The Realities of Fatigue for Pediatric Residents:

A Qualitative Study

Dr. Amy Robinson

Faculty of Education

University of Ottawa

A thesis submitted in partial fulfillment of the requirements for the

Master of Arts degree in Health Professions Education

Submitted to Dr. Katherine Moreau, Dr. Douglas Archibald, and Dr. Lindsey Sikora

Acknowledgements

I would like to express my heartfelt gratitude to Dr. Katherine Moreau for her unwavering support and guidance throughout my MA journey. As my thesis supervisor, she provided invaluable insights and direction, helping me navigate the complexities of the research process with remarkable patience and encouragement.

I am also deeply grateful to my thesis advisory committee members, Dr. Douglas Archibald and Dr. Lindsey Sikora, whose constructive feedback and expertise played a crucial role in refining my thesis. I extend my thanks to Dr. Kaylee Eady for her helpful comments, which significantly strengthened my thesis proposal.

I am deeply indebted to the larger Fatigue Risk Management research team: Nicole Sheridan (Research Coordinator); Dr. Vivian Ng (Resident Researcher); Drs. Sandy Tse & Tobey Audcent (PGME Content Experts); and Dr. Stephanie Sutherland & Dennis Newhook (CRU Research Consultants). My heartfelt thanks go to Professor Drew Dawson, whose mentorship and expertise have been invaluable. I remain in awe that an international leader in fatigue research generously shared his time and insight with a pediatrician in Ottawa.

This research was made possible by the generous support of the Royal College of Physicians and Surgeons Fatigue Risk Management grant, which funded the research, and the Department of Pediatrics Associates, which provided partial funding for my MA studies.

A special thank you goes to my home family, Sebastien and Buckley, as well as my work family, for their understanding and patience throughout this journey. Their support allowed me to devote the time and energy required to achieve this goal.

Lastly, I am profoundly thankful to the resident participants in this study. Their openness and willingness to share their experiences provided the rich data essential for this research. I remain committed to using these insights to enhance both the learning and working environments for future trainees.

Abstract

Resident physicians are particularly susceptible to fatigue due to the rigorous demands of their training, which requires them to balance patient care, on-call responsibilities, and educational obligations. Resident fatigue is a complex issue in healthcare, one that previous quantitative studies have often overlooked in terms of depth and nuance. My thesis explored the question: *What are the realities of fatigue for residents within a pediatric training program?* Through an exploratory qualitative study, I conducted in-depth, semi-structured focus groups with pediatric residents to gain insights into their experiences of fatigue within a Canadian training program. Using reflexive thematic analysis, I developed six interrelated themes, which indicated that the realities of fatigue for the study participants involved: (1) a reluctant indoctrination into working hour expectations; (2) reaching the extreme limits of fatigue; (3) an emotional toll of tiredness; (4) feeling disconnected from others; (5) feeling disconnected from self; all of which were (6) compounded by the competing demands of residency and everyday life. The research findings offer a more comprehensive understanding of the fatigue experienced by residents within their clinical learning environments, helping to humanize their experiences and advocate for a more urgent allocation of resources to mitigate fatigue risk in medical education. Furthermore, the findings challenge deeply rooted cultural norms within medicine that have historically hindered open discussion and action on addressing fatigue among trainees.

Keywords: Resident fatigue, postgraduate medical education, clinical learning environment, medical culture, qualitative

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Section I: Introduction to MA Thesis by Article

Structure of Thesis

I completed this MA thesis, *The Realities of Fatigue for Pediatric Residents: A Qualitative Study*, in article format with three sections. The first section introduces my empirical thesis study and clarifies the study problem, rationale, and objectives, after which it situates the study in its scholarly context by presenting a literature review of fatigue risk in postgraduate medical training and the perceptions of fatigue in residency training and in medical culture in general. A detailed methodological rationale follows, providing justifications for the research approach and study design. I then engage in reflexivity to account for how my personal, interpersonal, methodological, and contextual issues influenced the qualitative research process (Olmos-Vega et al., 2023), and I describe my epistemological orientation. The section ends with a review of the study's potential contributions to research and health professions education.

In the second section, I present my empirical thesis study in article format, which explores the realities of fatigue for pediatric residents within a Canadian training program.

The final section concludes by reflecting on my experience and lessons learned in conducting this study. I review the steep learning curve I experienced as a novice qualitative researcher, and the benefit of the experiential learning I gained through conducting this study. I highlight my newfound appreciation of reflexivity, and its value in understanding the effects of a researcher's influence on all aspects of a qualitative research study (Wright et al., 2016). I also outline how my own perspective on resident fatigue evolved during this research process, and my appreciation of the difficulties in challenging "wicked problems" that are deeply embedded in complex medical education and healthcare systems (Gorman et al., 2013; Varpio et al., 2017). Finally, I suggest possible implications of the study in continuing the narrative on resident fatigue and advocating for a paradigm shift in fatigue risk management (FRM) in healthcare.

Description of the Study Problem and Rationale

The Study Problem

Fatigue is inevitable in healthcare professions because patient care is provided around the clock. Shift work, particularly night shifts, exacerbates this issue, forcing workers to remain alert during hours when their circadian rhythms naturally dictate sleep (Fatigue Risk Management Task Force, 2018a). The potential for fatigue to impair both physiological and cognitive performance heightens risks for both healthcare professionals and their patients (Owens, 2007).

Resident physicians are particularly vulnerable to fatigue due to the demands of their training, which requires balancing patient care, on-call responsibilities, and educational obligations (K. Imrie et al., 2014). Given that fatigue is likely unavoidable with prolonged work hours, residency programs must ensure that residents can work safely while fatigued, minimizing potential harm to themselves and others.

Since the late 20th century, research has increasingly shown that fatigue among resident physicians increases the risk of medical errors and adversely affects trainee well-being (Fatigue Risk Management Task Force, 2018a). Early efforts to address fatigue focused primarily on resident duty hours; however, sweeping changes to resident duty hours regulations in the US and Europe did not lead to the anticipated reduction in medical errors (Institute of Medicine, 2009). This limited impact may be attributed to unintended consequences of shortened shifts, such as increased patient handovers, discontinuity of care, and reduced trainee supervision (Gorman et al., 2013). It became clear that duty hours are just one of many factors that impact fatigue-related risk.

The field of resident fatigue has continued to be dominated by studies related to resident work hours. Long working hours have remained a tradition in resident training for several reasons, including (a) the origin of residents as hospital employees providing 24-hour coverage; (b) long hours being seen as a rite of passage or reflecting a form of "nostalgic professionalism" deemed essential for continuity of patient care; and (c) long working hours offering a low-cost staffing solution for training institutions (Arora et al., 2012; Asch & Parker, 1988; Institute of Medicine, 2009; Ruedy, 1993). Given the substantial efforts and costs associated with overhauling postgraduate medical education, policymakers and educational stakeholders have demanded compelling, quantifiable evidence demonstrating the benefits of resident duty hours restrictions on patient outcomes, resident education, and trainee well-being. However, existing research has often been inconsistent, hindered by methodological flaws and a lack of standardization in outcome measures (Gates et al., 2018; Weaver et al., 2023).

In 2020, the Royal College of Physicians and Surgeons of Canada (RCPSC)[1] updated its accreditation standards for residency training programs, placing greater emphasis on mitigating fatigue risk. The 2020 standards recommended that all residency education programs develop a

[1] The RCPSC is the national accreditation body for Canadian residency programs and maintains the *General Standards of Accreditation for Residency Programs*, a set of national standards that uphold the quality of residency education within Canadian training programs and include requirements applicable to all residency programs and learning sites (Canadian Residency Accreditation Consortium, 2020).

fatigue risk management plan (FRMP) and include FRM in their curricula, "specifically, education addressing the risks posed by fatigue to the practice setting, and the individual and team-based strategies available to manage the risk" (Canadian Residency Accreditation Consortium, 2020). The RCPSC intentionally refrained from specifying educational content or methods, recognizing that a "one-size-fits-all" approach would be inappropriate given the significant variability among residency training programs and sites across the country (Gorman et al., 2013).

While the mandate to create program-specific FRMPs and curricula is conceptually sound, it lacks essential design and implementation strategies (Pattani et al., 2014). Each residency program is tasked with conducting its own needs assessment before implementing an FRMP or FRM curriculum. Understanding residents' experiences with fatigue during their training is a crucial piece of this process. Despite the potential risks to learners, workplace safety, and patient care, there has been no systematic effort to assess the impact of fatigue on clinical care or to identify possible system-level solutions to enhance safety (Amaral et al., 2016). Additionally, residents' voices have been largely absent from the discourse, and qualitative research on this topic remains limited.

Defining Key Terms

The two key terms used throughout this study were defined as follows:

Fatigue. "A subjective feeling of tiredness that is experienced physically and mentally. It ranges from tiredness to exhaustion, creating an unrelenting overall condition that interferes with individuals' physical and cognitive ability to function to their normal capacity. Its experience involves some combination of features: physical (e.g., sleepiness) and psychological (e.g., compassion fatigue, emotional exhaustion)" (Fatigue Risk Management Task Force, 2018a).

Fatigue Risk Management (for the medical education context). "Fatigue risk management is a set of ongoing fatigue prevention and mitigation practices, principles, and procedures integrated throughout all levels of the clinical and academic work environment, and are designed to monitor, ameliorate and manage the effects of fatigue and associated risks for the health and safety of healthcare personnel and the patient population they serve" (Fatigue Risk Management Task Force, 2018a).

Rationale for the Study

To effectively address the potentially harmful effects of fatigue in the clinical learning environment, further research is essential to explore residents' experiences of fatigue during their

training. Existing empirical literature has predominantly focused on quantitative studies related to resident duty hours, which may not adequately capture the multifaceted nature of resident fatigue, a phenomenon deeply rooted in the complexities of medical education and healthcare systems (Gorman et al., 2013). Further qualitative research is warranted to gain a comprehensive understanding of the realities of fatigue faced by residents.

Research Purpose, Objectives, and Research Question

The purpose of my research study was to explore the realities of fatigue experienced by residents within a Canadian pediatric training program. This was accomplished through qualitative analysis of transcripts from previously conducted resident focus groups, employing reflexive thematic analysis viewed through a constructivist lens. The original transcripts were analyzed using a codebook approach, akin to template analysis (Brooks et al., 2015), which produced topic summaries but did not generate deeper themes, with a theme defined as a "pattern of shared meaning organized around a central concept" (Braun & Clarke, 2022b, p. 77). Given the richness of the data collected and the potential to leverage researcher subjectivity as a strength, I conducted a secondary analysis using reflexive thematic analysis. The aim of this approach was to move beyond superficial meanings of the data to fully developed themes that collectively narrate residents' experiences of fatigue within their training environment.

This study sought to answer the following research question: What are the realities of fatigue for residents within a pediatric training program?

Literature Review

To accurately understand the landscape of the current study, I begin with a literature review including a brief discussion of the history of residency training in Canada, followed by a review of the scholarly research on fatigue risk in postgraduate medical training. Next, I will describe the debate regarding resident duty hours, summarize FRM in the Canadian context, and reflect on the complexity of fatigue. Finally, I will examine the perceptions of fatigue in residency training and in medical culture in general.

History of Residency Training in Canada

In 1823, the Montreal Medical Institution became the first medical education program in Canada, initially associated with the Montreal General Hospital. In 1829, it merged with McGill College to establish the first Faculty of Medicine in the country (Cruess, 2024). After graduation, new doctors typically entered private practice or took *house officer* positions in teaching hospitals

to gain clinical experience. House surgeons or physicians were hospital employees responsible for providing 24-hour patient care coverage in exchange for room, board, and a small stipend, leading to the term *residents*, as these doctors lived at the hospital. This compensation model continued until the 1950s, when newly formed intern and resident organizations successfully negotiated with the government for better wages, addressing the increased debt from their undergraduate education and supporting more family-friendly lifestyles (Ruedy, 1993).

The RCPSC was established in 1929, leading to more formalized training programs that included examinations and credentialing requirements. In 1975, the management of residency programs shifted from individual teaching hospitals to universities, ensuring better oversight of the clinical training experience (Ruedy, 1993). This transition marked the official beginning of the "worker–learner" duality in the apprenticeship-style postgraduate medical education model, where residents serve as both learners and service providers within the healthcare team as professionals-in-training (K. A. Harris & Frank, 2014).

Evolving Focus on Potential Risks of Resident Fatigue

Research on the effects of sleep deprivation dates back to the late 19th century (Asken & Raham, 1983; Patrick & Gilbert, 1896). Since then, substantial evidence has accumulated supporting the detrimental effects of increased fatigue on cognitive, physiological, and psychomotor performance (Dawson et al., 2021; Dawson & McCulloch, 2005; Krause et al., 2017; Williamson et al., 2011). The first study examining sleep deprivation among medical residents was published over 50 years ago and concluded that "interns deprived of normal sleep may experience transient psychopathology and impaired efficiency of performance" (Friedman et al., 1971). Despite the seemingly urgent need for more research on this critical issue, given the universal experience of sleep deprivation from overnight call duties among residents, the research continued slowly. Authors of the first narrative review on resident performance and sleep deprivation reflected that "while research is remarkably rare, the lack of response to what does exist is even more remarkable" (Asken & Raham, 1983).

In the US, a high-profile medicolegal case in the 1980s prompted a comprehensive review of working conditions for medical trainees. The case involved Libby Zion, an 18-year-old college student who died unexpectedly after presenting to an emergency department in New York City with flu-like symptoms. Her death was later attributed to a lethal drug interaction that led to the previously obscure serotonin syndrome (Asch & Parker, 1988; K. R. Imrie et al., 2014). This tragedy sparked extensive civil and criminal investigations, driven in part by her father, Sidney

Zion, who was a prominent attorney and a writer for *The New York Times* (Asch & Parker, 1988). Concerns emerged regarding overworked and under-supervised medical residents, which ultimately led to reforms in trainee duty hours at the state level. In 2003, the Accreditation Council for Graduate Medical Education (ACGME), the accrediting body for all graduate medical training programs in the US, implemented its first national guidelines on resident duty hours, which included an 80-hour workweek, one day off in seven, and a maximum shift length of 24 hours (with an additional 6 hours for education and patient handoffs) (Philibert et al., 2002; Rosenbaum & Lamas, 2012).

Public concern regarding patient safety intensified following the Institute of Medicine's report, *To Err is Human: Building a Safer Health System*, which highlighted the alarming number of patient deaths attributed to preventable medical errors (Institute of Medicine, 2000).

In response to this growing concern, US Congress and the Agency for Healthcare Research and Quality requested that the Institute of Medicine form the Committee on Optimizing Graduate Medical Trainee (Resident) Hours and Work Schedules to Improve Patient Safety. After a year-long review, the committee delivered the report, *Resident Duty Hours: Enhancing Sleep, Supervision, and Safety* (Institute of Medicine, 2009), which recommended further limiting consecutive work hours for residents to 16 hours, or providing a 5-hour protected sleep period for longer overnight shifts. While the primary focus had been on duty hours reform, the report acknowledged the need for additional, interrelated improvements, including (a) enhanced direct supervision, especially for junior trainees; (b) training in effective patient handoff techniques; (c) adjustments to residents' workloads; (d) enhanced teamwork in patient care; € a stronger culture of safety; and (f) strengthened internal and external oversight of work hours and other recommendations (Baldwin et al., 2003; Blum et al., 2011; Institute of Medicine, 2009; Steinbrook, 2002). In 2011, the ACGME implemented a subset of these recommendations, restricting only first-year interns to a maximum of 16-hour call shifts (Nasca et al., 2010). However, this decision was reversed in 2017, citing insufficient evidence to support the continuation of the limit (Burchiel et al., 2017).

The Resident Duty Hours Debate: Conflicting Research and Unintentional Consequences

The response to resident duty hours restrictions has been polarizing, highlighting the vital role resident physicians play in the healthcare system. As residents progress toward full licensure, they provide essential medical services while gaining valuable experience through graduated responsibility for patient care. For many specialties, this provision of care involves clinical

learning environments that function 24/7, such as inpatient wards, emergency departments, or intensive care units, resulting in nontraditional work hours.

Frequent extended-duration work shifts stem from the historical origins of residents as house surgeons or physicians, and their persistence is due to both internal and external factors within the medical profession. Medical culture has continued to cling to nostalgic professionalism, which emphasizes selfless service and prioritizes patient welfare over providers' well-being (Arora et al., 2012; Hafferty & Levinson, 2008). Critics of work hour restrictions have argued that such changes could erode trainees' sense of patient ownership and foster a "shift mentality" (Asch & Parker, 1988; Coverdill et al., 2010), reducing physicians and surgeons to mere employees rather than professionals (Fischer, 2005). Furthermore, training institutions benefit financially from resident patient coverage, which often falls outside their budgets. The report, *Resident Duty Hours: Enhancing Sleep, Supervision, and Safety*, noted that "both society at large and the training institutions benefit from residents' service at relatively low cost" (Institute of Medicine, 2009, p. 7). Implementing the 2003 ACGME guidelines on duty hours was estimated to incur an annual cost of approximately $1.7 billion US for additional personnel (Institute of Medicine, 2009).

Contributing to the controversy related to resident duty hours restrictions are methodological weaknesses in the existing research (Gates et al., 2018; Weaver et al., 2023). One of the original randomized control trials, the *Intern Sleep and Patient Safety Study*, suggested that first-year residents on a traditional call schedule of 24-hour shifts every third day committed significantly more serious medical errors than those on a reduced schedule of shifts of 16 hours or less (Landrigan et al., 2004). However, concerns about the generalizability of these results have been raised, particularly due to the well-staffed conditions in the intervention group (Pennell et al., 2005).

Challenges in conducting in vivo research in the clinical learning environment have led to reliance on retrospective self-assessment surveys, which are vulnerable to reporting and recall bias. The *Harvard Work Hours, Health and Safety Study* reported alarming findings regarding the risks associated with extended-duration shifts (≥ 24 hours) for first-year interns, revealing a 300% increase in fatigue-related medical errors leading to patient fatalities when interns worked five or more extended shifts per month (Barger et al., 2006). However, on closer examination, the study, which was based on retrospective web-based surveys, had notable limitations, including a low response rate of approximately 15% among eligible participants and an ill-defined outcome

measure, as the definition of a "significant error" was left to the participants' discretion and not independently validated.

One of the largest trials conducted to date was the Randomized Order Safety Trial Evaluating Resident-Physician Schedules (ROSTERS) study, a multi-centre, clustered-randomized crossover clinical trial in the US. Its aim was "to compare patient safety between the extended duration work roster (EDWR), which included shifts ≥24 h, and a rapidly cycling work roster (RCWR), where shifts were limited to a maximum of 16 h" (Blackwell et al., 2019). The well-funded study was carried out in six pediatric intensive care units across the US and used centrally trained physician reviewers who were blinded to the study arm to gather data on potential medical errors. Initial analyses were promising, finding that residents on shorter shift schedules experienced reduced weekly work hours and improved sleep duration (Barger et al., 2019), along with improvements in their neurobehavioural performance (Rahman et al., 2021). However, subsequent analyses regarding patient safety contradicted the investigators' hypothesis, showing that residents on the intervention schedules committed more serious errors than those on the control schedules. This increase was likely due to a higher workload, as measured by the number of ICU patients per physician. In a secondary analysis that adjusted for this potential confounder, the intervention schedules were no longer associated with an increase in errors (Landrigan et al., 2020). The secondary analysis also discussed other site-level factors that may have influenced the results, such as variations in handoff processes and attending physicians' supervision or performance. The study exemplified the complexities surrounding residency work hour reductions and FRM, concluding that "excessive work hours degrade patient safety, but so too do excessive workloads and poor handoffs" (Landrigan et al., 2020).

Surgical training programs have been among the most vocal opponents of resident duty hours restrictions, citing concerns about diminished educational experiences, particularly in mastering technical surgical skills, which could adversely affect patient outcomes (Ahmed et al., 2014). The *Flexibility in Duty Hour Requirements for Surgical Trainees* (FIRST) trial aimed to challenge these policies through a national clinical trial involving 118 general surgery residency programs. Programs were randomized to adhere to either the current ACGME duty hours standards or to follow an intervention arm with more flexible requirements, which allowed for longer maximum shift lengths and reduced minimum time off between shifts. Specifically, duty periods could exceed 16 hours for PGY1 residents and 28 hours for PGY2–PGY5 residents, with no mandated rest periods of 8 to 10 hours between shifts or 14 hours off after 24 hours of

continuous duty (Bilimoria, Chung, Hedges, Dahlke, Love, Cohen, Tarpley, et al., 2016). After a year of data collection, the study found that the flexible, less-restrictive duty hour policies were noninferior to the standard ACGME policies concerning patient postoperative outcomes. The authors concluded that "flexible duty-hour policies appear to be safe for patient care" (Bilimoria, Chung, Hedges, Dahlke, Love, Cohen, Hoyt, et al., 2016). Additionally, there were no significant differences in resident satisfaction with education or overall well-being between the groups. However, residents following flexible duty hour policies reported benefits related to continuity of care, which positively impacted both patient safety and surgical training, albeit potentially at the expense of time for personal activities and rest (Bilimoria, Chung, Hedges, Dahlke, Love, Cohen, Hoyt, et al., 2016). Despite these findings, the FIRST study has faced criticism regarding its design and outcome measures, including its noninferiority framework evaluating hospital-level postoperative outcomes from a national database, which was considered very distal from the intervention, as well as its reliance on subjective self-assessment surveys from residents (Weaver et al., 2023).

Recent systematic reviews and meta-analyses have sought to synthesize the existing research on resident duty hours and their effects on patient safety and outcomes. Weaver et al. (2023) conducted a systematic review followed by a series of meta-analyses to pooled data from similar studies on work hour policies and patient safety. Sephien et al. (2022) conducted a meta-analysis of randomized control trials examining the impact of resident duty hours on both resident- and patient-based outcomes. While these systematic reviews both suggested that reduced work hours may be associated with a potential reduction in mortality and improved patient safety (Weaver et al., 2023), as well as improved resident-based outcomes (Sephien et al., 2023), the overall quality of evidence from the included studies was overwhelmingly low. Other limitations included (a) small sample sizes restricted to specialties in specific clinical contexts; (b) heterogeneity in outcome measures; (c) differing definitions of reduced resident shift hours; and (d) questionable comparison groups, such as data from nonteaching hospitals or services (Philibert, 2016; Sephien et al., 2023; Weaver et al., 2023).

The interventions in resident duty hours studies have come under scrutiny, particularly in light of industrial workplace safety data. Research has indicated that the risk of fatigue-related errors significantly increases after 8 hours of duty, and doubles after 12 hours (Burchiel et al., 2017; Sephien et al., 2023; Weaver et al., 2023). Consequently, some researchers have argued

that studies comparing shifts of 16 hours to 28 hours—or shifts of 28 hours to longer durations—are essentially pitting fatigued staff against even more fatigued staff (Greig & Snow, 2017).

Traditional quantitative research methods may not adequately capture the complexities of fatigue. Resident work schedules account for just one small aspect of intricate healthcare systems, making it challenging to select appropriate metrics that accurately and comprehensively reflect their impact on patient care (Weaver et al., 2023). This limitation renders meaningful assessment difficult and potentially impractical.

Canadian Context

In Canada, aspects of the working environment—including resident duty hours—are negotiated as part of a collective bargaining process between provincial house staff organizations and employers at the provincial or regional level (representatives of hospitals or provincial ministries of health) (Gorman et al., 2013). Several provinces implemented their own duty hours restrictions as the relationship between fatigue and medical errors was recognized. For example, in 2011, Quebec ordered that resident duty hours be limited to a maximum of 16 consecutive hours per day and stipulated that a 24-hour duty period is a violation of the *Canadian Charter of Rights and Freedoms* and the *Quebec Charter of Human Rights and Freedoms* (Resident Doctors of Canada, 2012). In the rest of Canada, provincial agreements aligned on maximum shift lengths, with limits of 24 hours for call shifts, plus one to two hours for adequate handover of patient care responsibilities (specialty dependent). Limits were also set for the maximum number of in-house and home calls per month, weekly work hours on shift-based rotations, and weekend work.

In 2012–2013, instead of implementing homogeneous resident duty hours restrictions, as had been adopted in other global jurisdictions, the RCPSC undertook a review of the existing evidence on resident duty hours in the project, *Towards a Pan-Canadian Consensus on Resident Duty Hours*, with the goal of developing a national consensus. The project interviewed members of the National Steering Committee on Resident Duty Hours; conducted a national survey of residents, postgraduate deans, program directors, and a sample of hospital administrators; reviewed the available literature on the issue; and assessed approaches to regulation of duties in other countries (Gorman et al., 2013). Given a lack of conclusive data that resident duty hours restrictions significantly improved patient safety or medical education, with concerns raised of a paradoxical negative impact in the surgical specialties, the National Steering Committee on Resident Duty Hours released a set of principles and recommendations in their report, *Fatigue,*

Risk and Excellence: Towards a Pan-Canadian Consensus on Resident Duty Hours, including the development of FRMPs and FRM curriculum content in all residency education programs (Gorman et al., 2013).

An FRM approach represents a paradigm shift, recognizing that fatigue is unavoidable with prolonged work hours and night shifts that act against normal circadian rhythm (Lerman et al., 2012). Society increasingly views fatigue as an occupational safety hazard, and FRM focuses on mitigating the risk of fatigue-related impairment in the work environment (Dawson & McCulloch, 2005). FRM involves both fatigue-reduction strategies (e.g., reducing the likelihood of a fatigued individual working), as well as fatigue-proofing strategies (e.g., behaviours that reduce the risk that a fatigue-related error will cause an accident or harm) (Dawson et al., 2012). FRMPs consist of policies and procedures that are, ideally, developed and verified by key stakeholders using established principles of risk and safety management (Kassam et al., 2019). Although FRM systems have continued to evolve in a variety of 24/7 industries that have a low threshold for adverse outcomes (e.g., aviation, manufacturing, transportation, etc.) (Dawson & McCulloch, 2005), the use of FRMPs in medicine is still in its infancy.

In 2013, the RCPSC launched the Fatigue Risk Management project, assembling a taskforce that included resident representatives, postgraduate medical education leaders and policymakers, and international fatigue specialists (Fatigue Risk Management Task Force, 2018a). Informed by the key findings from *Fatigue, Risk and Excellence: Towards a Pan-Canadian Consensus on Resident Duty Hours*, the Fatigue Risk Management Task Force, together with stakeholders in postgraduate medical education, developed the *Fatigue Risk Management Toolkit for Residents, Leaders, and Policy Makers in Canadian Postgraduate Medical Education*, which provided a broad overview of developing FRMPs within institutions and programs, including suggestions on FRM education/training and a collection of fatigue risk mitigation tools and strategies. This first national resource on FRM in Canadian postgraduate medical education was meant as a "nonprescriptive resource that outlines strategies aimed at mitigating fatigue-related risk that can be adapted to suit specific contexts and specialties" (Fatigue Risk Management Task Force, 2018b), although responsibility is still delegated to the individual residency training programs to coordinate the infrastructure needed to support FRM while monitoring its impact (Pattani et al., 2014).

In 2020, the RCPSC released updated *General Standards of Accreditation for Residency Programs* (Canadian Residency Accreditation Consortium, 2020). New to this version was the

expectation that FRM be included in all residency program curriculum plans. Specifically, "education addressing the risks posed by fatigue to the practice setting, and the individual and team-based strategies available to manage the risk" (Canadian Residency Accreditation Consortium, 2020). FRM must also be addressed within resident safety policies and processes. The accreditation standards did not specify the educational content or methods, with the RCPSC noting that a "one-size-fits-all-approach" to FRM would be inappropriate given the considerable variation in residency training programs and sites across the country (Gorman et al., 2013).

The Complexity of Fatigue

Fatigue is a complex healthcare problem, with multiple physical, emotional, social, and cultural causes, that meets the criteria for *wicked problems*, which are "complex in nature, have innumerable causes associated with multiple social environments and actors with unpredictable behaviour and outcomes, and are difficult to define or even resolve" (J. A. Cleland et al., 2018). Wicked problems resist traditional linear analytic approaches, as they involve social and political factors that can shift during the problem-solving process (Varpio et al., 2017). The clinical learning environment itself operates as a complex system, marked by significant interconnections and interdependencies that can yield unpredictable results (Gamble, 2008). Within these dynamic systems, establishing causal links between program interventions and behaviour changes can be challenging, as many factors can influence the outcomes being studied (Patton, 2011).

According to the literature, two of the commonly targeted outcomes of fatigue studies are also multifaceted and complicated to study: (a) patient safety/medical errors (due to other contributing factors beyond provider fatigue, including healthcare provider experience, clinical context, high patient volume/acuity, resource scarcity, personal stressors, etc.) (Field et al., 2021); and (b) resident well-being. Without a better understanding of the role of fatigue in both medical errors and resident well-being, interventional studies are unlikely to yield meaningful insights or improvements.

Perceptions of Fatigue Within Residency Training

One important theme within the FRM literature was the perception of fatigue held by residents, as well as by medical culture in general. In most risk-adverse industries with established FRMPs, such as aviation, transportation, and mining, there is a shared understanding of fatigue as an occupational safety threat, with clear benefits to investing resources to minimize fatigue-related risk (Dawson et al., 2012). In healthcare, the lack of redundancy in medical

practitioners, along with funding constraints, limit many human resource interventions. In other words, "a tired doctor is better than no doctor at all" (Dawson & Thomas, 2019).

Taylor et al. (2016) conducted semi-structured interviews to explore how residents conceptualized fatigue in the context of their training environment. Using qualitative analysis based on constructivist grounded theory, they identified four key principles of fatigue that encapsulated residents' perspectives of fatigue as "(a) inescapable and therefore accepted; (b) manageable through experience; (c) necessary for future practice; and (d) surmountable when required" (Taylor et al., 2016).

Building on this work, Field et al. (2021) expanded their qualitative research to include healthcare team members, such as staff physicians, nurses, and senior residents, to examine their views on physician fatigue. Participants held contradictory views that were accurately summarized as the "fatigue paradox," that is, while healthcare professionals acknowledge the negative impacts of physician fatigue on clinical performance, they are reluctant to acknowledge any negative impact on patient care, despite providing examples to the contrary (Field et al., 2021). The notion of the "indefatigable physician" perpetuates the heroism myth in medicine, which undermines the systemic changes that are necessary to transform healthcare delivery from personal sacrifice to improved quality through team-based care (Field et al., 2021; Sarkar & Cassel, 2021).

Defenders of traditional extended-duration resident work hours have argued that individual differences affect responses to acute or chronic sleep deprivation. However, there is no evidence to suggest that physicians are inherently more resilient than the general population in terms of the negative impacts of sleep deprivation on performance (Czeisler, 2009). Multiple studies have indicated that individuals, including residents, are unreliable at assessing their own levels of sleepiness or impairment when sleep is chronically restricted (Howard et al., 2002).

Methodological Rationale

In this section, I explain the reasoning behind my research approach, particularly my choice to conduct a secondary analysis on a previously collected dataset to provide the richest interpretation, in order to best address the research question. I explore the context in which I conducted the study by engaging in a systematic approach to reflexivity (Braun & Clarke, 2022b). Finally, I review the methodological paradigm that formed the foundation of my empirical thesis study.

Research Approach

Given the complexity of the central phenomenon of resident fatigue, I used the qualitative data collected from the focus groups to conduct a secondary analysis in order to gain a deeper and more detailed understanding of the realities of fatigue for pediatric residents within the academic centre (J. Cleland & Durning, 2022). Previous qualitative studies have used constructivist grounded theory to (a) describe four principles of fatigue used by residents to understand fatigue in their training context (Taylor et al., 2016); (b) create theoretical frameworks that encapsulate the multifaceted nature of resident fatigue and outline FRM strategies at the self, program, and system levels (Kassam et al., 2019); and (c) propose the fatigue paradox theory to explain the contradictory views held by extended healthcare team members regarding the impact of physician fatigue (Field et al., 2021). Insights gained from this study will enhance our understanding of how fatigue is experienced in the clinical learning environment and its consequences for trainees, both personally and professionally.

Selection of Qualitative Data Analysis Method

I analyzed the focus group data using thematic analysis, which I defined as a method for "developing, analyzing and interpreting patterns across a dataset," and which encompassed a family of methods all using procedures of data coding to develop themes (Braun & Clarke, 2006, 2022b). Thematic analysis is an appropriate method when seeking to understand experiences across a qualitative dataset, and can emphasize the influences of social, cultural, and structural contexts (Kiger & Varpio, 2020). Thematic analysis is probably best known from Braun and Clarke's (2006) contemporary publication in the field of psychology, which described a six-step approach to engaging with and analyzing a dataset. The authors defined their approach as *reflexive thematic analysis*, which identifies researcher reflexivity as an asset, and where interpretation happens at the "intersection of the data, the subjectivity of the researcher, and the scholarly and societal context of the research" (Braun & Clarke, 2022b, p. 11).

Initially, a research assistant analyzed the transcripts using a codebook approach to thematic analysis, which is similar to the template analysis technique (Brooks et al., 2015). This process produced topic summaries for the dataset consistent with the semi-structured interview questions. However, it did not generate deeper themes, with a theme defined as "a pattern of shared meaning organized around a central concept" (Braun & Clarke, 2022b, p. 77). This initial analysis felt "shallow" and incomplete, which became an obstacle for me in writing up the results. To do justice to the residents' candid and honest participation in the research, I needed to

revisit the analysis. With my status as both an "insider" and "outsider" researcher, or another medical doctor who has also experienced fatigue associated with residency training, I felt that fully embracing my subjectivity and applying it to the meaning-making analytic process would be an advantage. Thus, I undertook a secondary analysis using reflexive thematic analysis to move beyond superficial meanings of the data to fully developed themes that together tell a rich story of the residents' realities of fatigue within their training setting.

Foundations for Data Analysis

My analysis was based on Braun and Clarke's (2022) six-step approach to conducting reflexive thematic analysis, which involves the researcher's systematic and active interaction with the dataset to generate a cohesive interpretation by analyzing and reporting patterns (themes) (Braun & Clarke, 2022b). The six steps are: (a) becoming familiar with the data; (b) generating initial codes; (c) searching for themes; (d) reviewing themes; (e) defining and naming themes; and (f) producing the final analysis (Braun & Clarke, 2006). The approach is not meant to be a linear but rather a recursive process, meaning the researcher moves back and forth throughout the steps during the analysis, possibly revisiting earlier steps based on new data or to further investigate newly constructed themes (Kiger & Varpio, 2020). The researcher must make several active choices on how they will engage with and analyze the data to best address the research questions (Braun & Clarke, 2006; Trainor & Bundon, 2021). My approach to theme identification for this study was primarily inductive and data-driven, although the semi-structured interview questions for the focus groups were informed by previous research on resident fatigue.

Building on the concept of researcher subjectivity as its primary tool, a single data analyst is standard in reflexive thematic analysis (Braun & Clarke, 2022a). I immersed myself in the dataset, and actively constructed patterns and themes (Braun & Clarke, 2006). Constructivist thematic analysis supported the study's purpose in forming more latent, deeper themes to answer the research question.

Reflexivity

Reflexivity has been defined within health professions education scholarship as "a set of continuous, collaborative, and multifaceted practices through which researchers self-consciously critique, appraise, and evaluate how their subjectivity and context influence the research processes" (Olmos-Vega et al., 2023). As qualitative research has gained momentum within health professions education—a field that has historically valued objectivity as the gold standard in quantitative research, based within a post-positivist worldview—there has been a push to

reframe reflexivity as an opportunity to benefit from the researcher's knowledge and identity (Olmos-Vega et al., 2023). This approach complements the reflexive thematic analysis method, which emphasizes researcher subjectivity as an essential resource and an opportunity to capitalize on the researcher's knowledge and identities (Braun & Clarke, 2022b).

Reflexivity can be seen as a "quality control" process in qualitative research (Braun & Clarke, 2013), and effective reporting includes a thorough reflection on the research team's subjectivity as well as the conscious decisions made throughout the research process (Olmos-Vega et al., 2023). Braun and Clarke (2022a) described the reflexive researcher as an advantage that can produce trustworthy interpretive analysis of a qualitative dataset if paradigmatic orientations and assumptions are clearly outlined.

As detailed in the Association for Medical Education in Europe guide to reflexivity in qualitative research (Olmos-Vega et al., 2023), I applied Walsh's reflexivity typology, which consists of the following four interrelated dimensions of the reflexive process (Walsh, 2003):

1. *Personal reflexivity* centres on "the researcher's attitudes and expectations that shape a research project" (Walsh, 2003), going beyond the surface level disclosure of the investigator's background and considering how prior experiences and motivations may affect the project (Olmos-Vega et al., 2023).
2. *Interpersonal reflexivity* focuses on the relationships between researchers and participants, including an analysis of potential power dynamics, as well as the influence of the relationships among research team members.
3. *Methodological reflexivity* reflects on the impact of methodological decisions made throughout the research process, including how they align with the paradigmatic orientation (Varpio et al., 2020).
4. *Contextual reflexivity* "situates research in its cultural and historical milieu" (Walsh, 2003) and includes a social examination of the research topic and a local exploration of the study context.

Importantly, reflexivity is a continuous activity conducted throughout a research study that enhances the quality of a qualitative research project (Barrett et al., 2020). As detailed in Table 1, throughout this study, I engaged in reflection and self-awareness through reflexive writing, keeping a reflexive notebook of memos and field notes, and by engaging in reflexive research collaboration with study team members (Olmos-Vega et al., 2023).

Table 1

Reflexivity Reflections

Dimension	Reflections
Personal reflexivity	The research team was composed of pediatricians and medical educators (AR, TA, ST), a pediatric resident (VN), two qualitative methodologists (SS and DN), a research coordinator (NS), a fatigue expert (DD), and a health professions education researcher/MA supervisor (KM). I (AR) was the primary investigator in this study, conducted as part of a research study supported by an FRM grant from the RCPSC, and a secondary analysis of the qualitative focus group data partially fulfilled the requirements for my MA in Health Professions Education. I am currently Wellness Lead for the residency training program, which led me to this field of study when the RCPSC advertised the FRM grant. The first step in my personal reflexivity involved reflecting on my own experience of fatigue during my training. I completed my residency in the same training program, although almost a decade prior (2009–2012). I situate myself as both an insider and outsider researcher, that is, while I share the experience under study with the participants, I have graduated and now occupy both a clinical supervisor and academic role within the program (Dwyer & Buckle, 2009). Three other team members had intimate knowledge of the training program, including the program director (TA), an educational lead (ST), and the resident champion (VN). The team was rounded out by members from outside the training program who worked within the same academic health centre: the project's research coordinator (NS) and two methodologists from the Clinical Research Unit (SS and DN). The inclusion of an outsider researcher (DD) served as a balance—and as an internationally recognized expert in the field of FRM, he also provided essential knowledge of past FRM research studies, against which I compared this study's data. The research team engaged in collaborative reflexivity through regularly scheduled coaching calls, facilitated through the RCPSC FRM project, where all aspects of the research process were discussed.
Interpersonal reflexivity	I (AR) was an insider researcher during this study, and actively reflected on possible power dynamics with participants due to my clinical and academic roles within the residency program. The research team consciously reflected on this unique power relationship and chose to have an experienced qualitative research scientist facilitate the focus groups, as well as championed resident involvement to promote the study and encourage participation. My intimate knowledge of both the academic (university) and healthcare (hospital) environments gave me a deeper understanding of the residents' experience, although I had to carefully consider how this could influence my data interpretation. Collaborative reflexivity with my research team and

	thesis supervisor was valuable in uncovering these blind spots (Kiger & Varpio, 2020). Power dynamics were also considered among research team members. Although the two other medical educators/clinical supervisors did not have direct contact with study participants, their academic roles as program director (TA) and an educational lead (ST) were recognized.
Methodological reflexivity	In 2019, the study residency training program was awarded an FRM grant from the RCPSC with the goal to implement and evaluate a pilot FRMP in a Canadian residency program, supported by coaching from an international fatigue expert. All study participants were aware of the study's source of funding, which was included in the informed consent form. Prior to developing or implementing any FRM strategies, my team felt that a preliminary study was needed to measure the baseline fatigue of current residents. I had originally planned a mixed-methods study, feeling that the participants' qualitative fatigue experience would be corroborated by objective sleep–wake data. I decided during the write-up process that to properly report the volume of study data, two separate reports were needed. I divided the study into quantitative and qualitative sections, with a manuscript in final development stages summarizing the quantitative results. In-depth, semi-structured focus groups were conducted with participants to explore their experiences with sleep and fatigue during residency. All focus groups were moderated by a research scientist with extensive qualitative interview experience (SS), with field notes by student volunteers (AHV, SR). The study protocol was initially developed before the Covid-19 pandemic, with planned in-person focus groups. The required pivot to virtual focus groups through the Zoom video conferencing platform due to infection control restrictions may have been a benefit, as it allowed more flexibility for participation. Online data collection did raise additional considerations. I purposefully used the hospital's Zoom licence, which was secure and compliant with Ontario's Personal Health Information Protection Act. I also deliberately disabled the auto-transcription feature on Zoom recordings, as this necessitated uploading the audio transcripts to the Zoom server, instead saving and transcribing the transcripts locally on the study computer. During data analysis of the qualitative focus groups, I felt that the original method used for thematic analysis had produced a surface level summary of codebook categories, and deeper meaning could be generated from the transcripts. To capitalize on my insider researcher status and evolving knowledge of FRM, I repeated the analysis using a reflexive thematic analysis methodology, which identifies researcher subjectivity as an asset (Braun & Clarke, 2006; 2022b). I conducted in-depth qualitative analysis on the focus group data from a constructivist paradigm. Constructivism acknowledges that there is no single truth, but multiple diverse interpretations of reality, which our selection of

	data collection method supported by collecting the viewpoints of numerous residents within the program through a collaborative exchange between researchers and participants (J. Cleland & Durning, 2022). A constructivist orientation also aligns with the data analysis method of reflexive thematic analysis, as both acknowledge the researchers' active influence. Using Walsh's four-dimensional typology for reflexivity allowed us to critically reflect on the research project and various influences throughout the study process and including it within the publication enhanced the transparency of viewpoints that informed the data interpretation.
Contextual reflexivity	I conducted the study in an accredited Canadian pediatric residency training program in academic, tertiary health centre from November 2020 to February 2021. Located in an urban setting, it is the only pediatric hospital in the region serving a large catchment area in Eastern Ontario. The study's conception was a direct result of the program's successful application for an FRM grant from the RCPSC, with the goal to implement and evaluate a pilot FRMP in a Canadian residency program. In a response to contextual concerns within postgraduate medical education on the potential risks of resident fatigue (Gorman et al., 2013), the RCPSC had engaged in a needs assessment regarding resident duty hours and chose instead to focus on an FRM approach. The RCPSC launched the Fatigue Risk Management project, which included a toolkit, FRM grants, and updates to the *General Standards of Accreditation for Residency Programs* that stipulated FRM be included in curriculum plans and resident safety policies in all RCPSC-accredited training programs (Canadian Residency Accreditation Consortium, 2020). Informal conversations with study participants after their focus groups revealed that many participants experienced their participation as therapeutic (i.e., they benefitted from just being asked about their experience of fatigue).

Note. Reflexivity reflections were based on Walsh's four-dimensional reflexivity typology (Olmos-Vega et al., 2023; Walsh, 2003). FRM = Fatigue risk management; FRMP = Fatigue risk management plan; RCPSC = Royal College of Physicians and Surgeons of Canada.

Epistemology

I conducted this study through the lens of a constructivist paradigm, which asserts that individuals construct reality in different ways through social interactions and contexts (Brown & Dueñas, 2020). This perspective acknowledges that researchers' backgrounds inevitably shape their subjective interpretations (J. Cleland & Durning, 2022).

This worldview aligns directly with the study's purpose: to better understand residents' lived experiences of fatigue within their specific clinical training environment. It also complements the chosen data analysis method—reflexive thematic analysis—which embraces researcher subjectivity as an asset (Braun & Clarke, 2022b).

By applying reflexivity, my analysis benefited from prior knowledge of the training environment and fatigue risk management literature. Simultaneously, a constructivist approach supported an inductive, data-driven identification of context-specific themes. Conducting thematic analysis at the latent level enabled the richest and most nuanced interpretation (Braun & Clarke, 2006).

Constructivism proposes that the subjective meanings that individuals develop of their experiences are diverse, directing the researcher to pursue the complexity of participants' views rather than fitting them into limited categories (J. Cleland & Durning, 2022). These meanings are formed through social interactions, within historical and cultural norms. Exploring the connections between residents' fatigue and the medical culture within their training program will contribute to a more comprehensive understanding of this occupational hazard, informing efforts to address it effectively.

Potential Study Contributions

Given that successful management of fatigue risk is a shared responsibility among all stakeholders in medical education (Fatigue Risk Management Task Force, 2018a), continued research is warranted to further explore strategies for managing fatigue in residency contexts. Providing a safe learning environment for both learners and patients is paramount to medical education.

This study contributes to the scholarship on resident fatigue by offering a deeper understanding of the fatigue experienced by participants within their clinical learning environment. Through the intentional use of qualitative focus groups, the research provides a rich, descriptive account of the fatigue experience—an approach that offers greater insight than quantitative surveys alone. My goal is to humanize the residents' experiences and advocate for the urgent allocation of resources to address fatigue risk in medical education. Additionally, I aim to challenge the deeply entrenched cultural beliefs within medicine that hinder progress in openly addressing and mitigating fatigue risks.

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Section II: Article

The Realities of Fatigue for Pediatric Residents: A Qualitative Study

Amy Robinson[1,2,3]

Affiliations:

[1] Department of Pediatrics, Children's Hospital of Eastern Ontario, University of Ottawa, Ottawa, ON, Canada

[2] Children's Hospital of Eastern Ontario Research Institute, Ottawa, Canada

[3] Faculty of Education, University of Ottawa, Ottawa, ON, Canada

Introduction

More than 50 years ago, the first study on sleep deprivation among medical trainees uncovered significant performance impairments, mood fluctuations, and cognitive and physiological issues stemming from lack of sleep (Friedman et al., 1971). A decade later, a narrative review highlighted the sluggish advancement in this area of research, despite the common experience of sleep deprivation among residents (Asken & Raham, 1983). While substantial progress has been made in postgraduate medical education over the past century, the field has fallen behind other 24/7 industries, such as aviation, manufacturing, and transportation, in addressing the risks of occupational fatigue (Dawson & McCulloch, 2005).

Extensive research has documented the negative effects of sleep deprivation on cognitive and physical performance (Dawson et al., 2021; Dawson & McCulloch, 2005; Krause et al., 2017; Williamson et al., 2011), yet the debate over the impact of fatigue in medicine persists. The notion that doctors are more resilient to sleep deprivation than the general population has been debunked (Czeisler, 2009). In fact, chronic sleep restriction from extended call shifts may heighten the risk of performance deterioration (Guzzetti & Banks, 2023), with 24 hours of wakefulness impairing performance to a degree comparable to alcohol intoxication (Dawson & Reid, 1997). Similar to the effects of alcohol, during periods of sleep deprivation—particularly overnight—individuals often struggle to accurately assess their own fatigue levels (Huizinga et al., 2019; Owens, 2007).

Residents are among the healthcare workers most at risk of experiencing fatigue, due to their long work hours and demanding educational commitments. They are professionals-in-training, and patient care is a dual professional and learning activity (K. A. Harris & Frank, 2014). Their traditional long work hours date back to the beginnings of modern residency

training in the late 19th century, where single, unmarried male medical school graduates resided at hospitals to provide round-the-clock patient care, thereby gaining crucial clinical experience (Ruedy, 1993). Since then, the clinical learning environment has transformed dramatically, characterized by increased patient complexity and rapid technological advances that have accelerated healthcare delivery. Unfortunately, the expectation for residents to provide extended-hour coverage persists, despite research highlighting the potentially harmful effects of fatigue on learners, occupational health, and patient safety.

Research on fatigue within healthcare has had a skewed focus on resident duty hours. Given the traditional long working hours in the apprenticeship model of postgraduate medical education and enforceable limits on work hours due to accreditation requirements, this focus seemed like a reasonable preliminary target for intervention. Numerous studies have investigated the impact of reducing resident shift lengths on patient safety, often expecting a straightforward correlation with improved outcomes. Given the complexity of medical errors, these studies have unsurprisingly yielded mixed results, stalling significant progress in effectively addressing resident fatigue within the clinical learning environment.

One obstacle is medical culture, where opinions on fatigue as an occupational health and safety hazard are often contradictory (Field et al., 2021). This phenomenon has been termed the fatigue paradox, in which healthcare professionals recognize the detrimental effects of physician fatigue on clinical performance but are hesitant to admit its negative impact on patient care, even when presented with compelling examples. The notion of the indefatigable physician perpetuates a heroic myth in medicine, which hinders the systemic changes necessary to transform healthcare delivery from a model of personal sacrifice to one focused on improved, team-based care (Field et al., 2021; Sarkar & Cassel, 2021).

Another barrier is the worker–learner duality inherent in the apprenticeship model of postgraduate medical education, particularly regarding patient coverage in clinical settings (K. A. Harris & Frank, 2014). The report, *Resident Duty Hours: Enhancing Sleep, Supervision, and Safety,* emphasized that "both society at large and the training institutions benefit from residents' service at relatively low cost" (Institute of Medicine, 2009, p. 7). Effectively addressing the risks associated with resident fatigue would require a comprehensive overhaul of postgraduate medical education, and likely healthcare delivery as a whole. However, progress has stalled due to the immense effort and costs involved in such reform, compounded by a demand for measurable,

quantifiable data on fatigue risks. Given the complexity of the outcome measures, achieving this data may prove elusive.

Fatigue is a complex healthcare problem, fitting the definition of a wicked problem—complex, with numerous causes, and resistant to traditional solutions (J. Cleland & Durning, 2022). Wicked problems defy traditional linear analysis approaches because they involve social and political factors that can change while the problem is being addressed (Varpio et al., 2017). The clinical learning environment itself is a complex system, with a high degree of connections and interdependence that can create unpredictable results (Gamble, 2008). In these complex dynamic systems, it is difficult to establish causal links between program interventions and behaviour changes, as numerous factors can contribute to the outcomes being studied (Patton, 2011).

Studies involving resident duty hours have typically focused on quantities, such as consecutive hours worked or total weekly hours, and not necessarily the content of those work hours. This narrow focus on quantitative research does not accurately portray the lived experience of fatigue for resident physicians, instead reducing those working these extended hours to faceless statistical outcomes. Given the monumental task of challenging the status quo with regard to acknowledging the risks of fatigue in the clinical learning environment, a more qualitative approach may serve to humanize the fatigue experienced by trainees. To challenge the status quo and better understand residents' lived experiences of fatigue, this study used qualitative focus groups to explore the realities of fatigue for resident participants.

Methodology

Study Design

In this exploratory study, I used qualitative focus groups to gain insights into residents' realities of fatigue within the academic training centre. The data were analyzed using reflexive thematic analysis through a constructivist lens to uncover deeper understandings of these experiences.

Setting and Context

I conducted the study in an accredited pediatric residency training program at a Canadian tertiary care centre from November 2020 to February 2021. Residents in the program are scheduled for in-hospital on-call shifts, providing care for patients in the emergency department or those admitted to inpatient medical or intensive care units. Shifts range from 8 to 24

consecutive hours, with a maximum frequency of seven on-call shifts in 28 days (1 in 4 frequency).

In Canada, the medical profession is excluded from the Canada Labour Code (Canada Labour Standards Regulations, 2023), and there is no national legislation or regulations governing resident duty hours. Instead, representatives from eight provincial house staff organizations independently negotiate working conditions for resident physicians through collective agreements specific to their provinces or regions (Gorman et al., 2013). In Ontario, the 2020–2023 Professional Association of Residents of Ontario, Ontario Teaching Hospitals Agreement specifies that the in-hospital call period shall not exceed 24 hours, plus to up to two additional hours to ensure adequate handover (Professional Association of Residents of Ontario, 2021).

Participants and Recruitment

All current pediatric residents enrolled in the accredited pediatric residency training program were eligible for participation in the study. This included residents in postgraduate training years 1 through 4, for a total of 43 eligible residents (44 total residents, including the study's resident researcher). Recruitment occurred by email, face-to-face, and through word of mouth. Study participation was voluntary, and residents received a $10 coffee card as a token of appreciation. Informed consent was obtained in writing from each participant (see Appendix 1). The study was approved by the Research Ethics Board (see Appendix 2).

Data Collection

In-depth, semi-structured focus groups were conducted with participants to explore their experiences with sleep and fatigue during residency. The focus group protocol was informed by previous research on resident fatigue (Field et al., 2021; Kassam et al., 2019; Taylor et al., 2016), with significant input from a fatigue expert. Seven focus groups were conducted virtually through Zoom, with 4 to 6 participants in each, lasting between 45 and 60 minutes (labelled chronologically Focus Groups A through G). Focus groups were loosely separated by postgraduate training year, given the current graduated call, as service coverage permitted (i.e., decreasing amount of monthly call shifts with seniority, affecting both sleep and fatigue levels). See Appendix 3 for the full focus group protocol.

All focus groups were moderated by a female research scientist and member of the study team with extensive qualitative interview experience, and field notes were recorded by the student volunteers. The moderator was not known to any participants and introduced herself as a

research consultant for the project. The resident researcher was present during the focus groups to introduce the study. As the principal investigator, given my role as a clinical supervisor in the residency program, I did not attend the focus groups to avoid any power dynamics. The audio was digitally recorded and transcribed verbatim for analysis, with identifying data removed. Demographic information was obtained separately from focus group participation though a personal survey link administered through REDCap, a secure, web-based software platform designed to support data capture for research studies (P. A. Harris et al., 2009).

Analysis and Interpretation

I analyzed focus group data using thematic analysis, a method designed to identify, analyze, and report patterns or themes within qualitative data (Braun & Clarke, 2006). Thematic analysis is particularly suitable for exploring experiences across qualitative datasets and can highlight the influences of social, cultural, and structural contexts (Kiger & Varpio, 2020). In this study, I conducted reflexive thematic analysis, which acknowledges that coding is a process of interpretation, fueled by researcher subjectivity (Braun & Clarke, 2022b). According to Braun and Clarke (2022b), researcher reflexivity is an asset, with analysis occurring at "the intersection of the data, the subjectivity of the researcher, and the scholarly and societal context of the research" (p. 11).

Reflexive thematic analysis often involves a single data analyst, who uses their subjectivity as a primary tool for analysis (Braun & Clarke, 2022a). As the primary investigator in this study, I performed the analysis, immersing myself in the dataset and actively constructing patterns and themes (Braun & Clarke, 2006). I approached this topic from a constructivist paradigm, viewing fatigue as a social construct shaped by individual experiences, personal beliefs, and contextual factors (Bunniss & Kelly, 2010).

Reflexivity

Reflexive thematic analysis values researcher subjectivity as a key asset and quality control, requiring deep reflection on the research team's biases and decisions (Braun & Clarke, 2013, 2022b). I recognize that my educational background, professional, and personal identities influenced both the conduct of this study and the interpretations I derived.

I conducted this study with support from a RCPSC FRM grant. The secondary analysis of qualitative focus group data also contributed to my MA in Health Professions Education. As the Wellness Lead for the residency program, I was initially drawn to this research field through the FRM grant advertisement. Qualitative research embraces the concept that subjectivity exists in all

research studies, even in the study topics themselves, which are often selected due to a personal interest or connection (Hill & Dao, 2021).

My reflexivity began by reflecting on my own fatigue during training, having completed my residency in the same program nearly a decade prior to this study. As both an insider and outsider researcher (Dwyer & Buckle, 2009), now a clinical supervisor and academic, I embraced reflexivity as a continuous activity throughout the duration of the study (Barrett et al., 2020), by using reflexive writing, maintaining a notebook of memos and field notes, and collaborating with study team members (Olmos-Vega et al., 2023).

I also completed a more thorough exercise in reflexivity by applying the four interrelated dimensions of the reflexive process described by Walsh: (a) personal; (b) interpersonal; (c) methodological; and (d) contextual reflexivity (see Table 1 in Section I).

Results

Participants

Of the 43 eligible participants, 26 (60.5 %) chose to participate in focus groups. Participants' demographic characteristics are presented in Table 2.

Table 2.

Participant Demographics

Demographics	Mean ± SD
Age	29.67 ± 2.20
Gender	n (%)
Male	11 (42.3%)
Female	15 (57.7%)
Marital Status	n (%)
Single	11 (42.3%)
Domestic partnership	4 (15.4%)
Married	10 (38.5%)
Other	1 (3.8%)
Children/Minor dependents	n (%)
No	25 (96.2%)
Yes	1 (3.8%)
PGY Year	n (%)
Junior Resident	14 (53.8%)
PGY 1	5 (19.2%)
PGY 2	9 (34.6%)
Senior Resident	12 (46.2%)
PGY 3	9 (34.6%)
PGY 4	3 (11.5%)

Themes

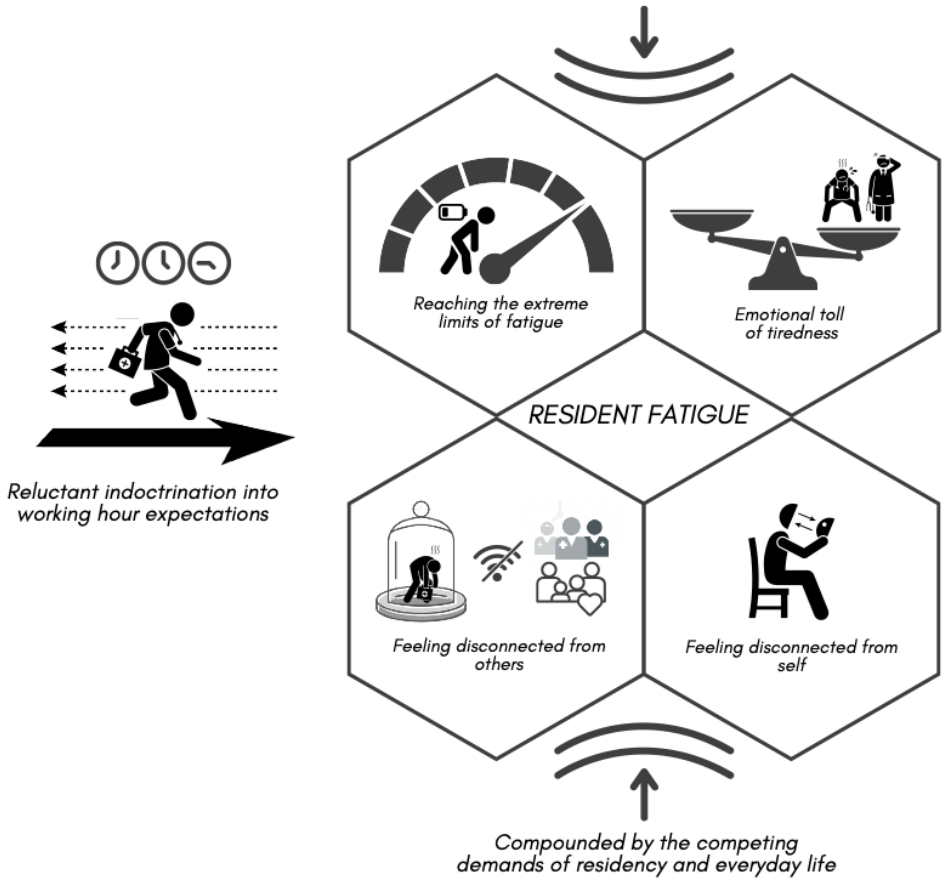
Using reflexive thematic analysis, I developed the following six interrelated themes to address the research question about the realities of fatigue experienced by pediatric residents:

1. Reluctant indoctrination into working hour expectations.
2. Reaching the extreme limits of fatigue.
3. Emotional toll of tiredness.
4. Feeling disconnected from others.
5. Feeling disconnected from self.
6. Compounded by the competing demands of residency and everyday life.

Figure 1 provides a visual representation of these themes, some of which also yielded subthemes.

Figure 1

Interrelated Themes on the Realities of Fatigue for Pediatric Residents



Reluctant Indoctrination into Working Hour Expectations. Given the recent attention to resident duty hours, it was not surprising that residents experienced cognitive dissonance when accepting extended-hour shifts, particularly when associated safety risks and disruptions to their daily lives are not fully acknowledged. As one resident noted, "not like anyone wants to be suboptimally safe but I don't think that 24 hours is totally compatible with safety" (Participant-Focus Group D 4).

Residents understood their professional responsibilities to patient care, including nontraditional working hours, but did question the personal cost:

> And ultimately, we're not going to get rid of being tired—it's part of the job. We all signed up for a certain level of fatigue . . . we're here to save people's lives, we're not here to sleep on the job, but at the same time, there's no reason to push it to the levels where we are in danger of making mistakes, not getting home safely, ruining interpersonal relationships and our own physical health and mental health, just to be able to say, 'yeah, I barely sleep during the week, I sleep 4 hours a night.' (P-G1)

They also realized that while working extended duty hours, "our bodies are not made to keep going and functioning the way they have for the daytime" (P-E5). Residents suggested that the risks of round-the-clock patient care need more explicit recognition, advocating for a shift in perspective: "if it's nighttime in the hospital, we shouldn't pretend that it's daytime, and we should actually accept that it's nighttime and treat it as such" (P-A1).

***Juxtaposed with External Perceptions of Fatigue*.** Residents' concerns were reenforced by individuals in their social circles outside of the medical profession:

> I know when I tell family members or even other people who aren't in medicine that we do stay for this amount of time, the first thing that comes to people's mind is, 'is that safe? How are you doing work?' (P-E5)

They realized that those within medicine accede to the working conditions, but "how much comparison you do with other people outside medicine, it can dictate how unreasonable you feel these things are" (P-B2).

***Conflicted with Culture of Concealing Fatigue*.** Within medicine, residents continued to note a culture of hiding or downplaying fatigue:

> Honestly, people are really good at pretending that they're not fatigued. [I'm] constantly impressed by how untired and unaffected people look post call and at the end of a night

> shift . . . I think a lot of people are just very good at showing a strong face in this business. (P-G3)

They felt compelled to maintain a facade of alertness and competence despite being exhausted, that they're "pretty good at hiding our true feelings, to soldier on and do the work that we need to do" (P-E5).

***Possessing Limited Agency in Mitigating Fatigue*.** This behaviour may stem from the limited control residents have over their schedules compared to practicing physicians (K. A. Harris & Frank, 2014), leading to a sense of resignation about their ability to manage fatigue within the current system:

> What can we do to check in with each other . . . why does it matter, what are you going to do? You're not going to send me home. I still have to be here; I still have to do my job so how's it going to change anything if I'm freaking exhausted? I still have to be here and just have to deal with it. (P-B4)

Some expressed skepticism about the efficacy of individual efforts to address fatigue: "putting the onus on the residents . . . can't say, 'what can residents do to mitigate this?' It's not my responsibility. You put me in this system, change the system" (P-D3). Although this too contributed to potential moral distress, as residents grappled with the implications of their own fatigue:

> All the ways that fatigue is not only dangerous for us, but for people we take care of . . . something really terrible is going to happen to somebody that somebody really loves because we've been up for 28 hours and we will feel awful and destroyed by it and we would not have had the energy or the mental capacity to have done the right thing. (P-C2)

Reaching the Extreme Limits of Fatigue. Residents reported reaching extreme fatigue levels, evidenced by "falling asleep in the middle of our conversation" (P-A2), or even in front of a computer, "rocking on her chair, hands in typing mode and all" (P-F2). Residents described fatigue from both acute sleep loss as well as chronic sleep deprivation, including both physical and cognitive consequences:

> There's the acute fatigue or it's just pure sleep deprivation either because you've worked a very long shift or you were just woken up where it's just like sleepiness . . . it's just really having a hard time keeping your eyes open and all you want to do is just put your head down on a flat surface no matter what. But then the more chronic-y sort of fatigue is more just you think a bit slower, things just don't make sense, you need people to repeat

> things for you, you forget details that you should be retaining in your mind. I would say a solid 10–15 point drop in your IQ. (P-A1)

Emotional Toll of Tiredness.

Emotional Difficulty Beyond Expectations. While the physical exhaustion residents reported was significant, the heightened emotional strain proved even more striking and unexpected for many: "I expected it to be difficult, but I didn't expect it to be this emotionally difficult" (P-C5). The persistence of the fatigue they experienced was challenging:

> I expected going in that it would be like similar to other parts of my life where we work really hard and you're really tired and then once you get to an endpoint, like get to your exam or finish a deadline, then you sleep . . . I didn't expect from residency that there would never be a moment or opportunity to recover. Yeah, it's like an always grumbling baseline fatigue. (P-C2)

Depleted Emotional Reserve. Residents frequently raised the concept of being emotionally depleted, with comments that they "don't have anything left in the tank" (P-D1), and reports of diminished emotional resilience:

> The idea of the window of tolerability—when you're well and rested your window is wide in terms of being able to tolerate things that are not going to plan or somebody being rude to you or whatever . . . I usually can tell that I'm tired is that I just can't cope with a lot of stuff, and I struggle to continue to be pleasant and even professional sometimes . . . I really notice that things really irritate me and it's really hard work sometimes to be my normal self. (P-D4)

This affected not only their interactions with others but also their ability to practice self-compassion:

> Even just your capacity to be able to be compassionate, not just with other people but with yourself post call . . . Everyone has really rough cases, shit happens that you regret or that you would have done differently, and when you're post call, you're not kind to yourself . . . that part for me is probably the toughest bit . . . you're out of compassion, you're out of empathy, you don't have any left. (P-C4)

Feeling Disconnected from Others. Through this emotionally demanding time, residents felt increasingly disconnected from their primary sources of support. The unique challenges of residency may require firsthand experience with extended work hours to fully grasp their impact,

positioning residents to be misunderstood and isolated from both hospital colleagues who work daytime or shift hours and non-medical support networks.

Colleagues' Lack of Awareness Regarding Work Hours. Residents reported a pervasive lack of awareness and understanding among nursing staff and other allied healthcare professionals regarding the extended work hours of residents, leading to a poor appreciation of residents' schedules and workloads, especially among junior colleagues:

> On the nursing side, there's maybe less of an understanding. I wouldn't say it's malicious but just less of an understanding of how we work. Because we would often get questions like, 'oh were we working nights this week' or 'oh, you're doing the night shift'. . . without understanding that this is not a night shift, this is a 24-hour shift and extension to a day that was already worked. So I think the lack of awareness there sometimes means that things that can wait until the morning or that are not very urgent or that could be clustered, let's say cluster of pages that can be set together, often end up being spaced out through the night . . . without the understanding that the person you're trying to reach right now is on hour 21 of a work day as opposed to hour six or seven at work. But again, it's not malicious, I would just say it's unfortunate lack of awareness a lot of times. (P-A1)

It was acknowledged that this unfamiliarity with the long shifts worked by residents may further contribute to their fatigue, as "they might get pages or things come up that aren't as urgent or don't need to be dealt with overnight . . . it still really disrupts their time of rest" (P-B3).

Family and Friends' Limited Comprehension of Work Experience. The insular experience of residency training and its extended work hours also interfered with the ability of residents' loved ones to support them through tough experiences:

> It's always been on nights where I've gotten no sleep and it's been emotionally challenging. On a night when I remember I had a kid cone and die, in the morning, it just didn't feel real. It's hard to have that experience and maybe be able to talk to some residents who have a similar understanding, but no one else can talk to, can understand, what that feels like unless you've been in that position. So, you can't talk to friends outside of medicine about that part of it, you can't talk to your family about it with any way of feeling support, you feel guilty and even more alone because you're having a period of isolation. (P-D3)

Feeling Disconnected from Self. Further adding to their sense of isolation was the tension participants expressed between their usual personalities and the behaviours they exhibited when fatigued, leading to feelings of discomfort or dissatisfaction with themselves:

> There's a degree of irritability that isn't normally there, although I can sometimes be irritable even if I'm well rested . . . I find the driving, the grocery store, [requiring] interpersonal dynamic . . . I'm much less nice and my threshold for honking or for scoffing or trying to cut someone off because they were picking their tomatoes for too long . . . I find I'm not the kind of person I want to be. (P-A1)

> I'll say something or do something that's not who I am when I'm energized . . . this chronic residency time has definitely shifted and it's hard to reflect on that and say I'm not the person that I'm used to being and I don't like how I am around other people. (P-A2)

Compounded by the Competing Demands of Residency and Everyday Life. Residency does not occur in a bubble, making the effects of fatigue an additive to other stressors in both training and personal environments, intensifying the negative impact. Residents described how these added pressures also present barriers to fully recovering from fatigue, and conversely, how the inability to recover fully can worsen the stressors:

> I feel guilty sometimes with post call days, 'cause you're trying to balance let me get a few hours of sleep but I also want to see my parents and I haven't seen my friends in a long time and I haven't gone grocery shopping and I actually did not know this case at all yesterday so should probably review that and do a little bit of studying and so just trying to like balance all of that there's always like something that gets kicked out and I haven't really figured out how to figure that out yet. (P-A4)

The formative nature of residency is inherently stressful, with residents feeling "under a microscope . . . when we're still being expected to work the hours and have a lot of responsibility" (P-D4). Residents noted that they are aware their work is being scrutinized, with the resultant constructive feedback:

> Every day is a tryout for a resident because you're on rotation with new people and you're being supervised every sentence you say, every patient that you hand over, is being judged and supervised and is going into your evaluation. (P-D1)

Educational demands further complicated recovery from fatigue, and vice versa: "research and studying and feeling like you need to improve and constantly be studying . . . a lot of that

pressure also prevents you from being able to just go to bed and sleep and chill with your friends" (P-E2). Additionally, residents noted that the post-call day following an extended shift often fails to provide adequate rest:

> I learned so fast that your post call day is not a free day. No, you are useless, you can't do anything you think. You're going to have to do research or get to the dentist or whatever—you get nothing done. You're a vegetable, you go to bed and then you wake up and you go back to bed and all you do is eat and drink coffee in between. (P-D3)

An overall impression of the residents' realities was that they were somewhat captive in a system with acknowledged fatigued conditions and powerless to change it. Without firsthand experience of their extended work hours, their loved ones and colleagues were unable to consistently support their needs. This lack of understanding also hampered efforts to advocate for improvements in the clinical learning environment.

Discussion

With the viewpoint that "not everything that counts can be counted," this study aimed to provide a deeper understanding of the realities of fatigue experienced by residents during their training, amplifying their voices through qualitative research. The high level of engagement from residents in the focus groups allowed me to depict a vivid picture of residents in significant distress, feeling disillusioned by the slow progress in addressing the fatigue they face in their training, causing isolation and misunderstanding in an already stressful training environment.

The increased focus on resident fatigue can be traced back to a highly publicized medicolegal case, the Libby Zion case (Asch & Parker, 1988), which was further intensified by the public outcry following the Institute of Medicine's report, *To Err is Human: Building a Safer Health System*, which unmasked the fatal risks associated with preventable medical errors (Institute of Medicine, 2000). Because patient safety is a compelling catalyst for change in modern medicine (Osborne & Parshuram, 2014), there was a rush to implement interventional studies rather than well-planned scholarship aimed at comprehensively understanding the complex phenomenon of fatigue within the dynamic and interconnected landscape of healthcare delivery. The subsequent duty hours standards imposed by ACGME lack an evidence-based foundation; there is no data to support the 80-hour workweek as an acceptable maximum, and the maximum shift lengths of 16 to 24 hours are likely to contribute to both acute and chronic sleep deprivation (Baldwin et al., 2003; Steinbrook, 2002).

Resident fatigue is not a "tame problem" that lends itself to the traditional quantitative analysis techniques that have long dominated medical education scholarship, but rather a wicked problem that is so "socially messy" that each participant and stakeholder perceives different underlying causes and aspects of the issue (Varpio et al., 2017; Varpio & Meyer, 2017). Despite this complexity, there has been a dominant focus on defining the relationship between resident fatigue and patient harm. This emphasis is likely related to the significant costs and efforts required to fundamentally overhaul the postgraduate medical education system in order to achieve sustainable change.

Research on resident fatigue has largely adhered to the medical education tradition of prioritizing quantitative methods, particularly randomized controlled trials, which are viewed as the gold standard (Varpio & Meyer, 2017). However, the mixed results of quantitative studies that have assessed the impact of restricting resident duty hours on patient safety have hindered meaningful progress to effectively address resident fatigue in clinical learning environments. Furthermore, many of these studies are more than 10 to 20 years old, and in that time, even national attention to resident fatigue and duty hours has not generated significant change compared to other industries.

Qualitative methods offer a valuable opportunity to explore complex phenomena that resist quantitative analysis (Wright et al., 2016). Through reflexive thematic analysis, I identified themes that deepen our understanding of fatigue in residents' clinical working conditions and challenge the outdated myths about fatigue in medicine, which have already been addressed in other fields (Dawson, 2012).

The cognitive dissonance expressed by residents in accepting working conditions that they recognize can pose risks to both their well-being and patient safety underscores the critical importance of addressing the issue of resident fatigue. This reflects a broader challenge within medical culture, which often fails to acknowledge that the evolving science of sleep and human performance also applies to residents and practicing physicians (Shanafelt, 2021). Moreover, the persistent error of seeking individual solutions to systemic problems in physician well-being continues to be perpetuated.

Recognizing fatigue as an occupational hazard in medical education continues to be a significant barrier. Field et al. (2021) articulated the fatigue paradox, which highlights the contradictory views of healthcare professionals who recognize the detrimental effects of physician fatigue on clinical performance yet hesitate to acknowledge any negative impact on

patient care, even when faced with compelling evidence. Sustaining this paradox are nurses who self-identify as "safety nets" for recognizing and mitigating fatigue-related errors (Field, 2021). However, participants in this study noted their allied health colleagues' limited understanding of their working hours, raising questions about the validity of this role.

Residency is recognized as a period of "temporary imbalance," where residents often prioritize professional development over other aspects of their lives (Ratanawongsa et al., 2007). Ensuring a safe learning environment for both learners and patients remains essential to medical education. The extreme emotional toll of fatigue described by participants is worrisome for their mental health and is a risk factor for burnout. The uncharacteristic irritability and personality changes reported by participants align with the decreased empathy commonly associated with excessive fatigue (Fowler & Ellis, 2019; Guadagni et al., 2014). Problems with communication and professionalism feature prominently in college complaints against resident physicians, which could jeopardize their future careers (Crosbie et al., 2022).

This study advocates for a paradigm shift in considering the qualitative experience of medical trainees to better understand their clinical working conditions rather than statistical significance in complicated outcome measures. Better yet, we must acknowledge that just as patient safety is not a postgraduate medical education issue, neither is fatigue—the singular focus on the residency experience does not validate that fatigue within healthcare is a system-wide issue. Most medical professional organizations have published policies on fatigue risk in healthcare, including the Canadian Medical Association's policy on Management of Physician Fatigue, which states that "fatigue management is a competency that needs to be taught, modelled, mentored, and evaluated across the medical education continuum, from medical student to practicing physician" (Canadian Medical Association, 2014). Despite this, independent physicians' working conditions continue to be unregulated, and fatigue-related faculty development has been non-existent.

What is difficult to convey from the qualitative analysis is the overall sense of sadness and exhaustion that permeates the transcripts, that is, residents' exhaustion with exhaustion. Accepting working conditions that are potentially hazardous and illegal in most other industries is a difficult ask, and the slow pace to address fatigue-related risks in postgraduate medical education invalidates the residents' experiences. Anecdotally, residents shared that participating in the focus groups felt therapeutic; they benefitted from just being asked about their experiences. Perhaps because residency is a temporary and time-limited experience, which means insider

advocates are transitory, there is a lack of urgency in implementing meaningful changes in postgraduate medical education despite the well-documented risks of fatigue.

Strengths and Limitations

Analysis of the results employed reflexive thematic analysis, intentionally leveraging the researcher's subjectivity, which contrasts with the medical education field's emphasis on objectivity and replicability. I view my in-depth knowledge of both the study setting and the research topic as a valuable asset, enhancing the richness of the data interpretation. It should be noted that a researcher with a different background might have engaged with the dataset differently, potentially yielding enlightening insights. However, the primary aim of this study was to gain a deeper understanding of resident fatigue within a specific local context, rather than to seek broad generalizability.

Conclusion

Resident fatigue is a complex healthcare issue that prior quantitative studies have inadequately addressed. This qualitative study offers a deeper insight into residents' experiences of fatigue within the clinical learning environment, highlighting their reluctance to confront it and their feelings of powerlessness to effect change. Furthermore, because residents' loved ones and colleagues lack firsthand experience of the demand associated with such long working hours, they often struggle to provide residents with the necessary support, which further hinders efforts to advocate for improvements.

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Section III: Conclusion to MA Thesis by Article

Lessons Learned

Completing this MA thesis has been a winding journey, shaped by the challenge of balancing educational demands with a full-time academic career, as well as the experiential learning inherent in qualitative research. Despite these obstacles, I have benefited from this hands-on experience, navigating the steep learning curve as a novice qualitative researcher. This study marks my first foray into qualitative research, and the practical experience has been invaluable in fostering an appreciation for the rich data it can produce.

I have always recognized the value of qualitative research, but it was not until I immersed myself in the focus group transcripts—reading and re-reading them—that I truly understood the privilege of amplifying the voices of the participants and the experiences they shared. My deep interest in the topic, coupled with my own residency training in the study setting, made it challenging to select the most salient quotations to illustrate the identified themes because each quote held significance. At times, this interest became distracting, leading me to conduct an extensive literature review that continually unveiled more articles, ultimately resulting in a comprehensive understanding of the related research.

Transitioning from the quantitative approach that I was accustomed to in medicine, which emphasizes objectivity and the elimination of bias, made qualitative research initially daunting. However, I embraced reflexivity and its importance in recognizing how a researcher's influence shapes every aspect of a qualitative study (Wright et al., 2016).

I also gained an appreciation for the role of the insider/outsider researcher. My familiarity with the training program and environment provided valuable contextual insights, and I made a concerted effort to ensure that the voices of the research participants were heard, striving to separate their experiences of fatigue from my own during training. I take pride in fully embracing Braun & Clarke's (2006, 2022) vision for thematic analysis and applying reflexive thematic analysis. While the benefits of researcher subjectivity support a single coder approach, ideal for an insider researcher, this contradicted the analysis strategies recommended by research consultants on this study.

My perspective on the research topic evolved over time. I entered the study with optimism, eager to implement FRM interventions after my training program received the FRM grant from the RCPSC. However, as I delved deeper into the historical context of the research, I became more cynical, recognizing the limited effectiveness of past interventions. I also noted that

the focus in both Canada and the US was predominantly on resident physicians. While incorporating FRM curriculum into residency training programs is crucial, "placing the burden of a system-level problem solely on the individual is unlikely to bring about significant and lasting change" (Gates et al., 2018). While the RCPSC's decision to focus on FRM after identifying that addressing resident duty hours alone was insufficient is commendable, I challenge the continued acceptance of 24-hour shifts for trainees. Public sentiment echoes this concern.

There are difficulties inherent in tackling wicked problems that are deeply embedded in the complex systems of medical education and healthcare (Gorman et al., 2013; Varpio et al., 2017). Faculty mentors must recognize fatigue as an occupational risk in training and move away from a culture that equates long hours with dedication and professionalism. Only through a collective effort and a paradigm shift in FRM—one that engages the entire 24/7 hospital workforce—can we achieve sustainable change. The first step is to continue the conversation regarding fatigue risk in healthcare, and I hope this study contributes meaningfully to that ongoing discussion.

Study Implications

The results of this study offer valuable insights into the realities of fatigue experienced by residents in this clinical learning environment, helping to humanize their experiences. This research advocates for a departure from the demand for quantifiable, systems-level evidence that addressing resident fatigue will yield tangible impacts, questioning the realism of such expectations. I hope these findings ignite discussions that challenge outdated and inaccurate cultural beliefs about fatigue in medicine, fostering a paradigm shift toward recognizing fatigue as an occupational risk within medical education.

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Appendix 1 – Fatigue Risk Management Plan Consent Form

Informed Consent Form for Participation in a Research Study

Study Title: Implementation of a Fatigue Risk Management Plan for CHEO/University of Ottawa Pediatrics Residents — A pilot study

Principal Investigator: Dr Amy Robinson, Department of Pediatrics, CHEO
Co-Investigator: Dr Vivian Ng, Chief Resident, University of Ottawa/CHEO Pediatrics Residency Training Program

Sponsor/Funder(s): Royal College of Physicians and Surgeons of Canada — Fatigue Risk Management Task Force

INTRODUCTION

As a resident in the Pediatrics Residency Training program at the University of Ottawa/CHEO, you are being invited to participate in a research study. The program has been successful in obtaining a Royal College grant to be one of two residency programs in Canada to implement a Fatigue Risk Management Plan (FRMP) at their residency site. Developing an FRMP will soon become an accreditation standard for all residency programs, to help mitigate the risks associated with resident fatigue. In participating in this pilot project, the CHEO Pediatrics program will have the support of the Royal College as well as an international expert in fatigue risk management in developing their FRMP, with the opportunity to share the experience with training programs nationwide.

This consent form provides you with information to help you make an informed choice. Please read this document carefully and ask any questions you may have. All your questions should be answered to your satisfaction before you decide whether to participate in this research study. Please take your time in making your decision.

Taking part in this survey in voluntary and your decision to participate or not in this study will not affect your residency in any way. You are free to withdraw from the study at any time without any penalty.

IS THERE A CONFLICT OF INTEREST?

There are no conflicts of interest to declare related to this study.

WHY IS THIS STUDY BEING DONE?

The purpose of this study is to acquire data related to resident fatigue, liaise with key stakeholders to create and implement an FRMP in CHEO's residency training program, and then facilitating knowledge-sharing of FRMP implementation amongst Canadian residency programs.

HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

It is anticipated that about 60 residents, faculty and CHEO staff will take part in this study. This study should take ~ one year to complete, with preliminary results available in Fall 2020, in anticipation of the International Conference on Residency Education (ICRE).

WHAT WILL HAPPEN DURING THIS STUDY?

Focus Groups:

You will be asked to participate in a focus group separated by postgraduate training year. A focus group is a small group of representative people who are asked to speak about their opinions as part of the research. A moderator will organize the focus group. Each focus group discussion will be about 90 minutes in length and will take place at CHEO. You will be asked to speak about your experience with sleep and fatigue during your residency training. The focus groups will be audio recorded, and the transcription will be anonymized with no personal identifiers taken.

Questionnaires:

You will be asked to complete a brief questionnaire collecting demographic information. You will also be asked to complete a 14-day sleep diary, recording sleep quantities as well as self-perceived levels of fatigue.

This information will be entered into an electronic database. The data will be securely stored and will be maintained by Drs Robinson & Ng. The database can only be accessed by people who are involved in research. The sleep diary and demographic data will also be anonymized, with each participant assigned a unique study number.

Please talk to the research team if there is information that you do not feel comfortable sharing.

The information you provide is for research purposes only. Some of the questions are personal. You can choose not to answer questions if you wish.

WHAT ARE THE RESPONSIBILITIES OF STUDY PARTICIPANTS?

If you choose to participate in this study, you will be expected to:

- Complete the demographic data collection form
- Record a 14-day sleep diary
- Participate in a 90-minute focus group
    - Not discuss with others any information you learn in the focus group. This includes information about other group members and any opinions or comments that are shared.

HOW LONG WILL PARTICIPANTS BE IN THE STUDY?

Your participation on this study will last for about one year.

CAN PARTICIPANTS CHOOSE TO LEAVE THE STUDY?

You can choose to end your participation in this research (called withdrawal) at any time without having to provide a reason. If you choose to withdraw from the study, you are encouraged to contact the research team.

Information that was recorded before you withdrew will be used by the researchers for the purposes of the study, but no information will be collected after you withdraw your permission.

CAN PARTICIPATION IN THIS STUDY END EARLY?

Your participation on the study may be stopped early, and without your consent, for reasons such as:

- New information shows that the research is no longer in your best interest
- The research team decides to stop the study
- The research ethics board withdraw permission for this study to continue

If you are removed from this study, the research team will discuss the reasons with you.

WHAT ARE THE RISKS OR HARMS OF PARTICIPATING IN THIS STUDY?

There are no risks to you from participating in this study, but taking part in this study may make you feel uncomfortable.

Focus Groups:

You may become uncomfortable while discussing your experiences. You may refuse to answer questions or leave the focus group at any time if you experience any discomfort.

While the study team will take precautions to protect your confidentiality, we cannot guarantee that other members of the focus group will respect your privacy or keep the discussions of the group confidential.

WHAT ARE THE BENEFITS OF PARTICIPATING IN THIS STUDY?

You may or may not directly benefit from the study. However, we hope the information learned from this study will add to the current research on fatigue risk management and inform other residency training programs on implementing an FRMP.

HOW WILL PARTICIPANT INFORMATION BE KEPT CONFIDENTIAL?

If you decide to participate in this study, the research team will only collect the information they need for this study. No personal health information will be collected.

Records identifying you at this centre will be kept confidential and, to the extent permitted by the applicable laws, will not be disclosed or made publicly available, except as described in this

consent document. Following completion of the research study, the data will be kept for 7 years after the last publication of this study, and then destroyed.

Authorized representatives of the following organizations may look at your original (identifiable) records at the site where these records are held, to check that the information collected for the study is correct and follows proper laws and guidelines.

- Royal College of Physicians and Surgeons of Canada
- The research ethics board who oversees the ethical conduct of this study in Ontario
- The Children's Hospital of Eastern Ontario — Ottawa Children's Treatment Centre and the Research Institute, to oversee the conduct of the research at this location

Information that is collected about you for the study (called study data) may also be sent to the organizations listed above. Your name, address, email, or other information that may directly identify you will not be used. The records received by these organizations may contain your date of birth and gender.

During the focus groups, we will remind everyone that the information shared is private and should not be repeated outside the group, but we cannot be sure that information about you will be kept private. People in groups may share information with others outside the group.

During the discussions, participants will be encouraged to refrain from using names. If names or other identifying information is shared during the discussion, it will not be included in the written records.

The audio recordings will be stored in a secure location and accessed only by members of the research team. The recordings will be kept until they have been transcribed (turned into written records), and then they will be destroyed.

If the results of this study are published, your identity will remain confidential. It is expected that the information collected during this study will be used in analyses and will be published/ presented to the scientific community at meetings and in journals.

Even though the likelihood that someone may identify you from the study data is very small, it can never be completely eliminated.

WHAT IS THE COST TO PARTICIPANTS?

Participation in this study will not involve any additional costs to you.

ARE STUDY PARTICIPANTS PAID TO BE IN THIS STUDY?

If you decide to participate in this study, you will receive a gift certificate and be provided with nutrition during the focus groups.

WHAT ARE THE RIGHTS OF PARTICIPANTS IN A RESEARCH STUDY?

You will be told, in a timely manner, about new information that may be relevant to your willingness to stay in this study.

You have the right to be informed of the results of this study once the entire study is complete. If you would like to be informed of the results of this study, please contact the research team.

Your rights to privacy are legally protected by federal and provincial laws that require safeguards to ensure that your privacy is respected.

By signing this form, you do not give up any of your legal rights against the researcher, sponsor or involved institutions for compensation, nor does this form relieve the researcher, sponsor or their agents of their legal and professional responsibilities.

You will be given a copy of this signed and dated consent form prior to participating in this study.

WHOM DO PARTICIPANTS CONTACT FOR QUESTIONS?

If you have questions about taking part in this study, or if you suffer a research-related injury, you can talk to the research team, or the person who is in charge of the study at this institution. That person is:

Dr Amy Robinson XXX-XXX-XXXX

If you have questions about your rights as a participant or about ethical issues related to this study, you can talk to someone who is not involved in the study at all. That person is:
The CHEO Research Ethics Board XXX-XXX-XXXX

SIGNATURES

- All of my questions have been answered,
- I understand the information within this informed consent form,
- I allow access to the completed data collection form, sleep diary, and focus group content as explained in this consent form,
- I do not give up any of my legal rights by signing this consent form,
- I agree to take part in this study.

_____	_____	_____
Signature of Participant	PRINTED NAME	Date

_____	_____	_____
Signature of Person Conducting the Consent Discussion	PRINTED NAME & ROLE	Date

Appendix 2 – CHEO Research Ethics Board Approval and Annual Renewal

CHEO Research Ethics Board

Approval – Delegated Review

REB Protocol No: 20/21X

ROMEO File No: 20190388

Principal Investigator: Dr. Amy Robinson

Project Title: CHEOREB# 20/21X – Implementation of a Fatigue Risk Management Plan for CHEO/University of Ottawa Pediatrics Residents – A pilot study

Protocol Status: Active

Approval Date*: September 09, 2020

Approval Expiry Date:** August 15, 2021

Documents Reviewed & Approved:

Document Name	Comments	Version Date
Questionnaire/Survey	FRMP – revised Data Collection Form – clean version	2020/02/19
Other Document	FRMP – Resident focus group guide	2020/02/19
Questionnaire/Survey	FRMP sleep diary	2020/02/19
Recruitment Materials	Recruitment email – CHEO FRMP advisory group	2020/09/08
Recruitment Materials	Recruitment email – CHEO staff	2020/09/08
Recruitment Materials	Recruitment email – residents	2020/09/08
Protocol	CHEO FRMP REB application – version 5.0 – clean	2020/09/03
Consent Form	FRMP revised Staff Consent Form – clean version	2020/08/24
Consent Form	FRMP revised Resident Consent Form – clean version	2020/08/24

Documents Reviewed & Acknowledged:

Document Name	Comments	Version Date
Other Document	CHEO FRMP revised timeline	
Budget	CHEO FRMP Budget	2020/02/19
Other Document	CHEO FRMP Proposed Study Timeline	2020/02/19
Other Document	CHEO Pediatrics FRMP Advisory Group	2020/02/19

This is to notify you that the Children's Hospital of Eastern Ontario Research Ethics Board has granted approval to the above named research study on the date noted above. Your project was reviewed within the delegated stream, which is reserved for projects that involve no more than minimal risk to human participants.

Final approval is granted for the above noted study, with the understanding that the investigator agrees to comply with the following requirements:

1. The investigator must conduct the study in compliance with the protocol and any additional conditions set out by the Board.
2. The investigator is responsible for complying with all applicable guidelines and regulations regarding the ethical conduct of research with humans, as applicable to the research project.
3. Investigators must obtain annual renewal approval prior to the expiry date stated above.
4. The investigator must not implement any deviation from, or changes to, the protocol without the approval of the REB except where necessary to eliminate an immediate hazard to the research subject, or when the change involves only logistical or administrative aspects of the study (e.g., change of telephone number or research staff). As soon as possible, however, the implemented deviation or change, the reasons for it and, if appropriate, the proposed protocol amendment(s) should be submitted to the Board for review and approval.
5. The investigator must, prior to use, obtain approval from the Board for changes to the study documentation, e.g., changes to the informed consent letters, recruitment materials.

6. Investigators must obtain approval from the Board of French version(s) of the consent/assent form(s), unless a waiver has been granted. An interpreter should be offered to participants as required or at the request of the participant throughout the course of research.
7. For clinical drug or device trials, investigators must promptly report to the REB all adverse events that are both serious and unexpected (SAEs) or unexpected and untoward occurrences (including the loss or theft of study data and other such privacy breaches).
8. For SAE reports on clinical drug trials, the investigator must also comply with the hospital-wide Policy regarding, Procedures for Considering Medical Error in the Differential Diagnosis of Severe Adverse Events (SAE) Associated with the Drugs Administered in a Clinical Trial.
9. Investigators must promptly report to the REB any new information regarding the safety of research subjects (e.g., changes to the product monograph or investigator's brochure of drug trials). Where available, any reports produced by the Data Safety Monitoring Board should also be promptly submitted to the REB for acknowledgement.
10. Investigators must notify the REB of any change in study status (closed to accrual, temporary, premature or permanent).
11. Investigators must submit a study closure event form at the conclusion of the study.

If you have any questions, pertaining to this letter, please contact the Research Ethics Board Office.

Regards,

Cécile Bensimon, MA, PhD
Chair, Research Ethics Board
Président, Comité d'éthique de la recherche

* The final approval date for initial delegated study applications approved with or without modifications will be the date the REB has determined that the conditions of approval have been satisfied.

** The expiry date of REB approval for initial study applications will be as follows:

- If the date of approval was **on or before** the 15th of the month, the expiry date will be the 15th of the month prior to the date of review and approval by the Chair and/or delegate *in the following year*;
- If the date of review and approval was **after** the 15th of the month, the expiry date will be the 15th of the month in which the date of review and approval by the REB *in the following year*.

CHEO REB

Approval of Annual Renewal

REB Protocol No: 20/21X

ROMEO File No: 20190388

Principal Investigator: Dr. Amy Robinson

Protocol Title: CHEOREB# 20/21X – Implementation of a Fatigue Risk Management Plan for CHEO/University of Ottawa Pediatrics Residents – A pilot study

Protocol Status: Active

Approval Date: July 17, 2024

Approval Expiry Date: August 15, 2025

The CHEO REB has conducted a delegated review and approved the renewal of the above-named study. Approval is valid for the period indicated above. Future annual renewals or study closures must be completed before the expiry date noted above.

The decision was ratified by the Full Board. REB members involved in the study do not participate in the review, deliberations, or decision.

Any modifications made to the study must be reviewed and approved by the REB prior to implementation, except when necessary to eliminate immediate danger or hazard(s) to study participants or when the change(s) involves administrative aspects of the study. Investigators must promptly alert the REB of any changes that increase the risk to participants or affect the safety of participants, all unanticipated and harmful events that occur, and new information that significantly impact the conduct of the study.

The CHEO REB operates in compliance with, and is constituted in accordance with, the requirements of the Tri-Council Policy Statement: Ethical Conduct of Research Involving

Humans (TCPS 2); the International Conference on Harmonization Good Clinical Practice Consolidated Guideline (ICH GCP); Part C, Division 5 of the Food and Drug Regulations; Part 4 of the Natural Health Products Regulations; and Part 3 of the Medical Devices Regulations and the provisions of the Ontario Personal Health Information Protection Act (PHIPA 2004) and its applicable regulations. The CHEO REB is registered with the U.S. Department of Health and Human Services (DHHS) Office for Human Research Protection (OHRP).

Please do not hesitate to contact the Research Ethics Office if you have any questions.

Best wishes with the successful completion of your research.

Cécile Bensimon, MA, PhD
Chair, Research Ethics Board
Présidente, Comité d'éthique de la recherche

Appendix 3 – Resident Focus Group Protocol

Fatigue Risk Management Plan — Resident Focus Group Protocol

Protocol Version 2.0, 19-Feb-2020

Introduction

- Introduction of the facilitator
- Thank group for their participation
- Purpose of the study
    - Endorsement of the RCPSC
        - Tell "silly stories about sleepy doctors" (e.g., ObGyn falling asleep on pt. stomach while listening to fetus' heartbeat and Emerg doc dozed off while palpitating child's abdomen, mother goes to charge nurse and expresses gratitude for the doctor "praying" over her son)
- Ethics approval and informed consent
- Strict confidentiality
- Taping of the focus group for the purpose of data collection
    - Focus group norms: no talking over each other, etc.
- Distribution of demographic data collection and sleep diaries (at end of focus group)

Focus Group Questions

1. I want to kick things off by asking if you have any funny sleep stories? Prompt: Have you ever seen anyone fall asleep? What does "sleepy" look like? [Note: These prompts are meant to get people chatting]
2. On average, in residency, (when on clinical duty) how many hours of sleep do you think you get per night? Prompts: Just an average
3. When on call (during the day) how fatigued do you feel? Prompts: How do you know you feel fatigued: physical sensations, cognitive skills, emotional feelings, performance?
4. When on call (during the night) how fatigued do you feel? Prompts: How do you know you feel fatigued: physical sensations, cognitive skills, emotional feelings, performance?

5. Prior to residency, what were your expectations regarding fatigue? Prompts: Did you anticipate being as tired as you are? More? Less?
6. Do you have a sense of the kinds of things residents do to minimize risks to patients (when they are tired)? Prompt: Can you talk about some specific examples?
7. Tell me about some of the things residents do when they are tired? Prompt: Worded another way, how do you know when someone else (another resident) is fatigued? Prompt: Can you give me some specific examples?
8. What can residents do to ensure they work safely when they are fatigued?
9. Does fatigue interfere with your personal life? Prompts: Relationships? Physical health? Mental health? Eating habits?
10. What are some strategies you can do to get more sleep? Prompts: What was most helpful? What is least helpful?
11. What organizational changes would help you to get more sleep? Prompts: What are some changes PGME can do for you to get more sleep? Hospital-level? Royal College?

Thank participants for their time