditional restricted work hours with more flexible work hour arrangements that allowed general surgery residents to work beyond the established regulations for the sake of continuity of patient care. They demonstrated that more flexible work hour arrangements had non-inferior patient outcomes compared to more restrictive duty hour arrangements. Unfortunately, because the study was designed as a non-inferiority trial, we cannot conclude whether these flexible work hours are in fact safer for patients. Schumacher et al question whether duty hours are solely responsible for the increasing fragmentation of patient care; they suggest that other issues may be at play, including the block structure of resident rotations. With the complexity of patient care and residency training nowadays, it is proving to be very difficult to unravel the specific impact of altered resident work hours amid the many other aspects of patient care that are constantly shifting.

Can Fatigue Be Managed?
Recently, the discourse on resident work hours in the Canadian context has shifted away from restrictions to focus on fatigue management plans. The thrust of this new movement is that workplace fatigue may be unavoidable but it can be mitigated and managed, in lieu of prescriptive work hour limits. Fatigue management plans are embedded within the occupational health and safety systems of many industries outside of medicine, including aviation, military, and the maritimes. Fatigue-proofing is one component of a fatigue management plan. It involves identifying fatigue-susceptible tasks in the workplace and implementing systems-level changes to alter these risks. For example, when long-haul pilots self-identify as fatigued, they inform their co-pilot to ensure an earlier preparation for descent and minimize the risk of error from fatigue. In these contexts, fatigue is seen as a modifiable hazard.
Part of what makes fatigue management plans effective in other industries is the shared recognition that fatigue is hazardous. However, fatigue may not be so clearly defined within the context of medical training.ⁿ It might be entangled with, and perhaps indistinguishable from, other issues of trainee supervision, workload compression and workplace inexperience.¹² Varied perceptions about fatigue among clinicians and trainees serve to further complicate matters. Sexton et al⁵⁰ found that 60% of medical respondents believed their performance during critical times was unaffected by fatigue. Rosen et al¹⁷ demonstrated that trainees shared a strong sense of being able to develop a tolerance to sleep deprivation. The latter concept contradicts established principles of sleep deprivation and lacks empirical support.²⁰ It is unlikely that we can resolve the debate about whether fatigue in medicine can be managed until we have a better understanding of what we mean by fatigue in this context.

**Fatigue Through a Different Lens**

Predominant debates within the literature consider fatigue from an individualistic perspective. They are based on a shared underlying premise that individuals experience physiologic fatigue as a consequence of long working hours and sleep deprivation. As I have outlined above, there is considerable disagreement about how this plays out when a fatigued individual provides patient care while learning to practice medicine. Another way of thinking about these problems would be to consider fatigue not only a physiologic state but also a social and collective phenomenon. There are glimpses of this perspective in the literature. For example, Puddester points out that the success of fatigue management plans depend upon “a workplace and training environment that encourages and promotes good health, including good sleep.”⁴⁹(p2) Lopez and Katz acknowledge that physicians are “embedded in a social environment that can either facilitate or hamper their commitment to the professional ideals of medicine.”²²(p316) By approaching the issue of fatigue from a different perspective, as a collective and social phenomenon, further insights await that would not otherwise be appreciated by a purely individualistic stance.

My thesis¹ aims to explore fatigue as a social phenomenon. As an extension of this purpose, I explored interventions that are intended to modify fatigue, such as work hour restrictions and fatigue management plans through a similar lens. A more detailed discussion of my social constructivist stance and the impact this had on the chosen methodology for this research is provided in Chapter 2. The specific research questions that comprise this research program are outlined below and followed by a brief summary of each respective chapter.

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¹ While this thesis was accomplished within a collaborative team, I will use the first person pronoun throughout to acknowledge my final responsibility for the thesis project.
Research Questions

Research Question #1

*How do residents decide to stay or go following a 24-hour call shift?*

We set out to understand how residents decide when to transition from on-duty to off-duty while scheduled for 24h shifts. Because we chose to study this phenomenon in the Canadian context, where existing work hour rules are not legislated or consistently enforced, we were able to explore what motivates residents’ decisions when they are enacted outside of highly regulated policies. This question is addressed in Chapter 3.

Research Question #2

*What do residents do when they leave the hospital following a 24h call shift, how do they make these decisions and how do they understand them in the context of their own wellbeing?*

We were fortunate to emerge from the first study with a rich data set in which participants spoke candidly about their decision-making at the end of a 24-hour call shift. While analyzing the data for the initial study, we appreciated that there were two distinct but related stories to be told. One story captured how residents decide *when* to transition to off duty, while another story illustrated *how* residents make this transition. In the second study, we therefore returned to the original data set and proceed with an analysis that sought to understand how residents transition to off-duty. We also explored the relationship between this decision and residents’ perceived wellbeing. This question is addressed in Chapter 4.

Research Question #3

*How is fatigue socially constructed in the clinical training environment?*

Fatigue featured both explicitly and implicitly in the two previous studies that explored when and how residents transitioned from on-duty to off-duty when working 24-hour shifts. Some residents had indicated that there were certain clinical duties that they would feel more or less comfortable performing if they were fatigued and had chosen to extend their duty period beyond 24 hours. This led us to wonder whether fatigue was more than an individual physiologic state, given that perspectives of risk shifted according to the workplace context. We therefore sought to explore how fatigue is socially constructed within a clinical learning environment without enforced work hour regulations. This question is addressed in Chapter 5.

Research Question #4

*How are work hour regulations understood in the European context?*
When our earlier research was presented to international audiences, we often heard that trainees in contexts with longstanding work hour regulations did not struggle with issues of setting boundaries between on- and off-duty. There were mixed reports about whether the regulations truly reflected practice patterns. This led us to explore how work hour regulations are understood by sampling medical trainees from four European countries with established regulations. Rather than simply drawing comparisons between Canada and European experiences, we intended to further refine our understanding of the social phenomena at play within our earlier studies. This question is addressed in Chapter 6.

Research Setting and Context

Because the research comprising my thesis centres on the social learning environment, it is necessary to understand what is happening across the International, National and Local contexts where the research is situated. Salient and contemporary features of each context are described below.

The International Context

Europe

Employee safety and wellbeing was the main impetus for legislated work hour regulation, known as the European Working Time Directive (EWTD), which was implemented in 1998. The Directive stipulates a maximum 48-hour work week and requires a minimum of 11 consecutive hours of rest daily, among other restrictions. Regulations are now enforced for all workers across the European Union, including medical residents and their consultants. Notably, Denmark is recognized with many years of compliance, the Netherlands has been compliant since 2011 and the United Kingdom only recently began enforcing the directive for medical trainees in 2009. Ireland, on the other hand, has a reputation for poor compliance. Concerns about the EWTD go well beyond issues of compliance and enforcement. Brown et al suggested that poorly designed, yet EWTD-compliant, work schedules did not solve the problem of trainee exhaustion. Other issues include shifting definitions of what counts towards on-duty versus off-duty hours and disagreement about whether sleeping during a call shift is responsible or a financial burden to the system.

This is certainly a dynamic topic and beginning in 2015, there were two political disruptions of relevance to our research. First, the junior doctors in England’s National Health Service (NHS) were engaged in a contract dispute with the UK government, which led to public scrutiny of junior doctors’ work hour arrangements. Criticisms of the rejected contract included concerns that it was “an attempt to stretch existing staff over 7 days without increasing spending” and that, “acute specialties with ...arduous out-of-hours demand, such as anesthetics and intensive care, will be hardest hit under the new contract”. Matters
were complicated further when the UK population voted to leave the European Union in June 2016. Many individuals are now speculating that the European Working Time Directive will need to be reformed, given that the existing workforce in the UK will be reduced tremendously.\(^5\)\(^8\) This political turmoil added another layer of complexity during interviews with UK trainees because of the potential impact on work hour regulation.

**United States (U.S.)**

After the highly publicized and tragic death of Ms. Libby Zion, who died of undiagnosed serotonin syndrome in New York State,\(^4\)\(^6\),\(^5\)\(^9\) the Bell Commission was established to address systemic concerns about patient care delivery in U.S. training institutions. Although many recommendations emerged from the Bell Commission related to trainee supervision and patient care volume, New York State focused on imposing work hour regulations for all residents.\(^3\)\(^8\),\(^5\)\(^9\) This was an unprecedented move, given that trainee sleep deprivation was never officially implicated in Ms. Zion’s untimely death.\(^3\)\(^8\) In lieu of state-mandated legislation across the remaining states, training institutions are held to the Accreditation Council for Graduate Medical Education (ACGME) resident work hour regulations.\(^6\)\(^0\) For example, these regulations include a maximum 80-hour work week averaged over 4 weeks and at least 10 duty-free hours between work periods.\(^5\)\(^3\) Increasingly restrictive regulations have sparked ongoing debate and inspired resource-intensive studies about whether these policies are safe and necessary or detrimental and ill advised.\(^1\)\(^8\),\(^1\)\(^9\)

**The Canadian Context**

Unlike the above-mentioned jurisdictions, Canada does not have a national resident work hour policy. Furthermore, the work hours of independent physicians (consultants) remain entirely unregulated. Resident work hours are negotiated between provincial associations of resident representatives and hospital organizations with limited enforcement of these arrangements. Independent physician (non-trainee) work hours remain unregulated. In 2011, an arbitrator in the province of Quebec declared that the standard 24h shifts worked by residents violated the Canadian Charter of Rights and Freedoms, which led the province to restrict residents’ in-hospital shifts to 16h.\(^6\)\(^1\)

In response to this arbitration, the Royal College of Physicians and Surgeons of Canada (RCPSC) created a National Steering Committee to address the issue of resident work hours and fatigue in the Canadian context. The subsequent recommendations did not favour prescriptive restrictions to resident work hours because the committee suggested that, “a tired doctor is not necessarily an unsafe doctor.”\(^4\)\(^8\\)\(^p\)\(^2\)\(^8\) Instead, the committee advocated for fatigue risk management strategies to address the need for public accountability in defending the tradition of long working hours. Despite this shift in focus, the Canadian Association of Internes and Residents has maintained that all provinces and regions in Canada should “work toward a system that does not require residents to work more than 16 consecutive uninterrupted clinical hours at a time...”\(^6\)\(^2\\)\(^p\)\(^4\) Without clear infrastructure for
accommodating and enforcing this recommendation, there appears to be little appetite for implementing such system-level change.

The Local Context
Three of the four studies were situated at Western University, a Licentiate of the Medical Council of Canada-accredited medical school, which encompasses three hospitals in London, Canada. Elected provincial resident representatives comprising the Professional Association of Residents of Ontario (PARO) negotiated the existing regulations around resident work hours with the Council of Academic Hospitals of Ontario (CAHO). According to the contract, residents who complete in-hospital call for 24 consecutive hours should be relieved from clinical duties no later than noon the following day. Residents who were scheduled for out-of-hospital call were expected to return for a full working day, unless the shift was converted to an in-hospital shift. The frequency of 24h in-hospital shifts was limited to 1 in 4 and the frequency of out-of-hospital shifts was capped at 1 in 3, as averaged over a 28d period. The senior residents generally created the resident call schedule for each program. Without a formal auditing process, it is unclear how these regulations were reinforced and the consequences for violating these regulations were equally ambiguous. Once again, the dynamic nature of work hour regulation meant that a new work contract was negotiated for resident participants in our Canadian studies; however, details around resident call shifts remained unchanged.

Participants had completed their medical school training and were enrolled at various stages of postgraduate training. Most participants had already completed additional rotations outside of their program, which allowed them to comment on a broader range of experiences. When this research began, most residents were aware that the Royal College of Physicians and Surgeons of Canada was reviewing the status of resident work hours across Canada and the assumption was that they would be enforcing regulations similar to the legislated changes in Quebec. As a result, some programs were considering, or already transitioning to, alternative call models; however, participants were asked to reflect on their experiences as they related to the 24-hour call system.

References


Chapter 2

Reflexivity, Theoretical Framework and Methodology
This program of research is comprised of four interconnected studies that use a constructivist grounded theory approach to qualitative research. The main data were individual semi-structured interviews with postgraduate trainees. In keeping with my constructivist epistemological stance, I will preface this thesis by positioning myself within this research program and discuss how my insider role as a resident played out in the research. This is a process known as reflexivity, which requires “critical reflection both on the kind of knowledge produced from research and how that knowledge is generated”.\(^1\) (p274)

Because the researcher is a central influence over every decision made through the course of research, reflexivity is a critical component of a rigour.\(^2\) It ensures that the reader has a sense of “what and who is represented in a research study”.\(^2\) (p1000)

Once I’ve positioned myself within the research, I will describe the theoretical frameworks of sociocultural learning and social constructivism that shaped the course of the dissertation. Finally, I will outline the underpinnings of constructivist grounded theory (CGT) research, explain why this was our chosen methodology and elaborate on sampling challenges that are most salient to a rigorous research program.

**Reflexivity**

“Our research interests and the research questions we pose, as well as the questions we discard, reveal something about who we are”\(^n1\) (p274)

It is no coincidence that I began a research program to explore how residents grapple with issues of fatigue and work hour regulations during my second year as an obstetrics and gynecology resident. At the time, I was routinely working 24- to 27-hour shifts at a high-volume tertiary care centre. There were days when the burden of my exhaustion was both palpable and painful. During grand rounds, I watched sympathetically as my colleagues unsuccessfully fought to keep their eyes open post-call. I often lost the same battle. Once I was released from my duties post-call, I resented my exhaustion as it hindered my full participation in the world outside of the hospital. I felt compelled to make up for lost time, rather than lost sleep. In spite of this, I usually succumbed to sleep and ended up cancelling the litany of plans that I had made in anticipation of my post-call day. I was deeply fascinated by this perplexing pattern and a few informal discussions with colleagues suggested that I was not alone in this experience. And with that, my first few research questions began to take shape.

Meanwhile, I followed the arbitration ruling around resident work hours in Quebec, Canada with great interest. Once the arbitrator decreed that 24-hour shifts violated the Canadian Charter of Rights and Freedoms, many residency programs in other Provinces assumed that national legislation was inevitable. My residency program was no exception. I proposed and helped implement an alternative night float call model that limited continuous duty periods to a maximum of 16 hours in keeping with the arbitration. At the time, I saw this as...
completely separate from my research. I saw myself as less of a champion for duty hour reform but more of an advocate who wanted our program to be prepared for legislated policy.

During this transition to a new call system, I started graduate studies and my clinical training trajectory underwent its own metamorphosis. On paper, this arrangement looked tidy and compartmentalized. Certain months were dedicated to research and these research blocks were interspersed among my core clinical rotations. In reality, the two domains were messy and intertwined. During clinical rotations, I wrote analytical memos whenever I caught glimpses of my research playing out in the clinical environment. For example, one night in the delivery room I overheard the nurses talking about our anesthesia resident. Apparently he had told a laboring patient that he was planning to sleep, so she must decide at that moment if she wanted an epidural. I was struck by how profoundly this offended the nurses and I wondered if this would have been seen as responsible fatigue mitigation in a different context. Access to such moments made me particularly appreciative of my hybrid status as clinical resident and graduate student.

Being a resident positioned me as an insider to the research, particularly within the Canadian context. In many ways, this was an advantage, as it facilitated access to participants and likely enhanced their candidness during individual interviews. Because I conducted research within my peer group, establishing legitimacy was less of an issue. However, I also grappled with one of the greatest challenges of conducting insider research: I needed to avoid assuming that I already knew the culture. It required me to dig deeper, beyond what might seem to be shared understandings. After my first few interviews, I realized that I needed to flag this for my resident participants up front. Otherwise, they seemed baffled when I asked them to elaborate on certain colloquialisms or concepts that should have been self-evident to a fellow resident. Fortunately, my co-investigators were more removed from the research setting, which also helped me to see the data from a non-insider perspective. My insider status was also dynamic; it shifted as I transitioned from a junior to senior resident and then became a licensed obstetrician/gynecologist during the research. The insider-outsider dichotomy was further complicated by the various subcultures within the studied context to which I was an outsider. Thus, conducting research within my peer group required me to attend to the affordances and challenges of my insider status.

Of course, I am also represented in the research in ways that are unrelated to my status as an insider. My personal experiences and perspectives inevitably shaped the research at every stage, from initial conception to data collection and analysis to manuscript writing. This influence is neither good nor bad; however, it requires thoughtful consideration through reflexivity. I used memo-writing as one way of thinking critically about my role in the research. While writing memos, I gave myself permission to question everything. This allowed me to identify some of my blind spots and further probe some of my assumptions.
around fatigue and work hours. While conducting the interviews, I tried hard to remain neutral about work hour reform because I wanted the participants to freely share their perspective. When it came to memo-writing, however, I did not impose the same neutrality but instead I tried to maintain a curious skepticism about my own perspective (Memo: December 2014). When I began this research, I believed that Canada was foolish for not having work hour restrictions. Looking back through the memos, it’s apparent that my stance on work hours has been complicated and transformed by the research. For example, in “Memo: October 15, 2012”, I maintained a straightforward stance about what it meant to abide by work hour regulation, but in “Memo: August 27, 2016”, I’m starting to consider the complexity of this issue. I see this as further evidence of my willingness to remain open and receptive to other truths without denying my “catalytic influence” over the research process.²

Memo: October 15, 2012
I find it interesting that “shift-work mentality” is considered such a pejorative term. To me, a physician who is able to clearly delineate between work-life and home-life, uses his or her time at work to its fullest. Our profession attracts “the cream of the crop” in that we are collectively a highly motivated, innovative and intelligent group. However, we are notoriously poor at gauging our own limitations and accepting our shortcomings. The shift-worker, then, represents a new breed of physician who acknowledges that we are unable to self-assess the affects of fatigue on performance and learning. By accepting this truth, the physician places patient safety ahead of their personal educational agenda or financial gain, thereby embodying a standard of professionalism not widely role-modeled in medicine. However, it is this same individual who will be criticized for leaving work on time…

Memo: May 6, 2014
At times, I’ve noticed the participants tiptoe around the “patient safety” elephant in the room … in the more recent transcripts I am really hesitant to call out this elephant in the room by being explicit about the patient safety factor. Mostly I think this is because this is a loaded term and feels a bit threatening because essentially I want to know/ask, ‘have you ever considered the impact of your decision on patient safety?’ which may come across as a criticism or indictment for residents whose predominant discourse around work and work hours seems to exclude the patient safety factor. I also recognize that it’s a nebulous concept … I also don’t want to injure the rapport that I work hard to build in residents who are particularly explicit about the educational value of working long hours (since these are the ones who are least likely to lead in with details about the implications on patient safety but I suspect are most likely to become defensive if the question is raised)
Memo: December 8, 2014

I’m also aware of this personal tension that exists as I struggle to decide how to represent my participants without suggesting that they are hypocrites or completely uncritical about the nuances of fatigue in their working environment. I want to avoid this on a personal level because they are colleagues but I also believe this to be a very superficial interpretation of a more complicated issue. There are many cases in which I perceived inconsistencies in how residents described the experience of fatigue and subsequently dismissed harmful notions associated with that experience, when it suited their ‘hero narrative’. I’m also aware that these are only inconsistencies because that fits with my belief that the potential for harm still exists, whether we deny it or not. I want to remain attuned to my own perceptions on this issue, because it has the possibility to prevent me from seeing other things in the data.

[This memo led me to return to the data and re-analyze from the perspective that fatigue is not inherently dangerous]

Memo: August 27, 2016

I want to believe there are deviant examples and cases that would show duty hours are not all bad and it’s possible to have it all – to be passionate about what you do, find work fulfilling, not have to deny your own humanity and vulnerability/personal limits in order to fulfill the social contract with the patients and system at large.

This might also explain why these entities (contradictions) are sustained and why there may be little attention paid to information in the working environment that suggests something to the contrary/challenges these notions... why they go unchallenged (e.g. fatigue is dangerous to patients – can’t make meaning of this in the context of ‘do no harm’ credo. The two thoughts are incompatible – that something we don’t have control over could harm the patient. So we reconcile it by either assuming we have control over it, or self-confirming that it isn’t dangerous to patients!!!

Sociocultural Perspective

In the first chapter of this thesis, I reviewed the research on the topic of duty hour restrictions and highlighted a lack of sociocultural perspectives in the literature. This gap in the current perspectives resonated with my own experiences coming into this research. Rather than focusing on the individual experience of fatigue and personal implications of work hour practices, I took a sociocultural orientation to this research. In doing so, I focused on the social and cultural dynamics of the learning environment to sharpen our understanding of resident decision-making around work hours, boundary-setting between on- and off-duty, and fatigue.
Sociocultural perspectives in medical education envision learning as a social process of participation and engagement within a learning environment. This participation is enabled by a full spectrum of formal and informal processes. For medical residents, this might include attending orientation sessions, wearing scrubs and an ID badge, being buddied with a senior colleague, watching a case presentation, or socializing during coffee breaks. This participation “shapes not only what we do, but also who we are and how we interpret what we do”. By using a sociocultural lens in this research, issues of social norms, political forces, power dynamics, and invoked values were foregrounded in the analysis and resulting theory.

In taking a sociocultural orientation to this research, I am positioning myself as part of a contemporary movement in medical education. Until recently, individualistic perspectives have dominated medical education. The persistence of such perspectives is not surprising given that they align with espoused values in the medical profession such as autonomy and self-regulation. This sociocultural turn challenges individualistic theoretical perspectives about learning and provides a useful way of grappling with socially situated questions.

**Social Constructivism**

Social constructivism provides a complementary theoretical framework to the sociocultural perspective I brought to this research. Constructivism attends to the subjective knowledge that is generated between the participant and the researcher. It rejects the notion that truth is an objective reality waiting to be exposed by the researcher who asks the right question or finds the ideal informant. Instead, constructivism accepts that the researcher and participants are both situated within the research and engaged in co-creating what can be known. By extension, social constructivism examines the reality that is established and reinforced through participation in the sociocultural environment.

In seeking to understand how a phenomenon is socially constructed, one must explore shared realities and truths that have become reified over time. These social constructions are of critical importance because they become “a powerful force in support of maintaining the status quo”. Using this theoretical framework brought into focus the explicit and implicit forces that maintained the status quo related to fatigue and work hour policy within the clinical learning environment.

**Methodological Framework**

In line with the sociocultural and social constructivist starting points in this thesis, the methodological approach throughout our research was Constructivist Grounded Theory (CGT). Grounded theory emerged in the 1960s as a qualitative research methodology that is well suited for grappling with socially-oriented research questions that are insufficiently explained by existing theory. Glaser and Strauss carved out a new space for researchers.
who felt constrained by the predominant focus on verification of theory and instead sought to generate explanatory theory from data. Their approach to grounded theory is notoriously systematic and rooted in a desire to ensure that theory generation is deemed a “legitimate enterprise”.\(^{13}\) 

Comparative analysis is a defining aspect of grounded theory.\(^{13}\) Glaser and Strauss were quick to clarify what makes comparative analysis in grounded theory different than other logico-deductive approaches to theory generation and verification. Specifically, they emphasize that comparison for the sole purpose of establishing generalizations, validating data, specifying units of analysis, or disproving theory detracts from the ultimate goal of generating theory. The process of iterative data collection and analysis is another cornerstone of grounded theory, which supports constant comparative analysis. This non-linear approach permits researchers to seek out different informants or alter subsequent interview questions in response to the emergent theory.

The positivist epistemological stance inherent in Glaser and Strauss’ approach to grounded theory did not resonate with all social scientists. This inspired other versions of grounded theory, including constructivist grounded theory (CGT), which “adopts the inductive, comparative, emergent and open-ended approach of Glaser and Strauss’ (1967) original statement.”\(^{5}\) Unlike the earlier representations of grounded theory, however, CGT both acknowledges and accepts that the researcher is necessarily positioned within the work.\(^{5}\) This acknowledgement is purposeful, as it sets an expectation for the researcher to remain reflexive about their role in shaping the research.\(^{5}\)

**Justification for chosen methodology**

We chose CGT as our methodology because our research questions were socially situated. Rather than a mere descriptions of events, we were interested in the social forces at play while residents make post-call decisions and conceptualize the fatigue they experience during training. Furthermore, based on our review of the literature, there had been very little exploration of the questions we were poised to ask and therefore minimal preexisting theory. As a resident enrolled in the same institution as the Canadian participants, I maintained an insider role in the research setting for the first 3 studies, which I outlined above in the Reflexivity section. Fortunately, constructivist approaches to grounded theory consider every researcher an insider to some degree. Embracing my insider status certainly felt more authentic than an approach that would require me to set aside the perspectives I bring to the research.

Finally, the interconnected nature of these four research studies is no coincidence. Because we took a constructivist grounded theory approach to this research, each study intentionally builds upon the insights gained from the previous study. It meant that our research
questions were informed by preceding studies, which also influenced how our sampling shifted where applicable.

**Theoretical Sampling and Theoretical Sufficiency**

Theoretical sampling and sampling to sufficiency are two closely related issues of rigour in CGT that we grappled with during the course of this research. Before I explain how we negotiated these issues, I’ll explain their significance.

All CGT research begins with initial sampling that is both selective and purposive. This sampling approach seeks out participants who are well-spoken, thoughtful and open to sharing their experiences. Predetermined inclusion and exclusion criteria are also taken into account. The iterative process of data collection and analysis in CGT facilitates a shift from initial purposive sampling to theoretical sampling based on the emerging codes and theory. Unlike initial sampling, theoretical sampling is not determined a priori; instead it takes its cue from the ongoing analysis. As the study evolves, revisions to the interview guide serve to complement theoretical sampling strategies. Revisions may include removing, re-phrasing, or adding new questions based on how they relate to the emerging codes and categories. Revising the interview guide and proceeding with theoretical sampling allows the investigator to focus on the most salient emerging codes from multiple angles. Charmaz cautions that theoretical sampling is not intended to create generalizability, but rather it is intended to ensure a more in-depth, cohesive theory that remains grounded in the data.

Not only does theoretical sampling lead to a more detailed capture of the phenomenon in question but it is also the most efficient way to reach theoretical saturation. Theoretical saturation is reached when “fresh data no longer sparks new theoretical insights”. Of course, this precludes a priori estimation of sample size. However, Morse is quick to point out that saturation is not an issue of quantity. A category or code may reach theoretical saturation from a single, richly descriptive instance within the data. Dey takes issue with the sense of completeness and certainty implied by theoretical saturation. He offers theoretical sufficiency as an alternative, which he defines as the “stage at which categories seem to cope adequately with new data without requiring continued extensions and modifications”.

For each study, our purposive sampling involved recruiting postgraduate trainees of both genders, from a range of clinical programs and training level. Our research question dictated the inclusion criteria; we limited recruitment to willing, English-speaking medical residents. As analysis progressed, we refined our sampling strategy and interview guide to ensure we were seeking informants and asking questions that would help to further the emerging theory. For the first two studies, we conducted individual semi-structured interviews with residents across 6 disciplines (general surgery, internal medicine, pediatrics, urology,
orthopedic surgery, and obstetrics/gynecology) enrolled at a single training institution in
Canada. All residents were routinely scheduled to work 24-hour shifts, as this was critical to
our research question. The third study involved a theoretically-informed sampling of
residents from psychiatry, radiology and critical care, in addition to residents from
pediatrics, internal medicine, general surgery, and orthopedic surgery. These residents were
enrolled at the same institution as in the previous studies. Residents from the three
additional disciplines were sought after because of the unique nature of their on-call
responsibilities. This led to a more inclusive understanding of how social constructs of
fatigue play out in different clinical contexts with varied clinical demands. In our fourth
study, we wanted to explore how work hour regulations influence the social construct of
fatigue. Thus we sought out participants who were training in contexts with established
work hour regulations to which both residents and their supervisors are supposedly held.

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31


Chapter 3

To Stay or Not to Stay? A Grounded Theory Study of Residents’ Postcall Behaviors and Their Rationalizations for Those Behaviors

Published as:
Chapter 4

Recovery of Sleep or Recovery of Self? A Grounded Theory Study of Residents’ Decision-Making Regarding How to Spend Their Nonclinical Postcall Time

Published as:
Chapter 5

Principles of Fatigue in Residency Education:
A Qualitative Study

Published as:
Chapter 6

Work Hour Regulations Complicate Residency Education: Lessons About the Social Construct of Fatigue in Europe

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This chapter is embargoed at request
Chapter 7

Discussion
Residents and training hospitals exist in a symbiotic relationship. Because of this longstanding and mutually beneficial arrangement, substantial changes to residency training are difficult to implement and often met with resistance. Restrictions to resident work hours represent one such proposed change. These restrictions are based on the notion that the traditional training model, where residents work an unlimited amount of hours, is harmful to patients and trainees because it leads to fatigued trainees. This oversimplified stance fails to account for the many ways in which resident work hours and fatigue intersect with other training issues including educational considerations (supervision, opportunities for learning), wellbeing (consequences of exhaustion, burnout), and service provision (labour rights, patient safety).

This thesis set out to explore fatigue as a social phenomenon and its relevance to workplace interventions intended to mitigate fatigue, including work hour restrictions and fatigue management plans. The research was situated in different postgraduate training contexts. The Canadian context was characterized by inconsistently enforced, non-legislated work hour rules. In contrast, the European context was characterized by long-standing, enforced work hour legislation. Within the Canadian context, working longer hours was seen as a way of demonstrating commitment to patients and the profession. But in the European context, working later was equated with inefficiency. Based on my findings across these contexts, fatigue is indeed a social phenomenon that is both pervasive and covert. Both Canadian and European trainees described a collective reluctance to speak openly about fatigue within the clinical training environment. This shared finding underlines the utility of seeing fatigue as a social phenomenon when faced with the problem of mitigating fatigue. By naming the social dimensions of fatigue, as I have done in this thesis, the barriers to authentically managing fatigue in the clinical workplace become more apparent. This has implications for medical training in jurisdictions at all stages of work hour reform, whether regulations are being contemplated, implemented or revised. For example, interventions that focus solely on hours of work are insufficient to manage such a multi-dimensional construct. Work hour restrictions can bring awareness to the reality of fatigue in practice, but they do not eliminate fatigue. Solutions must account for the fact that trainees are social beings that need to recover themselves as much as they need to recover sleep after a night shift. Effective solutions require changes at the level of the clinical training environment rather than relying solely on trainees to carry the responsibility of keeping fatigue at bay.

Throughout all four studies, residents also vividly described their individual, lived experiences of fatigue during training. Publishing constraints precluded this aspect of my research from being included in the manuscripts; however, I offer some salient examples here as a way of illustrating the pervasiveness of fatigue among trainees. These quotes come from two data sets, one that formed the basis for chapters 3 and 4 and the other that led to chapter 5. The quotes are followed by a number indicating resident participant code. Manifestations of physical cues included “headaches”(013), “dozing off every five or ten
minutes” during sign-over rounds (006), feeling “essentially hungover” (008) or deferring certain tasks “for the morning guys because the manual dexterity doesn’t come around” (007). For some residents, experiencing fatigue was signalled by changes in affect, such as “the stress associated with feeling so tired” (010) or being “really cranky” (004). Others noticed their impatience during clinical interactions: “I just have less patience for those types of conversations, especially if they don’t go the way I want them to, like the patient has a lot of questions or doesn’t understand or is upset. I don’t have the patience for that when I’m tired” (017). Many residents perceived that the cognitive demands of clinical tasks were experienced differently when fatigue was at play. Memorable cognitive indicators included “little things that you forget to do” (012), an awareness of “starting to fuddle things up” (014) by confusing patient histories, “finding it’s just taking you longer to figure out what you want to do with the patient” (016) or being “more prone to lose your train of thought...and get distracted by things and then lose your place in whatever algorithm you have” (003). As these quotations indicate, residents remained tuned-in to the physical, emotional and cognitive dimensions of their fatigue.

Although much has been said about the issues of resident work hour restrictions from an individual perspective in the literature, a sociocultural perspective offers a useful way of considering these socially embedded problems. Therefore, in this chapter, I will return to the four key debates involving resident work hour reform and reconsider them through a sociocultural lens to demonstrate the utility of this perspective.

Is Sleep Deprivation Dangerous?
In the thesis introduction, I established that this line of inquiry questions whether or not a sleep-deprived individual is hazardous within the clinical workplace. In attempting to settle this debate, researchers have drawn upon diverse fields including chronobiology, genetics, experimental psychology and simulation. These fields all seek to objectively quantify the impact of sleep deprivation on an individual’s performance. Indeed, the debate about sleep deprivation in medical training is largely predicated on the notion that a sleep-deprived person is more likely to commit a medical error. The following paragraphs will take a different perspective by considering this debate in the context of the workplace, a sociocultural setting.

A sociocultural perspective must consider what is meant by sleep deprivation within a given context, rather than assuming a shared understanding of this concept across all contexts. In their sociological exploration of sleep, Williams et al also called attention to this gap, by suggesting that, “we need to know much more about people’s own definitions and normative expectations regarding ‘ideal’, ‘adequate’, or ‘enough’ sleep, which themselves may be context dependent.” Furthermore, sleep deprivation may hold different significance across different medical education contexts. It has been seen as a surrogate for professional dedication and conceptualized as an educational training tool in surgical
training contexts. My research adds to these existing conceptualizations of sleep deprivation in medical training by highlighting a collective sense that sleep deprivation leading to fatigue is both commonplace and, in many cases, unavoidable. In conceptualizing sleep deprivation as unavoidable, some residents struggled to see it as problematic. These socially-situated notions warrant consideration, as they shape perceptions of whether sleep deprivation is dangerous, regardless of what the empirical data suggest.

Even if we assume a straightforward understanding of sleep deprivation, as some have done, proving whether it is dangerous in the clinical workplace remains challenging. Certain undesirable consequences of sleep deprivation may not register as overtly dangerous in the clinical training environment. For instance, while studying the social constructions of fatigue, we found that residents readily admitted to strained social interactions with colleagues and other professionals when they were fatigued. Residents described feeling apathetic, frustrated and impatient. When it came to patient care, residents were even less troubled about the impact of these affective aspects of their fatigue than they were about the possibility of technical mishaps or diagnostic errors. Thus, perceptions about the potential dangers of fatigue in the clinical setting were narrowly defined and limited to concerns about the impact of fatigue on cognitive or technical function.

Ultimately, workplace culture defines what is considered dangerous and unacceptable. By extension, it also delineates innovative from deviant behaviour and dictates which skills must be preserved at all costs and which ones are extraneous. Whereas the clinical workplace has tended to focus on cognitive or technical errors, the business industry has considered other social consequences of fatigue. For example, increased hostility and impaired self-control due to sleep deprivation have been associated with deviant workplace behaviour. There is good reason to suspect that fatigue has unfavourable social consequences in the clinical workplace as well. Yet, this aspect of fatigue is seen as less problematic and perhaps less visible than other implications of fatigue related to cognitive dysfunction. It is well established that the clinical training culture tends to privilege medical expertise above other physician roles. As long as communication and collaboration are secondary roles, the fatigue-induced unraveling of trainees’ social skills will likely remain overlooked.

While it could be argued that one apathetic or frustrated trainee may not have a profound impact on patient care, the impact of an exhausted and emotionally labile team of healthcare professionals bears further consideration. Reason cautions that, “the psychological precursors of an error (that is, inattention, distraction, preoccupation, forgetting, fatigue and stress) are probably the last and least manageable links in the chain of events leading to an error.” That ‘chain’ extends beyond the medical members of a team. And, unfortunately, fatigue is not problem that is unique to medical trainees and physicians within the healthcare context.
Although the medical education literature rarely makes reference to fatigue among nurses, fatigue is a patient safety issue identified in the nursing literature.\textsuperscript{12,13} There is far less ambiguity about the dangers of fatigue in the nursing literature.\textsuperscript{13} Furthermore, there is greater emphasis placed on social implications of fatigue, such as compassion fatigue and high attrition rates from work-related fatigue among nurses.\textsuperscript{14} Given that nurses are not immune to fatigue in the workplace, medical education must also consider the impact of fatigued nurses interacting with fatigued residents. For instance, team members may engage in different practices to mitigate their fatigue, and these practices may interact or interfere with one another in impactful ways. One particularly salient example of this was evident in my Canadian research but was not featured in my published manuscripts. Many residents felt that nurses often sent non-urgent pages overnight, which disrupted any chance of sleep during residents’ 24-hour shifts. Residents were convinced that this was a consequence of the fact that nurses worked 12-hour shifts and did not appreciate that residents’ hours were different. This dynamic suggests that we must also grapple with the implications of sleep deprivation at the level of a clinical unit or care delivery team.

Given that trainee sleep deprivation is complicated by the team context of patient care, we need to consider distribution of responsibility for potential dangers associated with fatigue. Distribution of responsibility is reflected in Reason’s hazard framework.\textsuperscript{15} This well-known framework is predicated on the notion that errors are the final consequence of multiple defects that come into alignment in an otherwise functional system. Many trainees in my research felt that there were very few circumstances in which their erroneous actions would directly result in harm to patient care. They willingly acknowledged that fatigue might lead them to work more slowly or overlook a particular detail, but there was a general sense that the system contained sufficient checks and balances to prevent these oversights from reaching patients and causing harm. Findings from other high-stakes industries can help us to critique this assumption. One compelling study by the aviation industry showed that fatigued, post-duty flight crews performed better than the rested crew, even though individuals in the post-duty crew made more errors than individuals in the rested crew.\textsuperscript{16} Further analysis revealed that the post-duty team demonstrated more effective communication, which compensated for the higher individual error rate, presumably because they had already logged many hours together.\textsuperscript{16} This research seems to support my participants’ assumptions that the system protected against errors due to their fatigue: familiarity and stability within teams seems to compensate for increased risk of individual error and the otherwise troublesome social interactions. Unfortunately, healthcare teams are characteristically both unstable and unpredictable,\textsuperscript{17} so it is not clear that these findings are transferrable to our setting, and trainees’ sense of a protective team system may be inappropriate. Further research is needed to determine whether efforts to achieve more stable or consistent teams in healthcare can mitigate the risk of fatigued healthcare providers.
And finally, we cannot afford to overlook the larger societal context in which medical training is situated. One salient example of this is society’s current obsession with sleep and fatigue. Recent sociological work has described this obsession, which is evident in the “nearly five thousand apps that come up when you search ‘sleep’ in the Apple App Store, more than 15 million photos under #sleep on Instagram, … and more than 24 million under #tired.” One emerging discourse positions sleep as a tool that enables us to “regain control over our out-of-kilter lives” and urges society to “join the sleep revolution”. Although there are growing, collective concerns about an epidemic of sleep deprivation, it is unclear whether we are truly worse off than our predecessors. When it comes to quality and quantity of sleep, we have benefitted from modern day luxuries including shelter and heat possibly more than we have suffered from the chronic use of smartphones and other technologies. Yet, as sociologist Williams points out, “sleep(iness) is now being problematized if not politicized in contemporary society through discourses of risk, if not crisis or catastrophe…” Consequently, the public has developed strongly held beliefs about the perils of sleep-deprived physicians. Given that physicians and trainees are held accountable to society, as long as the public believes that sleep deprivation is inherently dangerous, it may not matter whether the profession resolves the debate otherwise.

**Does Resident Training Suffer from Work Hour Restrictions?**
This line of inquiry questions whether work hour restrictions detract from residency training, leading to inexperienced and incompetent practicing physicians. With few exceptions, this debate tends to be approached from an individualistic perspective. Characteristically, researchers and stakeholders are seeking clarity about the impact of fewer consecutive working hours on competence as it pertains to individual residents. In the thesis introduction, I noted a sociocultural component to this debate that has received less attention in the literature. I highlighted how implicit messaging in the training environment can influence perceptions about the quality of training. In paragraphs that follow, I will revisit this issue while introducing additional salient sociocultural considerations.

Residents can be considered relative newcomers to a community of practice and therefore legitimate peripheral participation is a useful lens to use when exploring issues of residency training. Within this framework, learning is conceptualized as legitimate, peripheral participation within a given community of practice. This is a dynamic framework in which “learners are transformed through participation in the community [just as] their participation, in turn, transforms the community.” Thus, this sociocultural learning perspective calls attention to aspects of the training environment that enable or impede trainees’ legitimate, peripheral participation.

Work hour restrictions intersect with issues of legitimate, peripheral participation at many levels. Most straightforwardly, there is the issue of restrictions lessening participation
through limiting trainee exposure to the workplace and the activities therein. This concern is well-established in the literature and was reflected in my research, which indicated that some trainees chose to stay beyond their shift in order to gain more workplace experience. However, my study also found that other trainees did not feel their educational needs would be met by working longer hours. There were two socially mediated influences that informed these differing positions. Firstly, as a community of practice, the training program influenced trainees’ sense of what counted as valuable learning opportunities. For example, many surgical trainees suggested that the operating room was more likely to provide novel learning opportunities. This was valued above ambulatory experiences, which were perceived to be interchangeable learning opportunities. Secondly, many trainees who saw the educational merit in staying believed that long work hours were a reality of their future practice.

The argument that working long hours is justified because it reflects future practice patterns points to a more complicated relationship between work hour restrictions and legitimate, peripheral participation. In looking through a sociocultural lens, it becomes apparent that medical educators, “give or deny students opportunities to participate and learn to fit into their roles” When it comes to work hour restrictions, the implication is that medical educators may preferentially grant such opportunities to trainees who endorse and enact shared ideas. Trainees implicitly learn that they stand to benefit from sharing the same opinions about work hours as their preceptors, even when those opinions conflict with existing policy and degrade the perceived quality of their training. These sociocultural forces mediate both the training experience and the trainees’ perceptions of those experiences.

Although the core premise of the larger debate centers on training as it pertains to trainees’ medical knowledge and skill, the impact of work hour restrictions also relates more broadly to issues of professionalism and identity development. Working long hours for the sake of doing so, rather than to obtain exposure to further learning opportunities, may serve a purpose in certain training contexts. Brooks and Bosk found that working long hours was valued as a rite of passage for surgical trainees. Consequently, work hour restrictions challenged the collective occupational identity of surgical trainees because it excluded them from the rite of passage upheld by their preceptors.

Preceptors are increasingly called upon to pass judgment about trainees’ professionalism. Assessment then becomes another tacit mechanism by which trainees learn what is valued and what it takes to become a full participant within the community. However, evaluating professionalism is inherently problematic. First, there are many different viewpoints and inconsistencies between assessors about what is actually being judged (e.g. traits, attitudes or behaviour). Second, professional ideals are not static. Medicine has a long tradition of lamenting lost professional values and skills in the modern trainee. Altruism, for example,
“is perceived to be in decline in the current generation”. And yet, according to analysis of codified documents, altruism has been increasingly de-emphasized over the past century. The recent era of work hour restrictions has also been criticized for reinforcing, “certain contemporary societal attitudes that are antagonistic to the traditional values of medicine... [with] an emphasis on personal lifestyle and care of the patient second.” Preceptors who cherish the traditional values are likely to favour trainee behaviours such as coming in early and staying late, even when doing so is in violation of working hour restrictions (and may not be in patients’ best interests). There is great temptation to cling to a misremembered and nostalgic past, particularly when it comes to passing judgment about professional conduct. Unless today’s preceptors can overcome this temptation, we risk becoming stagnant, rather than moving forward towards a “new professionalism” which includes respecting personal limits.

Another perspective on work hour regulation and identity development posits that long working hours provide a mechanism to ensure that trainees learn how to manage their on- and off-duty time effectively. Some have argued that working long hours teaches trainees to “weigh and choose between competing priorities, such as self-care...professional autonomy and the patient’s and public’s best interest”. This assumes that clinicians who trained in earlier eras of unrestricted work hours have learned how to strike this balance. The burnout literature would suggest otherwise. Longer work hours have been associated with greater conflicts at home, higher rates of depression and workplace error. High attrition rates have also been attributed to unfavourable work hours and lifestyle. Coulehan and Williams highlight another undesirable consequence of long work hours on trainees’ professional identity. They caution that excessive work hours is one of many perceived sacrifices that, “engender[s] a sense of entitlement to high income, prestige, and social power.”

Baldwin and Daugherty offer a counter position by proposing that reduced hours provide trainees with adequate space that is necessary to learn how to manage their lives. This resonates with my second study, where even mundane errands took priority over sleep for some residents as they sought to establish their place in the world outside of the hospital. Although this was a legitimate form of recovery, residents’ long work hours meant that maintaining a normal life came at the cost of sleep. Although residents in a study by Ratanawongsa, Wright and Carrese saw residency as a time of temporary imbalance, the authors question whether the imbalance is indeed temporary. The habits and behaviours established during residency that reinforce an imbalance are likely to persist beyond the training years.

Do Work Hour Restrictions Compromise Patient Care?
This line of inquiry considers whether restricting resident work hours has a negative impact on patient care due to interruptions in continuity of care from patient handoffs. In the duty
hours literature, continuity is typically perceived as the responsibility of one individual, usually the resident on the clinical team. Within this framework, the medical trainee plays a critical role as the primary custodian of a patient’s history, course in hospital and plan of care. It follows that the trainee’s absence from the team compromises patient care. Although this individualistic conceptualization of continuity aligns with professional ideals including self-sacrifice, it can also reinforce maladaptive behaviours such as presenteeism.

In the following paragraphs, I will challenge the notion that continuity is an individual’s responsibility and consider additional sociocultural implications of this stance in an era of work hour restrictions.

Across all of my studies, trainees held a predominantly individualistic perception of continuity. This is consistent with other research, such as a qualitative study demonstrating that residents valued the “longitudinal experience with patients” afforded by night float call models which strengthened their ability as individuals to provide continuous care. Reid et al’s broad literature review also highlighted a shared assumption that “enduring contact with a single provider is linked with stronger relationships, better information transfer and uptake, and more consistent management.”

One discrepant example from my non-Canadian cohort of participants bears further consideration here. Unlike his peers, who struggled to handover unfinished patient care duties at the end of a shift, one trainee reported that he was always able to leave work on time. I challenged him on this point, by citing his colleagues who were compelled to stay, often for what they perceived to be continuity of care. In reply, he endorsed an alternative model of continuity: “... I believe that if one person can’t be exchanged, the system is flawed. So, I don’t believe in people who can be missed because that is a symptom of a flawed system.” This resonates with calls for a new professionalism wherein “patient ownership is not relegated to an individual, but shared among a group of team members.” Admittedly, this shift will not be easy in light of deeply entrenched professional ideals that prioritize the individual above the collective.

Outside of the primary discourses on duty hour restrictions, however, more expansive notions of continuity exist. Management continuity includes, “the provision of timely and complementary services within a shared management plan.” The nursing and mental health literature places greater emphasis on this version of continuity. It may be that work hour restrictions are the very impetus needed to force a re-examination of professional ideals that no longer serve their intended purpose. For example, traditional, cherished professional ideals maintain that the physician is the ultimate authority. Yet, the patient safety literature considers this a barrier to achieving ultra-safe health care. If continuity of care was a shared responsibility embodied by the team rather than an individual, the coming and going of individual team members, whether due to shift work or illness, would not threaten patient care.
Patients are an important, albeit often overlooked, part of the sociocultural milieu that shapes and sustains notions of continuity of care. Both patients and physicians are quite invested in the notion of the patient-physician relationship; it implies a stable, dyadic relationship that patients have come to expect.\textsuperscript{46} The perpetuation of this construct further complicates the debate about resident work hours and patient care, although this has not been part of the discussion so far, even in my own research. If we redefine continuity as a shared entity, we also need a language or construct that captures how the patient might have a relationship with a team instead of primarily with an individual provider.

**Can Fatigue be Managed?**

So far we have established that sleep deprivation is not benign and that work hour restrictions are in conflict with traditionally held views about what quality training and patient care look like in the clinical environment. As long as these are the realities of training and practice, fatigue will also be a reality in the clinical workplace. It follows that we must consider whether or not fatigue can be managed.

While many industries identify fatigue as an occupational health and safety concern, medicine has tended to focus on individuals’ duty to manage their own fatigue. Researchers have called for educational interventions to “encourage improved sleep hygiene among residents”,\textsuperscript{47(p31)} although the impact of such interventions has been limited.\textsuperscript{48} Despite evidence to the contrary, fatigue management also tends to assume that trainees are both willing and able to accurately self-assess their own fatigue and its performance implications.\textsuperscript{39,49,50} Thus, when fatigue management is primarily the trainee’s responsibility, solutions remain focused on fixing the trainee without addressing the sociocultural factors that are also at play. The following paragraphs will explore the implications of an individualistic approach to fatigue management and then I will close by highlighting how a sociocultural perspective calls our attention to different solutions.

With the duty of managing fatigue left to the individual, it is unsurprising that wakefulness-promoting agents, or cognitive enhancers, have gained increasing popularity in the clinical workplace. Ten percent of surveyed medical students admitted to using non medically indicated prescription stimulants\textsuperscript{51} and 5% of surveyed anesthesia residents reported using a substance other than caffeine to maintain wakefulness while on call.\textsuperscript{47} A primary example of this is Modafinil, a non-amphetamine wakefulness-promoting medication currently approved for narcolepsy and shift work disorder.\textsuperscript{52} While some might argue that it is no different from caffeine, the most abused drug in the world,\textsuperscript{4} it has become a controversial issue. Promising research in medical education suggests that Modafinil may compensate for some of the cognitive deficits associated with acute sleep deprivation.\textsuperscript{3} Of course, not everyone agrees with the use of cognitive enhancement “based on philosophical or ethical grounds”.\textsuperscript{53(p113)} Policies have not kept pace with the use of these cognitive enhancers in medical training and clinical practice. In fact, mounting claims about the efficacy and low
side effect profile of Modafinil have left some researchers wondering whether one day clinicians and trainees will be expected to take such medication in the name of patient safety.\textsuperscript{54}

Although it may be tempting to solve the problem of fatigued trainees by medicating them, rather than revising their work hours, neither solution fully addresses the multi-faceted nature of fatigue. Fatigue is physical, emotional, cognitive and social. Acknowledging fatigue as a social construct allows us to understand why interventions that focus on simple solutions do not straightforwardly solve the problem of fatigued trainees. When it comes to fatigue management approaches, effective solutions account for the social constructs of fatigue. For instance, my third study demonstrated that residents may not see fatigue as hazardous to patient care and resident wellbeing. Solutions that assume otherwise are likely to be taken up superficially. We must continue to invest time upfront to understand the social context in which we are applying strategies or tools that are intended to address trainee fatigue. If we continue to focus on work hours and rely on individuals to manage their fatigue, without accounting for the social milieu, then we will likely be left wondering why residents are not any more rested and why patients are not any safer.

**Limitations**

Although constructivist grounded theory is well-suited for the socially-situated research questions of this thesis, there are inherent methodological limitations worth acknowledging here. Firstly, constructivist grounded theory, like most qualitative research, does not make generalizability claims. The emergent theory that was co-constructed by the research participants, myself and my co-investigators is not meant to be generalizable to other contexts. Transferability, on the other hand, is an established feature of rigorous qualitative research. By providing rich descriptions of the context in which this research was situated, we aim to support other researchers to explore the findings’ transferability to their context.\textsuperscript{55} The first three studies were situated within a single institution and therefore the findings will necessarily be shaped by the local training culture. Similarly, the final study that sampled from four European countries does not presume generalizability of the results across Europe or even throughout the sampled countries. In providing salient details of the study context, however, I enable other researchers to assess whether the theory is likely to fit within their context or if further research in their context is necessary.

Secondly, the semi-structured interview format elicits participants’ representations of their experiences rather than directly visualizing their choices or behaviours. This aligns with my constructivist approach to the research, which focuses on understanding participants’ perceived reality. For instance, in the first study that asked how residents decide whether to stay or go after a 24-hour shift, I was interested in understanding the underlying rationalizations for residents’ decisions rather than determining the actual decision that was
made. This is consistent with my methodological choice, as constructivist grounded theory values the interaction between the researcher, the researched and their co-constructed findings.\textsuperscript{56}

This leads me to my third point, which is that my lived experience as a resident undoubtedly shaped the course of this research, as I discussed in Chapter 2. In many ways, my insider status was a strength, as it provided access to participants and likely enhanced their candidness during interviews. However, being an insider required the use of particular analytical maneuvers to heighten my own awareness of how this status came to bear on the research process. For example, I have my own stance on fatigue, which is informed by my collective experiences as a resident within a demanding training program. Engaging in reflexivity through analytical memoing and co-analysis with non-insiders helped keep me attentive to my personal stance on fatigue. It was sometimes difficult to refrain from inadvertently imposing that stance on the data, so that, at varying stages of the research process, I would write memos as a way of making my view explicit, even to myself. Sometimes this led me to return to the transcripts and re-read them or even re-code them while assuming an opposing stance, just to see what might emerge. Other times it led to critical analytical discussions with my non-insider colleagues who offered other ways of seeing. Thus, in keeping with constructivist grounded theory, I recognize that I am unable to fully remove myself from the research. By explicitly situating myself in the research as I have done throughout this thesis, I invite the reader to account for my role in the identified findings as they engage with the research.

Finally, my sociocultural theoretical orientation was helpful in that it guided my approach to the research including data collection and analysis. This was a deliberate choice, as I outlined in Chapter 2, because this orientation is underrepresented in the duty hours literature. However, as with any theoretical orientation, it also meant that there were undoubtedly features of the studied phenomena that were overlooked because of my theoretical lens.\textsuperscript{57} One way of dealing with this inevitable uncertainty is to return to the research with a different theoretical orientation that reveals alternative aspects of the studied phenomena.\textsuperscript{57}

\textbf{Future research}
Throughout this thesis, I have alluded to areas of future research that will enable stakeholders within medical education to authentically address the issue of fatigued physicians and trainees. In this section, I will highlight a few key directions that I believe are essential next steps.
(1) Exploring how practicing physicians manage fatigue
My research was deliberately situated in the postgraduate medical education context. However, through the course of the work, I realized that we also understand very little about how practicing physicians navigate the boundaries between work and life in the context of
their own fatigue. This is a particularly pressing issue in the Canadian context since work hour regulations for practicing physicians are nonexistent. These regulations may be a reality of the future. It is also essential that we understand how fatigue is managed (or not) by practicing physicians.

(2) Finding positive deviants among us

Given that some permutation of resident work hour regulations is likely here to stay, it behooves us to find the positive deviants among us. Positive deviants are those individuals or groups that are subject to the same constraints as everyone else, but have found a way to manage fatigue and work within duty hour restrictions in ways that do not compromise patient care or resident education. My research offered a glimpse into understanding how these positive deviants operationalize their solutions would offer helpful insights to change the status quo.

(3) Consider the implications of fatigued teams

Due to the prevalence of team-based care, further research that explores how fatigue plays out in the context of teams is critical. Such research would be informed by other industries such as aviation and military to build on their established practices for enhancing team based performance in high-stakes environments. However, important considerations that are unique to healthcare will need to be dealt with, including the lack of team consistency and stability. Additionally, it is important to understand how fatigue is socially negotiated among team members from professions with varied and potentially conflicting approaches to fatigue and its management.

Summary

We have every reason to believe that sleep deprivation is not beneficial to trainees or the patients they care for. Designing and enforcing work schedules that are aligned with circadian principles may address sleep deprivation but it is unlikely to eliminate the problem of fatigued trainees. By making the social constructs of fatigue explicit, it exposes these constructs to scrutiny. Not only do existing social constructs enable the status quo but they also divert our attention from the systems-level issues that further reinforce these notions of fatigue. At present, fatigue is not a shared problem to be managed across all levels of the healthcare system. Instead, trainees are tasked with the responsibility of overcoming their fatigue or sacrificing time with loved ones to make up for lost sleep. Fortunately, there are ways to move forward from here. By acknowledging fatigue in analysis of medical errors and near misses, the threat of fatigue will be made more visible. Training programs should implement contingency plans that residents are empowered to employ in the event that they are not fit for duty due to fatigue. Rather than dismissing fatigue as a sign of vulnerability or necessary rite of passage, supervisors must consider fatigue as a barrier to fitness for duty in themselves and their trainees. Over time, interventions that reflect the complexity of medical education and fatigue will hopefully give rise to a more authentic approach to managing fatigue.
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Summary
Around the world, work hour restrictions have been considered the primary solution to the problem of fatigued physicians and trainees. Unlike Europe or the United States, Canada lacks unifying, national legislations for resident work hours and existing regulations are variably imposed. Research into work hour restrictions has been abundant in the past 30 years, and largely centers on proving or disproving whether these restrictions have achieved their intended outcomes. Such research asks whether restrictions have reduced resident fatigue, resulting in better-rested, safer trainees and patients. This thesis moves away from an individualistic approach to understanding fatigue in the context of resident work hour restrictions. Instead of trying to prove or disprove whether such restrictions are effective, it considers the sociocultural aspects of medical training that have otherwise remained peripheral to the dominant discourse about work hour restrictions. Broadly, the main research question explores fatigue as a social phenomenon and its relevance to workplace based strategies for managing fatigue, namely work hour restrictions.

Chapter 1 maps out four predominant lines of inquiry within the resident work hour restriction literature and highlights their relevance to the overall thesis: (1) Is Sleep Deprivation Dangerous? (2) Does Resident Training Suffer From Work Hour Restrictions? (3) Do Work Hour Restrictions Compromise Patient Care? And (4) Can Fatigue Be Managed? Multiple positions are outlined within each line of inquiry. This culminates in a reframing of fatigue as a social and collective phenomenon, which is not evident in the dominant discourses of the literature. The central research questions of the thesis are presented. Firstly, how do residents decide to stay or go following a 24-hour call shift? Then, what do residents do when they leave the hospital following a 24-hour call shift, how do they make those decisions and how do they understand them in the context of their own wellbeing? Also, how is fatigue socially constructed in the clinical training environment? And finally, how are work hour regulations understood in the European context and how do they shape the social construction of fatigue? The chapter finishes by providing an overview of the international, national and local contexts in which the thesis is situated.

Chapter 2 introduces two key theoretical frameworks and the methodology of constructivist grounded theory, after situating the researcher within the research. It describes how the research questions emerged from and were informed by lived experiences that shaped the research at every step, including data collection and analysis. Analytical memos are included to illustrate reflexivity and its influence on theory refinement. Sociocultural perspectives are increasingly common in medical education and this theoretical orientation provides a useful lens through which to consider socially situated research questions. Social constructivism is a complementary theoretical framework that acknowledges multiple, shared realities embedded within a given social milieu. This chapter concludes with a description of constructivist grounded theory and provides justification for this methodology on the basis of socially situated research questions that are not explained by existing theories.
Chapter 3 explores residents’ decision-making at the end of a 24-hour call shift in the Canadian context. Using constructivist grounded theory, semi-structured interviews were conducted with a total of 24 residents across six surgical and non-surgical training programs at one Canadian medical school. Understanding resident decision-making as they transitioned from on- to off-duty provided insight into the sociocultural forces that are likely to shape how residents navigate future duty hour policies. Cultural norms emerged as the predominant influence over whether residents decided to stay or go following their call shift. However, when justifying their decision, residents invoked values of patient safety and educational merit, regardless of whether they were choosing to stay or go. This key finding suggests that adherence to future duty hour policies is not simply a question of individual residents upholding correct values. Instead, it points to aspects of the training environment that could be modified so that staying or going is less of an individual, values-based decision.

Chapter 4 examines residents’ decision-making related to off-duty time after deciding to leave the hospital. Due to the richness and depth of the data set from Chapter 3, the same data was analyzed with this research question in mind. Decision-making was characterized by making trade-offs. Within these trade-offs, residents prioritized according to one of two orientations: oriented to maintaining a normal life or oriented to mitigating fatigue. This research provided two main contributions to the literature. First, it highlighted two distinct and competing forms of recovery and, while there is evidence for both of these processes as separate entities, this is the first model that considers both forms of recovery. Second, these findings called into question the predominant notion that work hour restrictions will only be beneficial if residents use additional “free time” for sleep. It strongly suggests that work hour regulations that focus on an accounting of work and sleep hours without ensuring that residents have opportunities to manage the day to day aspects of their lives are unlikely to improve resident wellbeing and recovery from the workplace.

Chapter 5 moves away from residents’ individual decision-making to focus on the shared social constructs of fatigue in the clinical workplace. Using constructivist grounded theory, semi-structured interviews were conducted with a total of 21 residents across seven surgical and non-surgical training programs at one Canadian medical school. This research was inspired by findings from the earlier interviews and a noticeable shift in the conversation about work hours in Canada whereby policy-makers had shifted their focus away from prescriptive restrictions in favour of fatigue risk management plans. Residents rarely framed fatigue as a safety threat that negatively impacted their clinical performance. Instead, four principles of fatigue emerged that centred on the notion of fatigue as a personal challenge to be overcome. These social constructs of fatigue expose potential barriers to the implementation of fatigue risk management plans and suggest that there is much work to be done in making the risks of fatigue more evident in the clinical workplace.
Chapter 6 expands upon and enriches the theories that had been constructed within the Canadian data by exploring the experiences of European trainees from different contexts, who have long-standing work hour regulation. Using constructivist grounded theory, semi-structured interviews were conducted with 13 residents across five surgical and non-surgical training programs from four European countries, which included Denmark, United Kingdom, Ireland and the Netherlands. Although the social constructs of fatigue that emerged generally resonated with our Canadian data, the varied meanings of work hour regulations was a striking finding. Some of the meanings are well established in the European literature, including concerns about sacrificing trainee autonomy and compromising continuity of care. However, the efficiency discourse, in which staying late is evidence of inefficiency, was a distinctive meaning that emerged. This study also suggests that the working time directive neither solves the problem of trainee fatigue nor the issue of trainees deciding whether to stay or go at the end of a shift. It appears that the sociocultural milieu takes primacy over policy, which warrants further attention.

Chapter 7 returns to the four predominant lines of inquiry within the resident work hour restriction literature and reframes each debate from a sociocultural perspective. New questions emerge, including whether fatigue needs to be considered at the level of the care delivery team and if more stable or consistent teams might compensate for the threat of fatigued individuals. When considering the implications of work hour restrictions on resident training and patient safety, a sociocultural perspective calls attention to professional ideals that may no longer serve their intended purpose. After establishing that trainee sleep deprivation is problematic and that work hour restrictions challenge avowed professional merits, this chapter grapples with the question of whether fatigue can be managed. It acknowledges that fatigue management is inherently complicated by the multifaced nature of fatigue. It follows that interventions must account for the social aspects of fatigue if they are to have any impact on the issue of fatigued trainees. The chapter concludes with a discussion of the limitations and affordances of the chosen methodology. This is followed by a call for future research that: (1) explores how practicing physicians manage fatigue, (2) seeks out positive deviants and (3) considers the implications of fatigued teams.
Samenvatting
Het beperken van arbeidstijden wordt wereldwijd gezien als de voornaamste oplossing voor het probleem van vermoeide artsen en artsen in opleiding tot specialist (aios). In tegenstelling tot Europa of de Verenigde Staten heeft Canada geen overkoepelende nationale wetgeving waarin de arbeidstijden van aios worden bepaald en aan bestaande regelgeving wordt op diverse manieren invulling gegeven. In de afgelopen 30 jaar is er veel onderzoek gedaan naar arbeidstijdsbeperkingen, waarbij de nadruk hoofdzakelijk lag op het bewijzen dat deze beperkingen wel of juist niet tot het gewenste resultaat hebben geleid. Bij dergelijk onderzoek wordt de vraag gesteld of beperkingen geleid hebben tot minder vermoeidheid onder aios waardoor zij beter uitgerust zijn en veiliger zijn voor zowel zichzelf als voor patiënten. Om vermoeidheid in de context van arbeidstijdbeperkingen van aios te kunnen begrijpen, neemt dit proefschrift afstand van een individualistische benadering. In plaats van te trachten te bewijzen dat dergelijke beperkingen wel of niet effectief zijn, richt het zich op de sociaal-culturele aspecten van de medische opleiding die anders hun marginale plek in de heersende discussie over arbeidstijdbeperkingen zouden hebben behouden. In grote lijnen onderzoekt de hoofdvraag vermoeidheid als een sociaal verschijnsel en het belang daarvan voor strategieën ter beheersing van vermoeidheid op de werkplek, namelijk arbeidstijdbeperkingen.


**Hoofdstuk 2** introduceert twee belangrijke theoretische kaders en de constructivistische gefundeerde theoriebenadering na plaatsing van de onderzoekster in het onderzoek. Het beschrijft hoe de onderzoeksvragen voortkwamen uit en ingegeven werden door beleefde ervaringen die het onderzoek bij elke stap, waaronder de dataverzameling en –analyse, vormgaven. Analytische memo’s worden bijgevoegd ter illustratie van reflexiviteit en de invloed daarvan op de theorieverfijning. Sociaal-culturele perspectieven worden
steeds gangbaarder in het medische onderwijs en deze theoretische benadering biedt een handzame bril waardoor we sociaal geplaatste onderzoeksvragen kunnen beschouwen. Sociaal constructivisme is een complementair theoretisch kader dat het bestaan van meerdere, gedeelde realiteiten binnen een bepaald sociaal milieu erkent. Dit hoofdstuk sluit af met een beschrijving van constructivistische gefundeerde theorie en onderbouwt de keuze voor deze onderzoeksmethode op basis van sociaal geplaatste onderzoeksvragen die niet door bestaande theorieën worden beantwoord.

**Hoofdstuk 3** onderzoekt de besluitvorming onder aios aan het einde van een 24-uursbereikbaarheidsdienst in een Canadese setting. Aan de hand van constructivistische gefundeerde theorie namen we semigestructureerde interviews af bij in totaal 24 aios van zes chirurgische en niet-chirurgische medische vervolgopleidingen aan één Canadese medische faculteit. Door te begrijpen hoe aios tot het besluit komen de dienst te beëindigen, verkregen we meer inzicht in de sociaal-culturele krachten die waarschijnlijk beïnvloeden hoe aios met toekomstig arbeidstijdenbeleid zullen omgaan. Of de aios besloten te blijven of te gaan na hun bereikbaarheidsdienst bleek voornamelijk beïnvloed te worden door culturele normen. Bij het beargumenteren van hun besluit noemden de aios echter waarden van patiëntveiligheid en leerzaamheid, ongeacht of ze besloten om te blijven of te gaan. Deze voornaamste bevinding suggereert dat naleving van toekomstig arbeidstijdenbeleid niet enkel een kwestie is van individuele aios die de juiste waarden hooghouden. In plaats daarvan wijst het naar aspecten van de opleidingsomgeving die veranderd zouden kunnen worden, zodat het besluit om te blijven of te gaan minder op waarden is gebaseerd.

**Hoofdstuk 4** bestudeert hoe aios besluiten hun vrije tijd in te vullen na te hebben besloten het ziekenhuis te verlaten. Gezien de omvang en diepgang van de gegevens die we voor hoofdstuk 3 hadden verzameld, werden deze zelfde gegevens geanalyseerd met deze onderzoeksvraag in gedachten. De besluitvorming werd gekenmerkt door het vinden van een balans. Aios vonden deze balans door een van de volgende twee doelen te prioriteren: het behouden van een normaal leven of het verminderen van vermoeidheid. Dit onderzoek leverde twee belangrijke bijdragen aan de literatuur. In de eerste plaats belichtte het twee verschillende en tegenstrijdige vormen van herstel en, ook al bestaat er bewijs voor deze beide processen als afzonderlijke eenheden, dit is het eerste model dat met beide vormen van herstel rekening houdt. Ten tweede trokken deze bevindingen het overheersende denkbeeld in twijfel dat arbeidstijdbeperingen alleen zullen baten als aios extra “vrije tijd” gebruiken om te slapen. De bevindingen wijzen er sterk op dat arbeidstijdenvoorschriften die gestoeld zijn op een rekensom van arbeids- en slaapuren, zonder aios de garantie te bieden dat zij de mogelijkheid hebben om de dagelijkse aspecten van hun leven te verwerken, waarschijnlijk het welzijn van aios en hun herstel van de werkplek niet zullen verbeteren.
Hoofdstuk 5 wendt zich af van de besluitvorming van individuele aios om zich te richten op de gedeelde sociale beeldvorming van vermoeidheid op de klinische werkplek. Aan de hand van constructivistische gefundeerde theorie namen we semigestructureerde interviews af bij in totaal 21 aios van zeven chirurgische en niet-chirurgische medische vervolгоopleidingen aan één Canadese medische faculteit. Dit onderzoek kwam voort uit de bevindingen van de eerdere interviews en uit een duidelijke verschuiving in de discussie over arbeidstijden in Canada waar beleidsmakers in plaats van de arbeidstijden aan banden te leggen hun aandacht vestigden op vermoeidheidsrisicobeheerplannen. Aios beschreven vermoeidheid zelden als een gevaar voor de veiligheid dat hun klinische prestaties negatief beïnvloedde. In plaats daarvan kwamen er vier zienswijzen van vermoeidheid bovendrijven die het begrip “vermoeidheid” interpreterden als een persoonlijke uitdaging die overwonnen moest worden. Deze sociale beeldvormingen van vermoeidheid zouden de invoering van vermoeidheidsrisicobeheerplannen mogelijk kunnen belemmeren en suggereren dat er nog veel gedaan moet worden om mensen bewuster te maken van de risico’s van vermoeidheid op de klinische werkvloer.

Hoofdstuk 6 bouwt voort op en verrijkt de theorieën die op basis van de Canadese data werden geconstrueerd door te onderzoeken wat de ervaringen zijn van Europese aios uit verschillende contexten die al geruime tijd bekend zijn met arbeidstijdenregelgeving. Aan de hand van constructivistische gefundeerde theorie namen we semigestructureerde interviews af bij 13 aios van vijf chirurgische en niet-chirurgische medische vervolгоopleidingen in vier Europese landen, waaronder Denemarken, het Verenigd Koninkrijk, Ierland en Nederland. Hoewel de sociale beeldvormingen van vermoeidheid die naar voren kwamen veel gelijkenissen vertoonden met de Canadese data, viel op dat er verschillend gekeken werd naar de arbeidstijdenregelgeving. Sommige van deze zienswijzen zijn duidelijk bewezen in de Europese literatuur, zoals zorgen over de opoffering van de zelfstandigheid van de aios en het in gevaar brengen van de continuïteit van de zorg. De discussie over efficiëntie bracht echter een nieuwe betekenis te berde, namelijk dat laat blijven of inefficiëntie getuigt. Dit onderzoek suggereert ook dat de arbeidstijdenrichtlijn geen oplossing biedt voor het probleem van vermoeidheid onder aios, noch voor de kwestie van aios die besluiten te blijven of te gaan aan het einde van een dienst. Het lijkt erop dat het sociaal-culturele milieu zwaarder weegt dan beleid, iets wat verdere aandacht vraagt.

Hoofdstuk 7 keert terug naar de vier onderzoekslijnen die de literatuur over arbeidstijdbeperkingen van aios domineren en herformuleert elke discussie vanuit een sociaal-cultureel perspectief. Daarbij rijzen nieuwe vragen, zoals of vermoeidheid op het niveau van het zorgverleningsteam gezien moet worden en of stabielere en consequentere teams het gevaar van vermoeide individuen kunnen ondervangen. Wanneer we nadenken over de gevolgen van arbeidstijdbeperkingen voor de opleiding en patiëntveiligheid, laat een sociaal-cultureel perspectief ons zien dat professionele idealen hun gewenste doel wellicht niet meer dienen. Na vastgesteld te hebben dat slaaptekort bij aios voor problemen zorgt en
dat arbeidstijdbeperkingen de verwerving van erkende professionele vaardigheden bemoeilijkt, worstelt dit hoofdstuk met de vraag of vermoeidheid aangepakt kan worden. Het erkent dat het aanpakken van vermoeidheid van nature complex is door de veelzijdige aard van vermoeidheid. Dientregevolge moeten interventies de sociale aspecten van vermoeidheid aanpakken als ze het probleem van vermoeide aios ook maar enigszins willen oplossen. Het hoofdstuk wordt afgesloten met een bespreking van de voor- en nadelen van de gekozen methode. Dit wordt gevolgd door een oproep tot nader toekomstig onderzoek dat: 1) onderzoekt hoe praktiserende artsen omgaan met vermoeidheid, 2) succesvolle alternatieve aanpakken opspoort, en 3) kijkt naar de gevolgen van vermoeide teams.
Valorisation
The research presented in this thesis has relevance that extends beyond resident work hour restrictions. As I outlined in the Discussion chapter, there are plenty of opportunities for future research, which include exploring issues of fatigue among practicing physicians and healthcare teams. Rather than revisiting these considerations, I will first acknowledge the knowledge translation that I have engaged in during the course of my research and then elaborate on further anticipated practical implications of this work.

Knowledge Translation
Over the past four years, I have disseminated my research through presentations at local, national and international levels within the medical education research community. This has amounted to a total of 20 presentations. At the national and international levels, this included the International Conference on Residency Education, Association for Medical Education in Europe, Canadian Conference on Medical Education and Association of Academic Professionals in Obstetrics & Gynecology. Locally, I presented my research at the Centre for Education Research & Innovation and during medical grand rounds within the Department of Obstetrics & Gynecology and the Department of Medicine at my training institution. I also shared my research as an invited speaker within the Best Practices in Education Research lecture series at the University of Toronto.

In addition to these well-established forums for disseminating research, I sought opportunities for knowledge translation through other means at both local and national levels. Early on during my doctoral studies, I accepted an invitation to participate in a national consensus committee meeting hosted by the Royal College of Physicians and Surgeons of Canada. This meeting was attended by all members of the expert working groups who were tasked with the challenge of deciding how Canada would address the issue of trainee fatigue and work hours at the postgraduate level. That experience reaffirmed the relevance of my research, as it was clear that there was still much to be understood about the problem of trainee fatigue. Subsequently, I was invited to join a new expert working group on fatigue risk management plans, which was established by the Royal College of Physicians and Surgeons of Canada. Through my ongoing involvement in this working group, my research on fatigue as a social construct has helped to shape emerging policies on how to manage fatigue. I will elaborate on this contemporary and influential aspect of my research in the paragraphs that follow.

Addressing the Taboo
One of the key findings from this research was that many trainees felt that it was taboo to talk about fatigue, especially in a meaningful way that acknowledges the potential for harm. The medical training environment lacks a sanctioned language and acceptable forum for talking about fatigue as hazardous. One way to address the taboo would be to acknowledge fatigue and sleep deprivation alongside other well-established threats such as communication errors as part of existing dialogues about quality assurance. The morbidity
and mortality conferences conducted by many training programs are an appropriate forum for serious, open discussions of fatigue and the role that it plays as a patient safety threat. Another practical approach is to make fatigue more visible by having trainees wear coloured wristbands, for example, that correspond with the number of hours they have been on shift. This approach was used in South Africa and instituted by the junior doctors as a form of protest after one of their colleagues was killed in a motor vehicle crash while driving home fatigued after a long shift. Unless we experiment with such opportunities to make fatigue visible and worthy of discussion, we have little hope of seeing fatigue as a hazard to be managed.

Consider the system
Residents, program directors, faculty and hospital administrators are collectively responsible for preserving existing social constructs of fatigue; thus, they are an essential part of any movement to incite change. Currently, there is much greater emphasis placed on the responsibility of individual trainees, rather than the system, to solve the problem of managing fatigue. The notion that fatigue can be overcome if an individual is motivated enough to rise to the challenge is one salient example. A comprehensive approach to fatigue management must combat this unsubstantiated, yet pervasive rationale. Work schedules that are aligned with sleep physiology principles are only the first step. Such schedules displace some of the burden for managing fatigue from individual trainees but only if issues of work compression and inadequate handover are also addressed. Existing frameworks for managing fatigue in the training environment rely on the trainee to will him or herself into overcoming the fatigue. Instead, programs would benefit from feasible and non-punitive contingency plans in the event that a trainee finds him or herself impaired from fatigue, regardless of work schedules. This might include having an extra, more senior resident or supervisor available from home to provide back up, making it more acceptable for trainees to reach out for help. Although this will require creative reorganization of human resources, such policies send a clear message that fatigue-related impairment must be taken seriously. By shifting our attention away from individual trainees to consider the role of the system, new solutions emerge that may help to reduce the overall impact of fatigue in medical education.

Managing Energy
This research demonstrated that residents engage in various forms of recovery that serve a purpose beyond making up for lost hours of sleep. Managing energy, or recovering, is simply another way of thinking about mitigating fatigue. This realization has implications beyond the training environment since the recovery routines established during residency are likely to persist during independent practice as well. This has certainly been the case for many of my colleagues and for me. In light of current epidemics of burnout in health care providers, off-duty time during residency provides a necessary opportunity for trainees to establish intentional self-care practices. Although self-care needs are very personal and
individualized, there is a role for the system to support trainees addressing these needs. Opportunities exist at multiple levels. First, residents should be educated about existing principles of good sleep hygiene, including strategic caffeine intake and napping. Second, environmental changes are warranted that allow healthy decisions to be the default, easy decision. This might include having a workout facility within the hospital, providing access to call rooms so trainees can take a nap before driving home fatigued and serving nutritional food during morning handover so that residents are less inclined to stop by the drive-through on their way home. Finally, programs should consider instituting policies that allow for personal time away, at the discretion of the trainee. Residents appreciate this autonomy as recognition of their maturity and professionalism. It leads to greater workplace satisfaction, regardless of whether they actually take the time off.²

Summary
Through this research, I have learned that successful change implementation requires that we consider a problem from multiple perspectives and take a careful inventory of the multi-dimensional sociocultural forces at play. I now maintain a sense of skepticism about straightforward solutions to complex, socially situated problems because I have seen how easily unintended consequences can detract from intended benefits. These realizations will continue to shape my conversations about fatigue and working hours with my near-peers in the clinical workplace as well as my co-committee members in the Fatigue Risk Management Plan Working Group.

References
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*The mind determines what's possible. The heart surpasses it.* - Pilar Coolinta

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Dr. Taylor discovered her passion for medical education during her residency while enrolled in the Clinical Investigator Program at the Schulich School of Medicine & Dentistry, Western University. Through the support of this program, she was able to pursue doctoral studies during her clinical training. As a junior Clinician-Scientist in medical education, Dr. Taylor provided resident representation on the Association of Academic Professionals in Obstetrics & Gynecology (APOG) Education Innovation Committee. In 2014, she was awarded the Royal College of Physicians and Surgeons of Canada Robert Maudsley Fellowship for Studies in Medical Education. Dr. Taylor also received the 2016 Award for Excellence in Teaching from the Department of Obstetrics & Gynecology at Western University, which remains one of her proudest achievements.

If she is not in the hospital or working on research, Dr. Taylor is happiest at the climbing gym or practicing her flying trapeze tricks. She also enjoys spoiling her friends’ kids whenever she can squeeze in a visit!