

Evaluating Burnout and Mental Health Among Nurses in Northwestern Ontario:

A 3-Manuscript Dissertation

by

Ainsley Miller

A Dissertation

presented to Lakehead University

in fulfillment of the

Dissertation requirement for the degree of
Doctor of Philosophy (PhD) in Health Sciences

Thunder Bay, Ontario, Canada, 2026

© Ainsley Miller, 2026

Author Declaration

I hereby declare that I am the sole author of this dissertation, including any final revisions, as approved by my dissertation committee, internal and external examiners, and the Graduate Studies office. This dissertation has not been submitted for a higher degree to any other University or Institution. I certify that this dissertation is a product of work completed during my registration as a graduate student at Lakehead University.

Acknowledgements

I would like to express my sincere gratitude to the many individuals who have supported me over the past six years in completing this dissertation. First, to my supervisor, Dr. Vicki Kristman, thank you for taking me on as your first official PhD student! I have sincerely appreciated your guidance, expertise, and unwavering support throughout this journey. Your mentorship has been invaluable in shaping both this research and my development as a researcher. Additionally, I would like to acknowledge the EPID@Work Institute including the staff, students, and researchers that I have crossed paths with. The cohort study would not be what it is today without everyone's dedication and collaborative efforts.

I would also like to acknowledge my committee members, Dr. Lynn Martin and Dr. Deborah Scharf, for their thoughtful feedback and contributions. Thank you for always providing a unique perspective and pushing me to think more critically. I truly believe that your guidance has significantly improved this work.

I am grateful to the organizations and participants who made this research possible. In particular, I would like to acknowledge the nurses who generously shared their time and experiences. I also want to acknowledge the funding agencies that supported this work: the EPID@Work Research Institute, the Social Sciences and Humanities Research Council (SSHRC), the Institute for Work and Health (IWH), and the Registered Nurses' Association of Ontario (RNAO) Nursing Research Interest Group (NRIG).

Thank you to my colleagues in the School of Nursing for checking in on my progress and providing me with support and encouragement throughout this journey. I am especially grateful to Alex and Kaitlin, whose friendship and shared experiences made this journey far more

manageable. Thank you for always being there to listen, for providing a space to share frustrations and celebrate successes, and for supporting me through every stage of this process.

Finally, I would like to acknowledge my family. Without all of you, none of this would have been possible. A special thank you to my mom – my inspiration, my role model, and my favourite person. Your love, guidance, and constant support have shaped who I am. Everything I have accomplished is because you were always there cheering me on, pushing me forward, and reminding me to keep going, even when it was difficult. To my dad, Ryan and Madeline, Nanny and Poppa, Anna, Auntie Sheri and Uncle Chris, cousins, and friends – thank you for always being interested in the work I was doing and for celebrating my efforts along the way. To my in-laws, Donna and Joe, Jenna and Toby, niece and nephew (Rivlen and Stella), I wouldn't have gotten to where I am without your support. Your love, encouragement, assistance with childcare, and all the delicious meals (and desserts!) you made along the way has sustained me through it all.

To my husband, Stephen. Your continuous encouragement, positive attitude, perseverance, and enthusiasm brightened every day. I am so appreciative of your unwavering support, your ability to make accommodations for me to complete this work, and for always finding ways for us to enjoy life and have fun together. I could not have done this without you and the way you showed up for me in every way possible. Finally, to my children, Avery and Max. You have both brought immeasurable joy and deep purpose to my life. I am so grateful for you every day, and for the light you bring into everything I do.

Table of Contents

<i>Author Declaration</i>	<i>ii</i>
<i>Acknowledgements.....</i>	<i>iii</i>
<i>List of Tables</i>	<i>ix</i>
<i>List of Figures</i>	<i>x</i>
<i>List of Appendices</i>	<i>xi</i>
<i>List of Abbreviations/Symbols</i>	<i>xii</i>
Chapter 1: Introduction.....	1
Background.....	1
Objective #1.....	3
Objective #2.....	4
Objective #3.....	5
Contributions	5
References	7
Chapter 2: Literature Review	12
Burnout.....	12
What is Burnout?	12
Is Burnout Different from Depression and Anxiety?	16
Measuring Burnout	19
Cross-Sectional Evidence.....	24
Prevalence of Burnout	24
Prevalence of Burnout by Nursing Specialty	28
Prevalence of Burnout and Co-Occurring Mental Health Conditions.....	29
Variables Associated with Nurses' Burnout.....	30
Limitations of the Cross-Sectional Evidence	34
Longitudinal Evidence	35
Incidence of Burnout	35
Variables Associated with Burnout.....	36
Limitations of Longitudinal Evidence.....	38
Additional Evidence	39
Variables Associated with Burnout Identified from Reviews of the Literature.....	39
Variables Associated with Burnout from Conceptual Models, Theoretical Frameworks, or Standards.....	41
Summary of Literature Review.....	47
References	49
Chapter 3: Methodological Approach and Conceptualizations of Burnout.....	62
Methodological Approach	62
Conceptualization of Burnout in this Dissertation.....	63
Burnout Definition and Measurement Using the CBI.....	63
Conceptual Approach to the Selection of Study Variables	64
Timing of Follow-Up (Incidence)	65

References	67
Chapter 4: Reliability and Validity of the Copenhagen Burnout Inventory among Nurses in Northwestern Ontario	69
Abstract	69
1. Introduction	71
2. Background.....	71
2.1 Aim.....	74
3. Methods	75
3.1 Study Design	75
3.2 Sampling and Recruitment	75
3.3 Inclusion/Exclusion Criteria	76
3.4 Data Collection.....	76
3.5 Instruments	77
3.6 Statistical Analysis	78
3.7 Sample Size Calculation.....	80
4. Results.....	80
4.1 Sample Characteristics	81
4.2 Structural Validity	83
4.3 Model Fit	83
4.4 Factor Loadings	84
4.5 Sensitivity Analysis	84
4.6 Convergent Validity	86
4.7 Reliability	86
5. Discussion	86
5.1 Structural Validity	87
5.2 Convergent Validity	88
5.3 Reliability	89
5.4 Strengths and Limitations.....	89
6. Implications for Policy, Research and Practice.....	90
7. Conclusion.....	91
References	92
Chapter 5: Understanding Burnout in Nurses: Prevalence, Mental Health Comorbidity, and Workplace Factors	98
Abstract	98
Introduction	100
Methods	102
Study Design and Setting	102
Sample and Recruitment.....	103
Data Collection.....	104
Measurement Tools	104
Statistical Analyses.....	108
Results.....	109
Sample Characteristics	110
Psychometric Properties of Measures	112
Prevalence of Burnout and Mental Health Conditions.....	113
Co-occurrence of Burnout and Mental Health Conditions.....	113

Workplace Factors and Mental Health Conditions Associated with Burnout.....	114
Discussion	118
Strengths and Limitations	121
Conclusion.....	122
References	124
<i>Chapter 6: Exploring the Incidence and Course of Burnout among a Cohort of Nurses in Northwestern Ontario</i>	<i>132</i>
Abstract	132
Introduction	134
Methods	136
Study Design	136
Setting.....	136
Relevant Dates.....	137
Sampling Approach.....	137
Participants	137
Survey	138
Instruments	138
Cohorts	141
Statistical Analysis	142
Results.....	144
Sample	144
Characteristics of Participants	146
Incidence Proportion and Incidence Density.....	150
Stratification and Per-Person Years.....	151
Incidence Rate Ratios (IRRs) by Years of Experience and Mental Health Conditions	152
Workplace Factors and Mental Health Conditions Associated with Burnout Over Time	154
Discussion	157
Limitations	161
Implications for Practice.....	162
Conclusion.....	163
References	164
<i>Chapter 7: Integrated Discussion.....</i>	<i>174</i>
Purpose and Main Findings of the Dissertation	174
Manuscript 1 (Chapter 4): Reliability and Validity of the Copenhagen Burnout Inventory (CBI) among Nurses in Northwestern Ontario	174
Manuscript 2 (Chapter 5): Understanding Burnout in Nurses: Prevalence, Mental Health Comorbidity, and Workplace Factors.....	174
Manuscript 3 (Chapter 6): Exploring the Incidence and Course of Burnout among a Cohort of Nurses in Northwestern Ontario	175
Integrated Discussion	175
Strengths and Limitations of the Dissertation	181
Strengths	181
Limitations.....	182
Conclusion.....	183

References	184
<i>Appendices.....</i>	<i>187</i>

List of Tables

<i>Defining Features, Risk Factors, and Symptomatology of Burnout, Major Depressive Disorder, and Generalized Anxiety Disorder.....</i>	<i>17</i>
<i>Comparison of Measurement Tools</i>	<i>23</i>
<i>Demographic and Employment Characteristics (N = 520)</i>	<i>81</i>
<i>Pearson's Correlation's Evaluating Convergent Validity.....</i>	<i>86</i>
<i>Cut-offs and Interpretation of Scores for Measurement Tools.....</i>	<i>108</i>
<i>Descriptive Statistics for Sociodemographic Characteristics (n=588).....</i>	<i>110</i>
<i>Prevalence of Burnout and Mental Health Conditions (n=588)</i>	<i>113</i>
<i>Univariable Associations between Burnout and Sociodemographic Characteristics and Workplace Factors</i>	<i>115</i>
<i>Multivariable Logistic Regression Model of Workplace Factors and Mental Health Conditions Associated with Burnout (n=473).....</i>	<i>118</i>
<i>Baseline Characteristics of Participants that Completed Follow-up Surveys (n = 361) Compared to Those Lost to Follow-Up (n=227)</i>	<i>144</i>
<i>Characteristics of Nurses by Cohort Group.....</i>	<i>148</i>
<i>Incidence Proportion and Incidence Density by Group.....</i>	<i>151</i>
<i>Stratification and Per-Person Years</i>	<i>151</i>
<i>Incidence Density and Incidence Rate Ratios (IRR) by Years of Experience and Mental Health and Burnout Trajectory.....</i>	<i>153</i>
<i>Unadjusted (null) and Adjusted Linear Mixed-Effects Models Examining Workplace Factors and Mental Health Conditions Associated with Burnout Over Time</i>	<i>155</i>
<i>Summary of Findings and Implications (Research, Practice, Policy).....</i>	<i>180</i>

List of Figures

<i>Karasek's (1979) Job Strain Model.....</i>	<i>42</i>
<i>Johnson and Hall's (1988) Job Demands-Control-Support Model.....</i>	<i>43</i>
<i>Maslach and Leiter's (1997) Six Areas of Worklife Model.....</i>	<i>45</i>
<i>MHCC's (2013) National Standard for Psychological Health and Safety in the Workplace... </i>	<i>47</i>
<i>Confirmatory Factor Analysis Path Diagram</i>	<i>85</i>
<i>Four-set Venn Diagram Illustrating Comorbidity Among Mental Health Outcomes (n=573)</i>	<i>114</i>
<i>Mean Burnout Scores at T1 and T2 by Cohort Group.....</i>	<i>148</i>
<i>Forest Plot of Mixed-Effects Regression</i>	<i>157</i>

List of Appendices

<i>Appendix A: List of Variables Associated with Burnout.....</i>	<i>187</i>
<i>Appendix B: Recruitment Postcard.....</i>	<i>191</i>
<i>Appendix C: Information Letter and Consent Form.....</i>	<i>192</i>
<i>Appendix D: Research Ethics Board Approval</i>	<i>198</i>
<i>Appendix E: Survey</i>	<i>199</i>

List of Abbreviations/Symbols

<	Less than
>	Greater than
≤	Less than or equal to
≥	Greater than or equal to
α	Cronbach's alpha
β	Beta coefficient
CBI	Copenhagen Burnout Inventory
CD	Coefficient of Determination
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CFST	Compassion Fatigue Self-Test
CI	Confidence Interval
CNA	Canadian Nurses' Association
CNO	College of Nurses of Ontario
COPSOQ	Copenhagen Psychosocial Questionnaire
COSMIN	COnsensus-based Standards for the selection of health Measurement INstruments
COVID-19	Coronavirus Disease 2019
<i>df</i>	Degrees of freedom
DSM-5	Diagnostic and Statistical Manual of Mental Disorders
EPID@Work	Enhancing the Prevention of Injury and Disability at Work
GAD-7	Generalized Anxiety Disorder 7-item Scale
ICC	Intraclass Correlation Coefficient
ICD	International Classification of Diseases
IRR	Incidence Ratio
LR	Likelihood Ratio
MBI	Maslach Burnout Inventory
MHCC	Mental Health Commission of Canada
NAICS	North American Industry Classification Systems
NOWWHS	Northwestern Ontario Workplace and Worker Health Study
NP	Nurse Practitioner
NWLHIN	Northwest Local Health Integration Network
NWO	Northwestern Ontario
OLBI	Oldenburg Burnout Inventory
OR	Odds Ratio
p	Level of statistical significance
PCL-5	Posttraumatic Stress Disorder Checklist
PES-NWI	Practice Environment Scale of the Nursing Work Index
PHQ-8	8-item Patient Health Questionnaire
PN	Practical Nurse
PROQOL	Professional Quality of Life
PTSD	Posttraumatic Stress Disorder
QWL	Quality of Work Life

r	Pearson correlation coefficient
R^2	Coefficient of determination
RMSEA	Root Mean Square Error of Approximation
RN	Registered Nurse
RNAO	Registered Nurses' Association of Ontario
SMBM	Shirom-Melamed Burnout Measure
SRMR	Standardized Root Mean Square Residual
T1	Time 1
T2	Time 2
TBRHSC	Thunder Bay Regional Health Sciences Centre
TLI	Tucker-Lewis index
WHO	World Health Organization
WSIB	Workers Safety Insurance Board
χ^2	Chi-square

Chapter 1: Introduction

This chapter provides an overview of the background, rationale, and structure of this three-manuscript doctoral dissertation investigating nurse burnout, mental health conditions, and the nursing practice environment in Northwestern Ontario (NWO). It begins by highlighting the scope of burnout among nurses and describing its multi-level impacts on individual nurse's health, patient outcomes, and health care organizations. The chapter then outlines the three core research objectives: evaluating the psychometric properties of the Copenhagen Burnout Inventory (CBI) in a broad nursing sample in NWO (Manuscript 1); assessing the post-pandemic prevalence and co-occurrence of burnout and mental health conditions and workplace and individual factors associated with burnout (Manuscript 2); and establishing the longitudinal incidence and associations of burnout over time (Manuscript 3). Finally, this chapter highlights the dissertation's contributions toward informing upstream policy interventions and organizational strategies.

Background

The World Health Organization (WHO) (2019) has declared burnout an “occupational phenomenon” in the International Classification of Diseases (ICD) 11th revision. They define “burn out” as a syndrome resulting from chronic workplace stress that has not been successfully managed. Global estimates suggest that up to 30% of nurses are suffering from burnout (Ge et al., 2023) and one-tenth of nurses worldwide are said to be suffering from “severe” burnout (Woo et al., 2020). Burnout prevalence increased during the COVID-19 pandemic, with 75.3% of Canadian nurses meeting the criteria for burnout (Registered Nurses' Association of Ontario [RNAO], 2022). Burnout is a significant concern due to the multi-level impacts it may have on individual nurses, patients, and healthcare organizations.

The core component of burnout is often identified as a state of profound psychological exhaustion (Canu et al., 2020), significantly impacting individual nurses. This exhaustion can lead to a variety of symptoms including physical exhaustion (WHO, 2019), feelings of being helpless, hopeless, or powerless (Bianchi et al., 2015), cynical detachment (Maslach & Jackson, 1981), and a diminished sense of personal accomplishment (Maslach & Jackson, 1981). Additionally, nurses with burnout were found to be more likely to screen positive for mental health conditions, such as anxiety, depression, and posttraumatic stress disorder (PTSD) (Stelnicki & Carleton, 2021). This is not only distressing for nurses and their overall health but also has implications for patients and healthcare organizations.

Nurses' burnout has also been associated with numerous negative outcomes for patients. This includes, but is not limited to, poor patient outcomes, poor quality of care, patient dissatisfaction, negative patient safety climate, higher odds of patient mortality, increased failure to rescue, increased length of stay, and higher rates of adverse events such as medication errors, infections (catheter-associated urinary tract infections and surgical site infections), nosocomial infections, and patient falls (Buckley et al., 2020; Dall'Ora et al., 2020; Jun et al., 2021; Schlak et al., 2021). These patient outcomes are believed to be a result of burnout-related reduced job performance (Dall'Ora et al., 2020), which can lead to increased levels of "missed care" (e.g., medication delivery, communication, and surveillance) (White et al., 2019), and higher rates of workarounds, common within poor work environments (Debono et al., 2013; Halbesleben, 2010).

Burnout can also significantly affect the healthcare organization. Higher levels of burnout are consistently associated with lower job satisfaction (Pradas-Hernandez et al., 2018; Vargas et al., 2016). Consequently, nurses experiencing burnout are more likely to change positions as a

strategy to relieve their symptoms (Leiter & Maslach, 2009). This is troublesome as there is currently a nursing shortage across the globe (Marc et al., 2019). A report by the Third Global Forum on Human Resources for Health estimates that by 2035, nursing deficits will reach 12.9 million (WHO, 2013; WHO, 2019). Within the Canadian context, a projected shortage of 117,600 nurses by 2030 is estimated (Scheffler & Arnold, 2019), with nursing shortages in Ontario recognized to be larger than the rest of Canada (RNAO, 2021). In a recent survey of Ontario nurses (n=2,102), 69% of respondents indicated they want to leave their current position within the next five years and 13% intended to leave the profession altogether (RNAO, 2021). This widespread intention to depart exacerbates workforce instability, generating immense healthcare costs driven by employee absenteeism, elevated turnover rates, and reduced productivity (Jun et al., 2021; McDermid et al., 2020).

Given the potential impacts of burnout for nurses, patients, and healthcare organizations, preventing and addressing burnout has become a priority. However, prior to the development of effective, targeted interventions, more research is needed to better understand the full complexity of the burnout phenomenon. The following doctoral dissertation is presented in a manuscript-based format and comprises three interconnected studies that collectively aim to strengthen the evidence base for burnout research among nurses. Each manuscript addresses a distinct research objective and stands independently. The studies are based on data from a prospective cohort study conducted by a multidisciplinary research team investigating nurses' burnout, mental health conditions, and work environments over time. The overarching research objective of this dissertation was to investigate burnout, mental health conditions, and the nursing practice environment in a sample of nurses in NWO.

Objective #1

The Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981) is the most frequently used measure of burnout. However, it has been increasingly criticized regarding its conceptualization and psychometric properties (Shoman et al., 2021). More recently, the Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) has been identified as a superior burnout measure due to its strong psychometric properties (Shoman et al., 2021). The use of the CBI among nurses has only been validated in one study among a sample of nurses working in acute care hospitals in the United States (Montgomery et al., 2021). The first manuscript in this dissertation evaluated the psychometric properties of the CBI among a sample of nurses working in NWO, Canada to evaluate its use in different nursing contexts.

Objective #2

The prevalence of nurse burnout and mental health conditions (e.g., anxiety, depression, PTSD) has increased over the past decade (Stelnicki et al., 2021; Woo et al., 2020), with particularly high rates reported during the COVID-19 pandemic (Galanis et al., 2020; RNAO, 2022). However, as healthcare systems have transitioned beyond the acute phases of the pandemic, limited evidence exists regarding the current prevalence of burnout, mental health conditions, and their co-occurrence among nurses.

Numerous studies have examined factors associated with nurse burnout, with an emphasis placed on workplace demands such as workload, staffing levels, shift work, leadership, and organizational support (Buckley et al., 2020; Dall'Ora et al., 2020). This body of evidence consistently demonstrates that characteristics of the work environment play a central role in burnout (Aronsson et al., 2017). However, research has also identified the importance of individual factors, including demographic characteristics, professional experience, coping strategies, resilience, and mental health (Buckley et al., 2020; Lopez-Lopez et al., 2019;

Ramirez-Elvira et al., 2021), suggesting that burnout may reflect the combined influence of workplace conditions and individual characteristics. Despite the extensive body of research examining burnout, gaps remain, and additional investigation is needed to better understand the full complexity of the burnout phenomenon.

The purpose of manuscript 2 was to 1) estimate the prevalence of burnout and mental health conditions in a post-pandemic sample of nurses in NWO, 2) evaluate the co-occurrence of burnout and mental health conditions, and 3) determine workplace and individual factors associated with burnout.

Objective #3

There has been a lack of longitudinal research focused on nurses' burnout. The incidence of burnout among nurses is unknown, which is problematic as incidence rates are necessary to understanding the rate of new cases of burnout over a specified period of time. Identification of burnout incidence among nurses would greatly assist in intervention studies, the allocation of resources, tracking of burnout rates across time, and the ability to identify at-risk individuals.

The third manuscript aimed to 1) estimate the incidence and longitudinal course of burnout among nurses, 2) stratify the incidence and longitudinal course of burnout by years of experience and presence of mental health conditions, and 3) identify which workplace factors and mental health conditions are associated with burnout over time.

Contributions

The studies within this dissertation will contribute to the growing body of knowledge in the field of burnout. The psychometric analysis of the CBI will add to the generalizability of this questionnaire by assessing its use for a broader sample of nurses (e.g., those working in full-time, part-time, or casual positions), in diverse practice settings (e.g., acute care, community,

long-term care), and geographic locations (e.g., urban, rural, remote) in NWO. The cross-sectional component will determine prevalence estimates of burnout and mental health conditions post-pandemic among nurses in NWO, where few studies have been published. Further, this study will consider the co-occurrence of burnout with mental health conditions. Lastly, the longitudinal component will be one of the first studies to evaluate the incidence of burnout among nurses, providing valuable new knowledge regarding how burnout develops. Collectively, the studies conducted in this dissertation may be able to influence the development of policies and/or interventions to target modifiable variables in an upstream manner to mitigate the development of burnout and mental health conditions. Not only will this produce a healthier, more sustainable nursing workforce, but impacts at the patient and organizational levels are also possible.

References

- Aronsson, G., Theorell, T., Grape, T., Hammarström, A., Hogstedt, C., Marteinsdottir, I., Skoog, I., Traskman-Bendz, L., & Hall, C. (2017). A systematic review including meta-analysis of work environment and burnout symptoms. *BMC Public Health*, 17(1), 264.
- Bianchi, R., Schonfeld, I., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review*, 36, 28-41. <http://dx.doi.org/10.1016/j.cpr.2015.01.004>
- Buckley, L., Berta, W., Cleverley, K., Medeiros, C., & Widger, K. (2020). What is known about pediatric nurse burnout: A scoping review. *Human Resources for Health*, 18(9), 1-23. <https://doi.org/10.1186/s12960-020-0451-8>
- Canu, G., Marca, S.C., Dell'Oro, F., Balazs, A., Bergamaschi, E., Besse, C., Bianchi, R., Bislimovska, J., Bjelajac, A., Bugge, M., Busneag, C., Caglayan, C., Cernitanu, M., Costa Pereira, C., Dernovscek, H., Droz, N., Eglite, M., Godderis, L., Gundel, H...Wahlen, A. (2020). Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries. *Scand J Work Environ Health*, 47(2), 95-107. <https://doi.org/10.5271/sjweh.3935>
- Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, 18(41), 1-17. <https://doi.org/10.1186/s12960-020-00469-9>
- Debono, D., Greenfield, D., Travaglia, J., Long, J., Black, D., Johnson, J., & Braithwaite, J. (2013). Nurses' workarounds in acute healthcare settings: A scoping review. *BMC Health Services Research*, 13, 175. <https://doi.org/10.1186/1472-6963-13-175>
- Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and

- associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77, 3286-3302. <https://doi.org/10.1111/jan.14839>
- Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing*, 32(17-18). <https://doi.org/10.1111/jocn.16708>
- Halbesleben, J. (2010). The role of exhaustion and workarounds in predicting occupational injuries: A cross-lagged panel study of health care professionals. *Journal of Occupational Health Psychology*, 15(1), 1-16. <https://psycnet.apa.org/doi/10.1037/a0017634>
- Jun, J., Ojemeni, M.M., Kalamani, R., Tong, J., & Crecelius, M.L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, 119, 103933. <https://doi.org/10.1016/j.ijnurstu.2021.103933>
- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>
- Leiter, M.P., & Maslach, C. (2009). Nurse turnover: The mediating role of burnout. *Journal of Nursing Management*, 17, 331-339. <https://doi.org/10.1111/j.1365-2834.2009.01004.x>
- Lopez-Lopez, I., Gomez-Urquiza, J., Canadas, G., De la Fuente, E. I., Albendin-Garcia, L., & Canadas-De la Fuente, G. A. (2019). Prevalence of burnout in mental health nurses and related factors: A systematic review and meta-analysis. *International Journal of Mental Health Nursing*, 28, 1035-1044. <https://doi.org/10.1111/inm.12606>
- Marc, M., Bartosiewicz, A., Burzynska, J., Chmiel, Z., & Januszewicz, P. (2018). A nursing shortage – A prospect of global and local policies. *International Nursing Review*, 00, 1-8.

<https://doi.org/10.1111/inr.12473>

Maslach, C., & Jackson, S. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2, 99-113. <https://doi.org/10.1002/job.4030020205>

McDermid, F., Mannix, J., & Peters, K. (2020). Factors contributing to high turnover rates of emergency nurses: A review of the literature. *Australian Critical Care*, 33, 390-396. <https://doi.org/10.1016/j.aucc.2019.09.002>

Montgomery, A., Azuero, A., & Patrician, P. (2021). Psychometric properties of Copenhagen Burnout Inventory among nurses. *Research in Nursing & Health*, 44(2), 308-318. <https://doi.org/10.1002/nur.22114>

Pradas-Hernandez, L., Ariza, T., Gomez Urquiza, J. L., Albendin-Garcia, L., De la Fuente, E. I., & Canadas-De la Fuente, G. A. (2018) Prevalence of burnout in paediatric nurses: A systematic review and meta-analysis. *PLoS ONE*, 13(4), e0195039. <https://doi.org/10.1371/journal.pone.0195039>

Ramirez-Elvira, S., Romero-Bejar, J., Suleiman-Martos, N., Gomez-Urquiza, J., Monsalve Reyes, C., Canadas-De la Fuente, G., & Albendin-Garcia, L. (2021). Prevalence, risk factors and burnout levels in Intensive Care Unit nurses: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18, 11432. <https://doi.org/10.3390/ijerph182111432>

Registered Nurses' Association of Ontario (RNAO). (2021). *Ontario's RN understaffing crisis: Impact and solution*. <https://rnao.ca/sites/default/files/202111/Ontarios%20RN%20understaffing%20Crisis%20Impact%20and%20Solution%20PAB%202021.pdf>

Registered Nurses' Association of Ontario (RNAO). (2022). *Nursing through crisis: A*

Comparative perspective.

<https://rnao.ca/sites/default/files/202205/Nursing%20Through%20Crisis%20-%20A%20Comparative%20Analysis%202022.pdf>

Scheffler, R. M., & Arnold, D. R. (2018). Projecting shortages and surpluses of doctors and nurses in the OECD: What looms ahead. *Health Economics, Policy and Law*, 14(2), 274–290. <https://doi.org/10.1017/s174413311700055x>

Schlak, A., Aiken, L., Chittamns, J., Poghosyan, L., & McHugh, M. (2021). Leveraging the work environment to minimize the negative impact of nurse burnout on patient outcomes. *International Journal of Environmental Research and Public Health*, 18, 610. <https://doi.org/10.3390/ijerph18020610>

Shoman, Y., Marca, S.C., Bianchi, R., Godderis, L., van der Molen, H.F., & Guseva Canu, I. (2021). Psychometric properties of burnout measures: A systematic review. *Epidemiology and Psychiatric Sciences*, 30, e8, 1-9. <https://doi.org/10.1017/S2045796020001134>

Stelnicki, A., Jamshidi, L., Angehrn, A., Hadjistavropoulos, H., & Carleton, R.N. (2021). Associations between burnout and mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 254-263. <https://doi.org/10.1177/0844562120974194>

Vargas, C., Canadas, G., Aguayo, R., Fernandez, R., & de la Fuente, E. (2014). Which occupational risk factors are associated with burnout in nursing? A meta-analytic study. *International Journal of Clinical and Health Psychology*, 14, 28-38. [https://psycnet.apa.org/doi/10.1016/S1697-2600\(14\)70034-1](https://psycnet.apa.org/doi/10.1016/S1697-2600(14)70034-1)

White, E., Aiken, L., & McHugh, M. (2019). Registered Nurse burnout, job dissatisfaction, and

- missed care in nursing homes. *Journal of the American Geriatrics Society*, 67, 2065-2071. <https://doi.org/10.1111/jgs.16051>
- Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>
- World Health Organization (WHO). (2013). *A universal truth: No health without a workforce*. <http://www.who.int/workforcealliance/knowledge/resources/hrhreport2013/en/>
- World Health Organization (WHO) (2019). *Burn-out an “occupational phenomenon”*: *International Classification of Diseases*. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>

Chapter 2: Literature Review

This chapter reviews the literature relevant to burnout among nurses to establish the state of knowledge and identify gaps that informed the present research. The chapter begins by defining burnout, distinguishing it from related constructs such as depression and anxiety, and reviewing commonly used approaches to measuring burnout. The empirical literature is then examined, including evidence from cross-sectional and longitudinal studies on the prevalence and incidence of burnout, its co-occurrence with mental health conditions, and factors associated with burnout among nurses. Findings from scoping reviews, conceptual models, theoretical frameworks, and professional standards, are subsequently discussed to provide a comprehensive understanding of the individual, occupational, and organizational factors associated with burnout. The chapter concludes with a summary of the literature, highlighting key knowledge gaps and the rationale for the research objectives in this dissertation.

Burnout

Burnout emerged as a construct in the 1970s, defined as a negative response to workplace stressors experienced by employees (Freudenberger, 1975). Today, burnout is still well-known and frequently used in reference to excessive stress at work. However, it has also been expanded to be applicable in other domains of life (Kristensen et al., 2005). Burnout remains a challenge globally with an abundance of research efforts dedicated to achieving a better understanding of the concept to mitigate its negative effects.

What is Burnout?

The signs of burnout were first described by Freudenberg (1975) as feeling hopeless, fatigued, bored, resentful, disenchanted, discouraged, confused, quickness to anger, irritation, frustration responses, and negative attitudes, among others. Subsequently, the conceptualization,

definition, and measurement of burnout have continued to evolve. Maslach and Jackson's (1981) definition of burnout is by far the most frequently cited (Canu et al., 2020). They defined burnout as "a syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who work with people in some capacity" (Maslach & Jackson, 1981, p. 99). Thus, they describe burnout as being comprised of three domains: emotional exhaustion, depersonalization, and a diminished sense of personal accomplishment. They theorized that emotional exhaustion occurs when an individual feels overwhelmed by work demands and is depleted of the necessary resources to recover (Maslach & Leiter, 2022). The ensuing symptoms of burnout are often related to the exhaustion and overwhelming feelings that set in, where negativity, detachment from the job, and a sense of powerlessness begin to manifest (Maslach & Leiter, 2022). The resulting effect is disengagement from work as a protective mechanism and a reduced sense of personal accomplishment as the work loses its meaning (Leiter, 1993; Maslach & Leiter, 1997). Emotional exhaustion can develop under many circumstances and reflects the stress dimension of burnout (Maslach et al., 2001). Depersonalization and reduced personal accomplishment refer specifically to "a particular object (e.g., one is cynical about something and feels ineffectual to do something)" (Schaufeli et al., 2009, p. 212). Emotional exhaustion is usually the first symptom of burnout to develop (Maslach et al., 2001), and several studies have used the subscale of emotional exhaustion alone as a measure of burnout (Schaufeli, 2021), thereby, using the term emotional exhaustion synonymously with burnout. However, burnout as a one-dimensional concept fails to capture the critical aspects of the relationship people have with their work (Maslach et al., 2001), including depersonalization and decreased sense of accomplishment.

A systematic review of burnout definitions (Canu et al., 2020) revealed that the next most frequently cited definition is that of Shaufeli and Enzmann (1998). In their definition, burnout is a persistent, negative, work-related state of mind in “normal” individuals that is primarily characterized by exhaustion, which is accompanied by distress, a sense of reduced effectiveness, decreased motivation, and the development of dysfunctional attitudes and behaviours at work. They identified a possibility of 132 burnout symptoms clustered into five categories: affective, cognitive, physical, behavioural, and motivational. They believe that exhaustion is at the core and that burnout is self-perpetuating due to inadequate coping strategies associated with the syndrome. Like Maslach and Jackson (1981), Schaufeli and Enzmann (1998) attribute burnout to an individual’s job, occurring from a misfit between intentions and reality in the job.

These two most commonly used definitions (Maslach & Jackson, 1981; Schaufeli & Enzmann, 1998) have been critiqued tremendously over the years for its conceptualization and definition. In attempts to address these pitfalls, Kristensen et al. (2005a) proposed a new definition of burnout where fatigue and exhaustion were at the core of burnout and would be attributable to specific domains of an individual’s life, not solely related to workplaces. They created three dimensions that can be used to evaluate burnout from different domains: personal, work-related, and client-related. The personal burnout dimension measures the degree of physical and psychological fatigue and exhaustion experienced by the person. It is applicable to everyone, regardless of occupational status (e.g., unemployed, retired, student). The work-related dimension is used when evaluating burnout that is attributable to an individual’s respective workplace. Lastly, if an individual’s work involves working with clients, the client-related burnout dimension can be used to evaluate the degree of physical and psychological fatigue and

exhaustion perceived by the person as related to their work with clients. The term “client” can be used for various populations, including children, students, residents, inmates, or patients.

The WHO (2019) has defined burnout as a syndrome characterized by “feelings of energy depletion and/or exhaustion, increased mental distance from one’s job or feelings of negativism or cynicism related to one’s job, and reduced professional efficacy” (p. 1). Burnout is considered a precipitating factor that can influence an individual’s health status or lead to contact with health services, although it is not classified as an illness or health condition (WHO, 2019). The WHO’s definition more closely aligns with Maslach and Jackson’s (1981) original conceptualization that burnout is three-dimensional and a result of an individuals’ job. However, an agreed upon standardized conceptual definition has yet to be determined (Schaufeli, 2021).

In attempts to address the discrepancies and propose a harmonized definition, a recent systematic review, semantic analysis, and Delphi consensus panel, suggested burnout be defined as “In a worker, occupational burnout or occupational physical AND emotional exhaustion state is an exhaustion due to prolonged exposure to work-related problems” (Canu et al., 2020, p. 104). The definition was formulated by 60 experts from 29 countries, with no Canadian representatives on the panel. This definition was critiqued by Schaufeli (2021) due to the lack of clarity regarding the nature of work (e.g., is work only defined by formal employment relationships and not inclusive of students, athletes, parents, etc.), omittance of other types of exhaustion (e.g., mental, cognitive), and a failure to utilize a theoretical basis for the definition. It appears that the attempts to solidify a definition have not been well received and the new proposed definition is still inadequate in capturing the many aspects of burnout. However, agreement regarding emotional exhaustion being at the core of burnout seems to prevail among most scholars (Canu et al., 2020; Maslach & Jackson, 1981; Schaufeli, 2021).

Is Burnout Different from Depression and Anxiety?

There is considerable debate regarding the overlap between burnout and mental health disorders, namely depression (Table 1) (Bianchi & Brisson, 2019). Many believe that they are distinct entities with the predominant argument that burnout is related to work and depression is “context free and pervasive” (Freudenberger & Richelson, 1980; Maslach et al., 2001). A systematic review and meta-analysis found associations between burnout and depression and burnout and anxiety; however, the small to moderate effect size suggests that they were not the same constructs (Koutsimani et al., 2019). The meta-analysis included 69 studies on burnout and depression and 36 studies on burnout and anxiety. While the two were correlated (depression and burnout; anxiety and burnout), studies that employed the MBI had lower effect sizes than studies that employed other tools. As such, the authors concluded that there may be inflation of the association between burnout and anxiety or depression when tools other than the MBI are used. The authors highlighted the lack of longitudinal evidence to determine a causal relationship between burnout and depression and/or anxiety.

Alternatively, Bianchi and colleagues (2015) argue that burnout is not distinct from depression. As a result of their work, they have concluded that 1) burnout and depression symptoms overlap in many ways, 2) the two are highly correlated in many studies across occupational groups, 3) some studies have determined discriminant validity between burnout and depression but these studies may be limited by the time frame/response options of the questions (i.e., burnout responses include in the last year, monthly, weekly, daily whereas depression questions are within the last 1-2 weeks, depending on the scale), 4) circular causation may exist between burnout and depression (i.e., burnout can predict depression and depression can predict burnout) and future research needs to conduct bi-directional analyses, 5) some degree of

discriminant validity exists between somatic and biological levels of burnout and depression but more evidence is needed, and lastly, 6) that burnout and depression are both associated with job-related factors, with depression demonstrating a stronger relationship with job-related factors than burnout (Bianchi et al., 2015). To corroborate some of this evidence, a more recent study by Bianchi et al. (2018) regarding burnout-depression overlap among staff in the education sector, they concluded that burnout and depression were found to “1) correlate with one another; 2) cluster together; 3) overlap in terms of nomological networks; and 4) be underlain by a single latent dimension” (p. 537). Another study by Schonfeld and Bianchi (2015) determined that 86% of the teachers in their sample that were burned out met criteria for a provisional diagnosis of depression, in comparison with fewer than 1% in the no-burnout group. Lastly, a study by Bianchi and Brisson (2019) evaluated to what extent individuals with burnout and depression attribute their symptoms to their job. In this study, among participants who reported at least some burnout symptoms (n=414), 44% considered their job to be the main cause of these symptoms, 43% considered that their job was not the main cause, and 13% did not attribute their symptoms to a specific domain. Among the participants who reported at least some depressive symptoms (n=426), 39% viewed their job as the main cause of the symptoms, 45% considered that their job was not the main cause, and 16% did not attribute their symptoms to a specific domain. The authors concluded that the premise that burnout is strictly job-related may be unfounded.

Table 1

Defining Features, Risk Factors, and Symptomatology of Burnout, Major Depressive Disorder, and Generalized Anxiety Disorder

	Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (APA, 2013)	
Burnout	Major Depressive Disorder	Generalized Anxiety Disorder

Defining Features		
Develops in response to chronic stress within the workplace. No definitive criteria regarding “time to development”	Five (or more) of the following symptoms (see below) present during the same 2-week period and represent a change from previous functioning; at least one of the symptoms is either depressed mood or loss of interest or pleasure	Excessive anxiety and worry, difficulty controlling the worry, and at least three (or more) of the following symptoms for at least 6 months (see below)
Symptomatology		
• Maslach and Leiter (1997) emphasize that burnout is not only about the presence of negative emotions but also about the absence of positive ones. • Many consider emotional exhaustion as the core of burnout • Defined by Schaufeli and Enzmann (1998) that “first and foremost, burnt-out individuals feel helpless, hopeless, and powerless” (p. 399) as cited in Bianchi et al. (2015) • Depersonalization or cynicism • Reduced personal accomplishment	• Depressed mood • Anhedonia (loss of interest and pleasure) • Decreased or increased appetite and/or weight • Insomnia or hypersomnia • Psychomotor agitation or retardation • Fatigue or loss of energy • Feelings of worthlessness and/or guilt • Impaired concentration or decision making • Suicidal ideation	• Sleep disturbance (difficulty falling or staying asleep, or restless unsatisfying sleep) • Restlessness or feeling keyed up or on edge • Being easily fatigued • Difficulty concentrating or mind going blank • Muscle tension • Irritability
Risk Factors		
Work-related stressors (high demands, low job control, low reward, low support). Upwards of over 200 risk factors have been identified in systematic reviews, although many have determined weak associations, and the literature is lacking longitudinal studies where causality can be determined.	Temperamental (negative affectivity, neuroticism). Environmental (adverse childhood experiences, social determinants of health, stressful life events), genetic and physiological, all major non-mood disorders (anxiety, substance use, trauma- and stressor-related, feeding and eating, obsessive-compulsive and related disorders)	Temperamental (negative affectivity, behavioural inhibition, harm avoidance, reward dependence, attentional bias to threat), environmental (childhood adversities and parenting practices), genetic and physiologic

Measuring Burnout

There are several tools used to evaluate burnout (see Table 2). The most widely cited measurement tools include the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981, 1986; Maslach et al., 1996), the Burnout Measure (Pines & Aronson, 1988; Pines & Maslach, 1978; Maslach-Pines, 2005), the Shirom-Melamed Burnout Measure (SMBM) (Shirom, 1989), the Oldenburg Burnout Inventory (OLBI) (Demerouti & Bakker, 2008; Demerouti et al., 2001; Demerouti et al., 2003), and the Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005a). Additional tools such as the Professional Quality of Life (ProQOL) (Stamm, 2010), the Compassion Fatigue Self-Test (CFST) (Figley & Stamm, 1996), and the Copenhagen Psychosocial Questionnaire (COPSOQ) (Kristensen et al., 2005b) have been used to measure burnout, although burnout is not the primary construct in these scales.

The MBI has dominated the empirical literature in terms of measuring burnout. The MBI assesses the three dimensions of burnout and considers the scores for each subscale separately and not as a total score. A high level of burnout is indicated by the combination of high emotional exhaustion and depersonalization, together with low personal accomplishment, suggesting one concept but three independent measures (Kristensen et al., 2005a; Maslach & Jackson, 1981). However, the MBI has been criticized for the unclear relationship between the definition of burnout and how it is measured on the MBI, and that burnout is a combination of symptoms, coping strategies, and outcomes experienced by an individual (Kristensen et al., 2005a). Constructs that involve a process of development are difficult to study in research without a longitudinal approach. A cross-sectional analysis may only capture one aspect of the construct if others have yet to develop. Thus, it is difficult to conclude whether the construct is occurring or not. For example, if the MBI has determined an individual to have emotional

exhaustion but not depersonalization or reduced personal accomplishment, does that individual have burnout? Further, research has suggested that reduced personal accomplishment develops largely independent from the other two burnout dimensions (Schutte et al., 2000) and is viewed more as a consequence of burnout rather than a symptom of it. Lastly, a recent systematic review determined the MBI to have poor psychometric properties due to the very low quality of evidence for content validity, reliability, measurement error, criterion validity, construct validity, and responsiveness (Shoman et al., 2021).

Around the same time as the MBI appeared, the Burnout Measure was also developed to evaluate burnout (Pines & Aronson, 1988). The authors described burnout being identical to tedium in terms of definition and symptomology but is unique to people who work with people in situations that are emotionally demanding. Tedium is the experience of physical, emotional, and mental exhaustion. It is characterized by emotional and physical depletion and by the negation (e.g., rejecting, devaluing, or losing a positive sense) of one's self, one's environment, one's work, and one's life (Pines & Aronson, 1988). The Burnout Measure evaluates burnout by a single score, suggesting it is easier to interpret than the MBI. In addition, the Burnout Measure is not restricted to a particular occupational field (i.e., "people work"), making it more applicable to all occupational fields, including students, parents, political activists, and housewives (Pines & Aronson, 1988). However, the Burnout Measure has been criticized for its lack of theoretical basis, its inability to discriminate from similar constructs (e.g., fatigue or depression), problems with conceptualization and operationalization, and low quality of evidence of psychometric validity (Shaufeli & Enzmann, 1998; Shoman et al., 2021).

The SMBM is a burnout measure that evaluates symptoms of physical fatigue, emotional exhaustion, and cognitive weariness (Shirom, 1989). It has widespread acceptance in the

occupational health psychology and related health disciplines, a solid theoretical foundation, is free to use, and is short at 14-items (Michel et al., 2022). A recent meta-analytic validation study of the SMBM (n=89 studies) revealed that the three subscales of physical fatigue, cognitive weariness, and emotional exhaustion all displayed strong intercorrelations and that the SMBM was stable over time, as suggested by high test–retest estimates (Michel et al., 2022). Further, the results of the meta-analysis determined the SMBM to be moderately to strongly predictive of attitudinal and behavioural detriments at work and reduced subjective and psychological wellness, consistent with the broader burnout literature (Michel et al., 2022). Furthermore, measurement invariance tests were conducted for males and females across age groups and results provided support for measurement invariance (Almen & Jansson, 2021). However, the SMBM has been critiqued due to its emphasis on exhaustion as a core component, leaving out others’ conceptualization of burnout which include withdrawal-type symptoms (e.g., disengagement, cynicism) (Qiao & Schaufeli, 2010).

The OLBI evaluates exhaustion and disengagement as its core components of burnout. The OLBI is based on a conceptualization of burnout such that exhaustion and disengagement are simultaneously present, and burnout represents a dichotomous and not continuous trait. The OLBI was developed in response to criticisms of the MBI and overcame the limitations of the MBI by balanced wording and broader conceptualization, not restricted to human service workers (Demerouti et al., 2001). However, limitations of the OLBI include low test-retest reliability, the negative wording and reverse scoring of some items, and poor fit for a two-factor model (Sedlar et al., 2015).

The CBI is a newer burnout measurement tool (Kristensen et al., 2005a) and was developed in response to the gaps noted in Maslach and Jackson’s (1981) conceptualization and

measurement of burnout. The CBI takes a unique approach to evaluating burnout as it is not measured by a specific set of symptoms but focuses on the degree of physical and psychological exhaustion experienced by the person, with no attempt to distinguish between physical or psychological fatigue or exhaustion (Kristensen et al., 2005a). The CBI contains three sub-dimensions: personal burnout, work-related burnout, and client-related burnout (Kristensen et al., 2005a). The separate parts of the questionnaire were designed to be applied in different domains. Personal burnout is the degree of physical and psychological fatigue and exhaustion experienced by the person. Work-related burnout is the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work. Client-related burnout is the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work with clients. Clients is a broad concept and includes terms such as patients, inmates, children, students, residents, etc.

In a systematic review by Shoman and colleagues (2021), the psychometric properties of five patient-reported outcome measures commonly used to assess occupational burnout among health professionals was conducted. The tools included the MBI, BM, the Psychologist Burnout Inventory (PBI), the OLBI, and the CBI. Nineteen studies were included in the review with 15 on the MBI and a single study for each of the other measurement tools. Using the CONsensus-based Standards for the selection of health Measurement INstruments (COSMIN) they evaluated the risk of bias in studies assessing content and criterion validity, structural validity, internal consistency, reliability, measurement error, hypotheses testing, and responsiveness for each of the tools. The CBI and the OLBI had the most robust psychometric properties and the MBI had the largest disagreement (27%). The CBI had the most complete validation conducted, with 7 of the 11 psychometric properties (face validity, predictive validity, concurrent validity, convergent

validity, discriminant validity, stability, and homogeneity), assessed. Risk of bias was assessed using the COSMIN checklist which determined that a moderate quality of evidence was found for the CBI's content validity, internal consistency, and construct validity, but very low evidence of structural validity, reliability, measurement error, criterion validity, and responsiveness. The OLBI had 4/11 psychometric properties assessed, indicating a less complete validation of the tool. However, the risk of bias assessment determined a moderate to low quality of evidence for content validity, construct validity, and structural validity, and moderate quality of evidence for internal consistency. The authors of the systematic review did stipulate that most of the measurement tools (including the MBI) were developed and psychometrically assessed before the methodological guidelines and frameworks for validation of outcome measures became available. Thus, some of the low scores on the MBI may be from a lack of reporting. The authors identified the CBI and OLBI as the most valid of the five reviewed, although the conclusions are both based on only one study. Further examination of the psychometric properties of the CBI and OLBI were recommended by the authors to ensure it's a sufficiently valid and reliable tool (Shoman et al., 2021).

Table 2

Comparison of Measurement Tools

	MBI	Burnout Measure	SMBM	CBI	OLBI
Burnout definition	A syndrome of emotional exhaustion, depersonalization, and reduced personal accomplishment that can occur among individuals who	Burnout is identical to tedium in terms of definition and symptomology but is unique to people who work with people in situations that	Individual level phenomenon. A negative emotional experience. A chronic ongoing feeling. The unique	Exhaustion attributed to a specific domain or sphere of a person's life (personal, work, client)	This state, where both exhaustion and disengagement are simultaneously present, represents the burnout syndrome.

	work with people in some capacity	are emotionally demanding. Tedium is the experience of physical, emotional, and mental exhaustion. It is characterized by emotional and physical depletion and by the negation of oneself, one's environment, one's work, and one's life.	content of burnout has to do with the depletion of an individual's energetic resources. Specifically, burnout refers to a combination of physical fatigue, emotional exhaustion, and cognitive weariness		According to our conceptualization, burnout represents a dichotomous and not a continuous trait, as in Maslach's concept, where burnout can have low, medium, or high levels.
Dimensions	1. Emotional exhaustion 2. Depersonalization 3. Reduced personal accomplishment	1. Physical exhaustion 2. Mental exhaustion 3. Emotional exhaustion	1. Physical fatigue 2. Emotional exhaustion 3. Cognitive weariness	1. Degree of physical and psychological exhaustion experienced by the person	1. Exhaustion 2. Disengagement
Number of Items	22	21	14	19	15
Scoring	Sum each subscale and interpret each scale independently. Criticisms regarding lack of scoring for a total score.	Total score of subscales.	Total score.	Sum each subscale and interpret each scale independently, identifying area of burnout.	Total score.

Cross-Sectional Evidence

Prevalence of Burnout

Burnout among nurses is a prevalent occupational syndrome, with estimates that high burnout affects one-tenth of nurses worldwide (Woo et al., 2019). This estimate was obtained from a global systematic review and meta-analysis of 113 studies of burnout among nurses representing data from 45,539 nurses in 49 countries (Southeast Asia and Pacific n=8, Latin America and the Caribbean n=7, North America n=27, Europe and Central Asia n=13, Sub-Saharan Africa n=3, and Middle East and North Africa n=3). The meta-analysis for the prevalence of burnout included 61 studies. To be included in the meta-analysis, studies required a definition of “high” burnout symptoms based on the standard or commonly used cut-off for the respective measurement tool. The global prevalence rate for “high” burnout symptoms was 11.23% (95% CI: 8.83-13.63%) with high heterogeneity across the 61 studies (Woo et al., 2019). Various tools were used to measure burnout contributing to the high heterogeneity. Significant differences in burnout prevalence were found by geographic region with the Middle East and North Africa having the lowest prevalence of burnout (3 studies; pooled prevalence 4.68%) and Southeast Asia and the Pacific having the highest pooled prevalence of burnout (8 studies; 13.68%) (Woo et al., 2019). The authors identified that the high prevalence of burnout in Southeast Asia may be related to significant staffing challenges, high nurse-to-patient ratios, natural disasters, and/or emerging infections. The greatest number of studies on the prevalence of burnout were conducted in North America (n=27) with a pooled prevalence of burnout of 10.27%. However, among the included studies from North America, only two were from Canada (Stanley et al., 2006; Wu et al., 2016).

An additional systematic review of cross-sectional studies was recently published regarding the global prevalence of burnout among nurses (Ge et al., 2023). This systematic review included 94 studies covering over 30 countries, with only one study included from

Canada (Rubin et al., 2021). Ge et al.'s (2023) meta-analysis determined high heterogeneity among the studies, likely due to the differing healthcare systems within the various countries and inconsistent use of scales to measure burnout. However, the authors did report a higher prevalence of burnout than Woo et al. (2019), with the meta-analysis estimating the global prevalence to be 30% (95% CI: 26%-34%) (Ge et al., 2023). However, Woo et al. (2019) only included studies before 2019 that reported “high” burnout levels whereas Ge et al. (2023) included studies from 2012-2022 and included studies that reported all levels of burnout symptoms and evidence collected during the pandemic. Adding to the evidence, Ge et al. (2023) noted a gradual increase in burnout prevalence over the last 10 years and recommended continued research efforts in studying burnout.

While few Canadian studies were included in the systematic reviews above due to exclusion criteria and/or date of publication, there is additional evidence on the prevalence of burnout from a national standpoint not captured in the reviews. The study by Wu et al. (2016) cross-sectionally evaluated burnout among oncology nurses working in Canada and the United States using the ProQOL. They determined that 54% of the nurses from the Canadian sample (n=63) had a low severity of burnout and average levels among the remaining 46%. Similar results were found for the United States sample of nurses (n=486), with 52% having low burnout and 48% having average levels. These findings are limited by the small sample size of Canadian nurses, impacting the generalizability of findings. The Canadian study by Stanley et al. (2006) was a thesis evaluating factors related to burnout among mental health nurses and was also conducted with a cross-sectional design. The author determined that approximately 40% of the sample fell within the “high” category for each dimension of burnout (emotional exhaustion, depersonalization, reduced personal accomplishment). Again, the sample size was small (n=115

nurses) and obtained from a single institution within Atlantic Canada. Rubin et al.'s (2021) study determined that 77.7% of their sample (n=242 nurses in a cardiovascular centre in Toronto, Ontario) experienced burnout symptoms in the last month. Pre-pandemic, a cross-sectional study of Canadian nurses (n=3257 nurses) reported that 29.3% of nurses reported "clinically significant" levels (measured with the SMBM whereby a score below 2 indicated no burnout and above 4.4 indicated clinically significant levels) of burnout and 63.2% reported at least some symptoms of burnout (e.g., physical fatigue, cognitive weariness, tension, and/or listlessness) (Stelnicki et al., 2021). Within the grey literature, an even higher prevalence of burnout was reported during the coronavirus (COVID-19) pandemic with 94% of practicing Canadian nurses reporting experiencing at least one symptom (Ahmed & Bourgeault, 2022) and 75.3% of Canadian nurses meeting clinical cut-offs (RNAO, 2022). Post-pandemic levels of burnout appear to remain high as noted by Singh et al. (2024), with 78.7% of public health workers in Canada meeting the cut-off for burnout. While this study did not stratify burnout prevalence by professional role, 62% of the sample indicated being front-line public health or community providers, such as a nurse.

Due to the use of different measurement tools, some studies report levels of burnout rather than prevalence rates. For example, among a sample of RNs working in Newfoundland and Labrador, moderate levels of compassion satisfaction, burnout and secondary traumatic stress were found pre-pandemic (Maddigan et al., 2023). Post-pandemic, a recent cross-sectional study examined psychological well-being and predictors of burnout in RNs employed in rural and acute care settings (Chunta et al., 2024). A high degree of emotional exhaustion and a moderate degree of depersonalization and personal accomplishment were salient findings using the MBI.

Prevalence of Burnout by Nursing Specialty

The prevalence of nurses' burnout varies across nursing specialties. In the systematic review and meta-analysis by Woo and colleagues (2019), intensive and critical care nurses were found to have the highest pooled prevalence for "high" burnout at 14.36% (Woo et al., 2019). This was followed by nurses working in multiple specialties, pediatrics, and emergency settings with pooled prevalence rates of 13.11%, 11.74%, and 10.18%, respectively (Woo et al., 2019). In comparison, Ge et al. (2023) determined the highest prevalence of burnout among nurses working in pediatrics (38%), followed by emergency departments (36%), oncology units (27%), intensive care units (25%), surgical units (25%), and obstetrics (24%). They noted a statistically significant increase of burnout among obstetrical nurses over the last 10 years, while other specialties have not experienced a statistically significant change in prevalence (Ge et al., 2023). These results can be compared to systematic reviews that synthesized studies on one specific nursing specialty. For example, a systematic review of 17 cross-sectional studies of emergency nurses determined that the prevalence of burnout was 26% (Adriaenssens et al., 2015a). Among pediatric nurses in a scoping review of 78 studies, "moderate" scores were found for the burnout subscales of emotional exhaustion and depersonalization, indicating a significant level of burnout (Buckley et al., 2020). In intensive care unit nurses (n=1986 nurses), the prevalence of high emotional exhaustion was 31%, high depersonalization was 18%, and low personal accomplishment was 46% (Ramirez-Elvira et al., 2021). Oncology nurses have also been extensively studied, with estimates from a meta-analysis (n=16 studies of nurses) finding that on average 32% of nurses had high emotional exhaustion, 21% had high depersonalization, and 26% had low personal accomplishment (HaGani et al., 2022).

While other areas of nursing were not captured in the global systematic review and meta-analysis (Woo et al., 2019), it does not preclude these other areas of nursing from having burnout. For example, in a sample of mental health nurses pre-pandemic (n=868), a meta-analysis determined prevalence estimates of high emotional exhaustion, high depersonalization, and low reduced personal accomplishment to be 25%, 15%, and 22%, respectively (Lopez-Lopez et al., 2019). Additionally, a meta-analysis of six studies on palliative care nurses (n=693), estimated rates of emotional exhaustion, depersonalization, and low personal accomplishment to be 24%, 30%, and 28%, respectively (Gomez-Urquiza et al., 2020). Limited data exists regarding other specialties in nursing and their respective burnout levels, including data on medical (general) nurses, surgical nurses (pre-operative, intra-operative, post-operative), outpatient nurses, community nurses (outreach nursing, street nursing, public health nursing), and nurses working within rural or remote settings.

Prevalence of Burnout and Co-Occurring Mental Health Conditions

Recent evidence suggests that burnout can co-occur with mental health conditions. In a national sample of Canadian nurses, it was determined that nurses with high levels of burnout were 17 times more likely to screen positive for posttraumatic stress disorder, 43 times more likely to screen positive for major depressive disorder, 25 times more likely to screen positive for generalized anxiety disorder, and 23 times more likely to screen positive for panic disorder than participants who reported no burnout (Stelnicki et al., 2021). This data was obtained from nurses before the pandemic (2016-2017) and likely does not reflect the current mental health status of the nursing workforce. Much of the pandemic or post-pandemic research suggests that nurses are experiencing higher rates of burnout, stress, posttraumatic stress disorder, anxiety, and depression than pre-pandemic levels (Crowe et al., 2022). A mixed-methods study of critical care

nurses across Canada (n=425) found that during the pandemic, 100% reported moderate to high burnout and many nurses also reported symptoms of posttraumatic stress disorder (74%), depression (70%), anxiety (57%), stress (61%), and secondary traumatic stress (87%) (Crowe et al., 2022). This is concerning as the evidence regarding the cumulative impact of mental health morbidity (e.g., having more than one mental health condition/disorder) among nurses is currently limited. However, the prevalence of co-occurring mental health conditions suggests that some nurses are experiencing profound mental health challenges. Additionally, the morbidity associated with burnout and co-occurring mental health conditions has the potential to impact patients and the healthcare system.

Variables Associated with Nurses' Burnout

Several systematic reviews have evaluated factors affecting burnout among nurses (Galanis et al., 2021; Lopez-Lopez et al., 2019; Pradas-Hernandez et al. 2018; Ramirez-Elvira et al., 2021; Vargas et al., 2014) (Appendix A). Vargas and colleagues (2014) conducted a systematic review and meta-analysis on occupational risk factors and burnout among nurses. The use of the MBI and studies that were conducted using an empirical design were listed as an inclusion criterion. They determined a high and significant negative correlation between job satisfaction and burnout, with moderate negative correlations between job satisfaction and emotional exhaustion and depersonalization. The positive correlation between job satisfaction and personal accomplishment was significant, but low. Further significant correlations were determined between specialization and the three dimensions of burnout. Correlations between the other variables (job seniority, professional experience, and work shift) were not significant which they postulate is due to the high heterogeneity in the effect sizes of the studies. Within their analysis, the authors determined that age and seniority moderated the association between job

satisfaction, emotional exhaustion, and depersonalization. Additional moderators included sex, marital status, and number of children (Vargas et al., 2014). Limitations of this systematic review include failure to describe what type of empirical designs their systematic review included and to report the specific meta-analysis results (e.g., forest plots and studies) (Vargas et al., 2014). Therefore, the results should be interpreted cautiously due to the high potential for bias.

Pradas-Hernandez et al. (2018) conducted a systematic review and meta-analysis (n=34) on the prevalence and characteristics of burnout among pediatric nurses. Most results were presented as factors associated with overall burnout, with one study presenting associations to a subscale domain, despite only including studies using the MBI. Their systematic review identified sociodemographic factors (age, marital status), occupational factors (job satisfaction, length of shift, number of assigned patients, difficulty in accessing workplace information and professional experience), and psychological factors (stress and anxiety, lack of emotional intelligence and lack of supervision) are associated with burnout. Emotional exhaustion was associated with age and job satisfaction. Limitations of the systematic review include a lack of description regarding which study designs were included in the review.

Ramirez-Elvira et al.'s (2021) systematic review and meta-analysis included 15 cross-sectional studies, inclusive of 1,986 intensive care unit nurses. Of the included studies, 87.5% used the MBI and presented factors associated with overall burnout and the specific domains of burnout. Factors related to nurses' burnout included being younger, single marital status, and having less professional experience. Having depression, specific personality traits (neuroticism, agreeableness, responsibility, and extraversion), low resilience, and high workload were associated with emotional exhaustion, depersonalization, and low personal accomplishment. The authors concluded that the work environment is paramount in the development of burnout and

that increasing support, job satisfaction, and a worker's self-esteem can be protective. The authors noted high heterogeneity of studies as a limitation which precluded all studies from being included in the meta-analysis.

Lopez-Lopez et al.'s (2019) systematic review and meta-analysis of mental health nurse's burnout and related factors included 10 cross-sectional studies and one cohort study. They only included studies that utilized the MBI and presented the findings on factors associated with each burnout domain. Risk factors for emotional exhaustion determined by cross-sectional evidence included role conflict, negative affectivity, family problems, moral distress, work overload, male gender, single-person status, work-related stress, aggression/violence at work, and intention to leave. Protective factors determined by cross-sectional evidence for emotional exhaustion included job stability, feeling valued at work, social support, positive affectivity, job satisfaction, and institutional support through clinical supervision. Depersonalization was associated with negative affectivity, commuting distance, age, seniority, role conflict, aggression, stress, moral distress, and intention to leave in the cross-sectional studies. Lastly, factors associated with low personal accomplishment in the cross-sectional studies included predictability of work tasks, progress in the workplace, negative affectivity, seniority, commuting distance, stress, and work overload.

Finally, a systematic review of cross-sectional studies (n=16) evaluated burnout and the associated risk factors during the COVID-19 pandemic (Galanis et al., 2021). The main risk factors that increased nurses' burnout included: younger age, decreased social support, low family/colleague readiness to cope with the COVID-19 outbreak, increased perceived threat of COVID-19, longer working time in quarantine areas, working in a high-risk environment, working in hospitals with inadequate and insufficient material and human resources, increased

workload and lower level of specialized training regarding COVID-19. Overall, the authors concluded that burnout was a significant concern during the pandemic and that identification of risk factors for burnout is important for nurses and the healthcare system. However, limitations of the systematic review include some studies not controlling for confounding (i.e., gender, age, profession [nurse, physician, etc.]), that the inclusion criteria were not always clearly defined, and that some exposures were not measured in a valid and reliable way and may be at risk for misclassification (Galanis et al., 2021).

The systematic reviews regarding burnout among nurses globally, within the Canadian context, and across diverse specialties has demonstrated that a problem exists. Additionally, some studies have highlighted that nurses may be suffering from co-occurring mental health conditions and burnout, but due to the cross-sectional nature of the studies, the temporality between the two is unknown. Finally, the systematic reviews and meta-analyses of cross-sectional studies has provided a multitude of variables that are associated with burnout. The variables most consistently associated with burnout from the systematic reviews include:

- Individual characteristics:
 - Sociodemographic characteristics (e.g., age, gender, marital status);
 - Mental health (e.g., depression, anxiety; moral distress); and
 - Personal characteristics (e.g., personality, coping, attitude)
- Employment characteristics:
 - Seniority (e.g., length of employment);
 - Length of shift (e.g., > 8 hours);
 - Resources (human and material);
 - Job satisfaction

- Feeling valued (rewards, recognition)
- Work demands/stressors:
 - Workload (e.g., number of patients, high acuity);
 - Work environment (e.g., department);
 - Psychological demands (e.g., decision making, uncertainty around treatment, exposure to suffering, pain, death, futile care); and
 - Control (e.g., autonomy, time pressure; uncertainty of pandemic)
- Support:
 - Social support (from colleagues, leaders, institutions); and
 - Leadership (authentic leadership, structural empowerment)

Limitations of the Cross-Sectional Evidence

While this cross-sectional data is an important first step in identifying the problem and associated variables, it is subject to many limitations. First, and probably most importantly, measuring exposure and outcome variables simultaneously subjects the findings to reverse causality. As such, the directionality and temporality of the relationship between work-related factors and burnout cannot be determined. Next, the way in which burnout is conceptualized and measured varied greatly amongst the studies, contributing to a high degree of heterogeneity and difficulty in synthesizing prevalence rates. As some burnout measures have been criticized as having flawed conceptualization and psychometric properties, there is a need to use valid and reliable burnout measures to give a more accurate representation of prevalence. Additionally, as co-occurring mental health conditions are more likely among nurses who experience burnout, this warrants further investigation among a large, diverse sample. Careful consideration of exposure measurements (e.g., work-related factors) needs to be taken so that concepts are well

described to provide an accurate representation of nurses' work (e.g., workload is complex and should not be measured by a single item). Lastly, nursing practice environments are constantly evolving, and research has yet to determine the prevalence of burnout and co-occurring mental health conditions following the pandemic.

Longitudinal Evidence

Incidence of Burnout

Studies on the epidemiology of burnout are scarce (Penz et al., 2018). No longitudinal studies were found that calculated the incidence of burnout among nurses. As such, a broader review of the general literature (e.g., expanding the search beyond nurses alone) was conducted. One systematic review and meta-analysis of prospective studies on exhaustion (n=65) identified that none of the included studies separated exposed from non-exposed participants and did not follow the participants to capture the onset of burnout (Shoman et al., 2022). Therefore, incidence was not calculated in any of the included studies. The authors noted the quality of evidence was generally low.

A couple of longitudinal studies were found that evaluated burnout within the medical field (e.g., doctors, residents, trainees). One study conducted on junior doctors (n=180) at two tertiary hospitals in Australia determined a statistically significant increase in burnout scores from baseline to 6-months for personal, work-related, and client-related burnout using the CBI. However, this effect diminished to a nonsignificant trend at 12 months for personal and work-related burnout (Parr et al., 2016). The authors reported that the incidence of burnout in at least one category of the CBI (personal, work-related, or client-related) was 55.9% (Parr et al., 2016). Another small study on pediatric residents (n=33) found that within 6 months of starting residency, the cohort became burned out, stressed, fatigued, less socially connected, and less

resilient (Koressel et al., 2022). As the scope of practice and level of responsibility differs between nurses, physicians, and residents, generalization of the findings to nurses is not possible.

Variables Associated with Burnout

In the systematic review and meta-analysis of prospective studies (n=65) regarding exhaustion, the authors assessed 242 predictors (Shoman et al., 2022). Of the included studies, 15% of studies were conducted on nurses, 15% focused on teachers, 3% on physicians, 17% on health and social service employees, and 18% on participants from different occupational sectors (e.g., mixed samples). The 242 predictors were classified into four families (situational and work-related, individual factors, work-family interface, and perceived immediate work consequences) and nine subfamilies (job demands, job control, job resources, interactions at work, communication and leadership, personality characteristics, and self-reported health status, job attributes, work-family interface, and perceived intermediate work consequences). The findings from the systematic review found a moderate quality of evidence on the effect of six groups of predictors: physical demands, workload, work agreements, lack of support from coworkers, stressful interactions with patients/students, and lack of control. However, they identified only weak associations ($\rho < .30$) between the predictors and emotional exhaustion. The heterogeneity was high, and the quality of included studies was generally low. The heterogeneity of studies was also noted to be a challenge in the meta-analysis as inconsistent measurement tools for predictors were employed and the length of follow-up varied. Interestingly, 33% of predictors were from the job demands, control, and resources subfamily, and the authors emphasize the need to evaluate non-work-related predictors as they may be impacting burnout. This has been previously noted by others (Bianchi et al., 2013; Gauche et al., 2017; Verweij et al., 2017) that both occupational and non-occupational stressors play a role in

burnout. While the systematic review and meta-analysis employed rigorous methodology and included longitudinal studies, they were unable to identify predictors of exhaustion that may be beneficial in preventing burnout.

Few longitudinal studies have evaluated burnout among nurses. A time-lagged study of new graduate Canadian nurses (n=405) used structural equation modeling to show that authentic leadership had a significant positive effect on structural empowerment which decreased short-staffing and work-life interference (Boamah et al., 2017). Short-staffing and work-life imbalance subsequently results in nurse burnout, lower job satisfaction, and lower patient care quality one year later. An additional Canadian study of nurses (n=596) demonstrated a protective effect of relationship occupational coping self-efficacy against incivility, burnout, mental health, and turnover intentions one year later (Fida et al., 2018). Among Canadian nurse managers (n=134), personal and situational factors influenced burnout over a one-year time frame (Spence Laschinger et al., 2008). Further, burnout levels, nurses' effort-reward imbalance, and core self-evaluations at baseline accounted for significant variance in emotional exhaustion one year later. Lastly, a retrospective, two-stage panel design of hospitals that employed nurses in Pennsylvania was conducted between 1999 and 2006 (n=137 hospitals) (Kutney-Lee et al., 2013). Burnout decreased by about 5% between 1999-2006. However, hospitals that improved nurse work environments (staffing and resource adequacy, nurse manager ability, leadership, and support of nurses, collegial, nurse-physician relations, nurse participation in hospital affairs, and nursing foundations for quality of care using the PES-NWI) witnessed a 5.4% decrease in burnout, a 6% decrease in job dissatisfaction, and a 3.5% decrease in intention to leave. Changes in nurse staffing were significantly associated with changes in rates of burnout, but the authors concluded that the work environment is a stronger and more consistent predictor of nurse job outcomes than

staffing alone. While these North American studies provide some insight into factors that may predict or protect against nurses' burnout, many of the work-related factors, such as leadership style or nursing practice environment factors (subscales from the PES-NWI) had a narrow focus specific to the aims of the research. As such, a broader examination of factors is lacking within nursing.

Outside of the North American context, a two-wave panel design of Belgium emergency room nurses (n=170) was conducted. Significant findings included high turnover rates between time 1 and time 2 (follow-up length of 18 months) and changes in job demand, control, social support, reward, social harassment, and work agreements predicted emotional exhaustion (Adriaenssens et al., 2015b). Another two-wave panel design of nurses working in the Netherlands (n=381) also found that changes in work conditions are predictive of emotional exhaustion (Gelsema et al., 2006). The strongest predictors of emotional exhaustion were work and time pressure and physical demands. Hudek-Knezevic et al. (2011) concluded that personality traits had a significant but weak prospective predictor of burnout at 48-months among Croatian, female hospital nurses (n=118). In a study of Italian nurses (n=217), high levels of emotional exhaustion at Time 2 were explained by high levels of social support at Time 1, and unfavorable changes in demands, control, and support over time (Pisanti et al., 2016). High depersonalization at Time 2 was explained by high social support at time 1 and by an increase in demands over time. Finally, high personal accomplishment at Time 2 was predicted by high demands, high control, an interactive effect of demands, control, and social support at Time 1, and by a decrease in demands over time.

Limitations of Longitudinal Evidence

A significant gap exists regarding the incidence of burnout within the nursing and general literature (e.g., other professions). While longitudinal studies have been conducted, most do not separate the sample by burnout-exposed and non-exposed, precluding the authors from calculating incidence. This is surprising as the general and nursing-specific literature has highlighted the high prevalence, severity of burnout, and negative consequences associated with burnout, yet longitudinal evidence has failed to measure the incidence of burnout. Thus, future research efforts should be directed towards a longitudinal study where non-burned-out nurses are separated from burned out nurses at baseline and followed prospectively. In this way, incidence can be calculated among the non-burned-out sample. Additionally, analyses can be performed comparing exposed and unexposed groups providing evidence regarding the temporality of relationships between work-related factors and burnout.

The longitudinal evidence provides preliminary data regarding predictors of burnout. Of the longitudinal studies that were conducted, weak associations were determined between various factors (physical demands, workload, work agreements, lack of support from coworkers, stressful interactions with patients/students, and lack of control) and burnout. Further, there are a multitude of factors that may contribute to burnout in nursing, as identified in the systematic review of 242 predictors and cross-sectional evidence. Thus, it is important that future studies continue to investigate which nursing work related factors are associated with burnout.

Additional Evidence

Variables Associated with Burnout Identified from Reviews of the Literature

Buckley et al. (2020) conducted a detailed scoping review (n=78 studies) of pediatric nurses' burnout. Studies were included regardless of the measurement tool employed, if they reported the prevalence and/or degree of burnout using self-identification or self-report

assessment tools. Additionally, they identified factors associated with burnout in 47 studies, categorizing the factors by nurse personal factors, the work environment, and work attitudes, noting that most included studies identified correlational relationships using cross-sectional designs. Significant nurse personal factors included work experience, level of education, and personality, whereas, age, marital status, or being in a supervisory position showed mixed results. Notable work environment factors included high-acuity units (pediatric emergency, medical/surgical, surgery, pediatric intensive care, and neonatal intensive care), workload, number of assigned patients, increased number of admissions, understaffing, shifts longer than 8 hours, organizational support, unreasonable policies, high volumes of paperwork, lack of nursing supplies, lack of regular staff meetings, poor communication and working relationships, lack of access to information, nurses role in patient care (uncertainty, decision-making), exposure to suffering, pain, sadness, death or hopelessness, provision of futile care, morally distressing events, and certain patient populations (cerebral palsy, neonatal abstinence syndrome, behavioural issues). Within work attitudes, identified associations were found between low self-compassion, low mindfulness, co-occurring conditions (depression, anxiety, somatic work-related health problems), higher perceived work stress, and low job satisfaction. Positive psychosocial factors and coping strategies were determined to be associated with lower levels of burnout and included positive affect, acting with awareness, self-care, humor, reflection, non-work relationships, and a personal philosophy related to work. Although this scoping review was specific to pediatric nurses, many of the factors described are common across all nursing disciplines, suggesting that they are pertinent to consider. Findings of the scoping review should be cautiously interpreted due to the nature of the scoping review design and lack of critical appraisal of the included studies.

A narrative review of the literature described theories of burnout, factors that trigger burnout, individual factors that modulate burnout, effects that burnout generate at the individual and organizational level, actions to prevent and/or reduce burnout, and tools to measure burnout. The authors summarized the antecedents of burnout into two broad categories: 1) organizational factors such as the workload or the emotional demands involved, and 2) individual factors such as the worker's personality or coping strategies (Edu-Valsania et al., 2022). The authors propose that while burnout is largely defined as an occupational phenomenon, various personal factors could act as moderating variables either putting an individual at risk for or protecting against burnout. Organizational factors include work overload, emotional labour, lack of autonomy and influence at work, ambiguity and role conflict, inadequate supervision and perception of injustice, lack of perceived social support, and poor working hours. Individual factors can influence how people perceive their work environment and how they manage to cope with workplace demands. Thus, burnout may develop and evolve differently depending on individual characteristics and the work environment, which has yet to be determined with longitudinal research. The findings of this review should be interpreted with caution due to bias as there was no systematic search or critical appraisal of articles included.

Variables Associated with Burnout from Conceptual Models, Theoretical Frameworks, or Standards

Conceptual models, theoretical frameworks, or practice standards serve as a valuable tool to identify key concepts, variables, relationships, and assumptions regarding phenomena. They can be used to organize, explain, or predict phenomena and to inform the design and evaluation of interventions, policies, or programs. Many of the aforementioned studies on nurses' burnout used a conceptual model, theoretical framework, or practice standard to guide their research.

A commonly cited theoretical framework used in occupational research is the job demand, control, support model, originally developed by Karasek (1979) and later modified by Johnson and Hall (1988). In its original iteration (Figure 1), Karasek (1979) identified that “psychological strain results not from a single aspect of the work environment, but from the joint effects of the demands of a work situation and the range of decision-making freedom available to the worker facing those demands” (Karasek, 1979, p. 287). Job demands serve to increase job stress, while having job control will help to decrease work stress. Furthermore, providing workers with job control helps to increase worker motivation and to improve workers’ coping skills (Karasek, 1979; Theorell et al., 1990). Support was later added to the model as an important factor that may serve to moderate or buffer the relationship between job demands and job control (Figure 2) (Johnson & Hall, 1988).

Figure 1

Karasek’s (1979) Job Strain Model

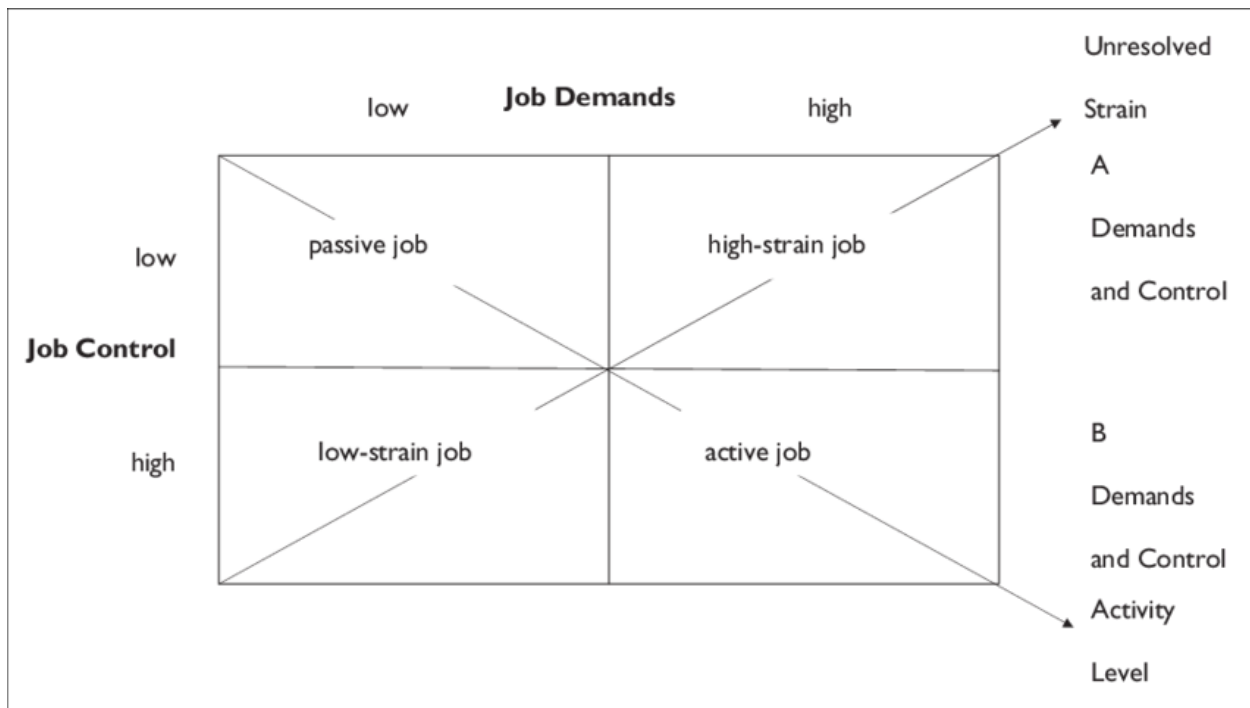
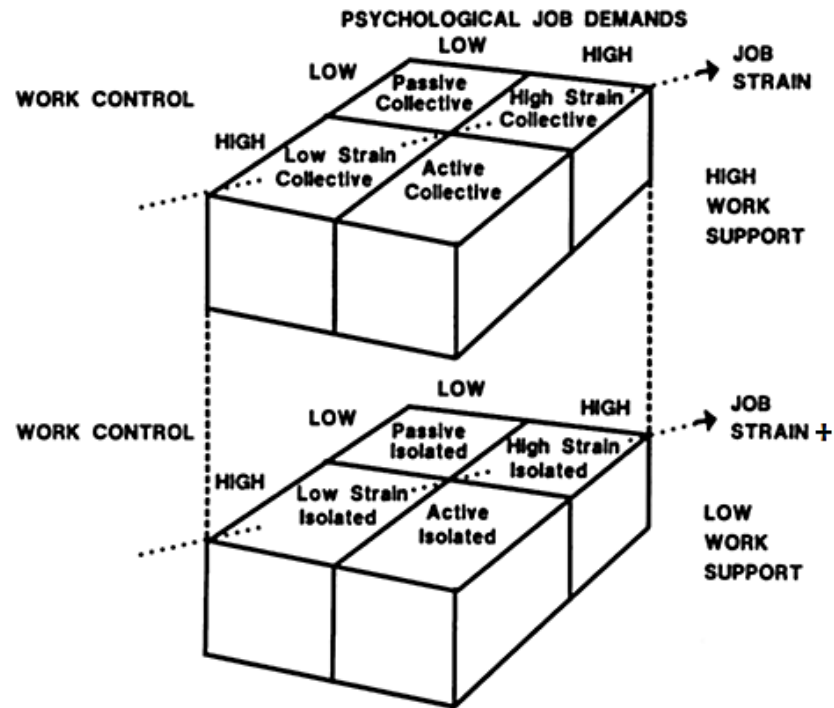


Figure 2

Johnson and Hall's (1988) Job Demands-Control-Support Model



The job demand, control, support model proposes that employee well-being is threatened, and job strain occurs when demands are high and when control and social support are low (Van Doorn, et al., 2016). Job demands are defined as psychological (not physical) stress factors present in the work environment, such as workload, time pressure, and role conflict (Van Doorn et al., 2016). Job control relates to the autonomy that workers should have to make job-related decisions and control their work activities (Karasek 1979). Social support has been defined as the overall level of helpful social interaction available on the job from coworkers and supervisors (Karasek 1998), that makes people feel valued and enhanced in a network of communication and mutual obligation (De Witte et al., 2007).

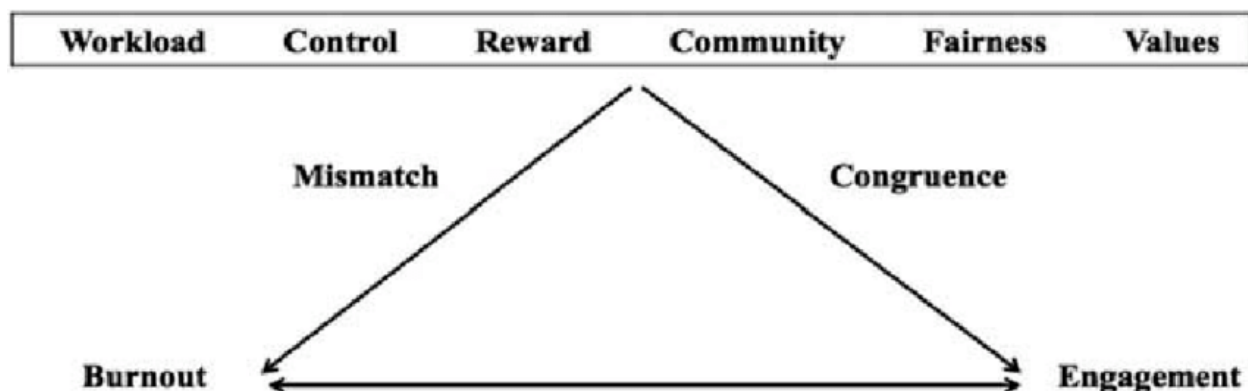
Within the nursing literature, the job demand, control, support model has been used to provide an understanding of a phenomenon, formulate research questions and hypotheses, measure occupational factors, and derive conclusions regarding nurses' work (Baba et al., 2013; Trousselard et al., 2016). In a cross-sectional design surveying 1,346 nurses, the job demand, control, support model was used to generate hypotheses that job demand will be positively associated with nurse stress, job control will be negatively associated with nurse stress, and support will be negatively associated with nurse stress (Baba et al., 2013). In another study, Trousselard et al. (2016) used a questionnaire based on the job demand, control, support model to survey 200 nurses. Findings of the study indicated that nurses exhibited both a high level of demand and a low control level of job strain (Trousselard et al., 2016). Additionally, studies used the job demand, control, support model with other workplace outcomes to determine associations with nurses' mental health. Hansen (2009) reported that job demands in terms of workload and role conflict were associated with emotional exhaustion among Swedish nurses in acute care hospitals. Spence-Laschinger et al. (2012) found that job demands (e.g., workload and bullying), but not job resources (e.g., control over work and supportive work environment), were associated with poor mental health in newly graduated Canadian nurses. Thus, the use of the job demand, control, support model may be important when studying nurses and work-related factors.

Maslach and Leiter's (1997) six areas of work life is another frequently used model regarding the organizational context of burnout (Figure 3). They propose six primary areas of work life that are related to burnout including workload, control, rewards, community, fairness, and values. These areas were developed based on diverse empirical research studies evaluating the relationship between each of the variables and burnout. While the model can help identify possible antecedents for nurse's burnout, nursing work is inherently complex, and categorizing

stressors under broad categories (e.g., workload) fails to capture the intricacies and nuances in nurses' everyday work. This was articulated in a recent theoretical review (Dall'Ora et al., 2020) of burnout in nursing where the authors identified seven additional factors associated with burnout outside of Maslach and Leiter's (1997) areas of work life model. These factors included working patterns and shift work, features inherent in the job such as psychological demand and complexity (e.g., violence from patients or families), job support from working relationships and leadership, hospital or environmental characteristics, staff outcomes and job performance, patient outcomes, and individual attributes (personal or professional) (Dall'Ora et al., 2020). They emphasized that reducing possible predictors to a single aspect overlooks the complexity within that category. As such, a variable such as workload should not be broadly defined, but include specific components such as staffing ratios, complexity or acuity of patients, or the mix between direct patient care and other associated nursing tasks (e.g., documentation, communication with interdisciplinary team). Further, they point out that psychologically demanding events are often subjective to the individual nurse and an emotional reaction in one nurse may not produce the same reaction in another. Thus, personal factors such as competence, experience level, and skill variety also impact the relationship on burnout (Dall'Ora et al., 2020).

Figure 3

Maslach and Leiter's (1997) Six Areas of Worklife Model



Lastly, the National Standard for Psychological Health and Safety in the Workplace (“The Standard”) (Mental Health Commission of Canada [MHCC], 2013) may serve as an alternative framework for evaluating antecedents of burnout for nurses (Figure 4). The Standard was created out of a growing need to identify risk factors for employee’s mental health and well-being and applies to the general working population. Included in the standard are 13 evidence-based workplace factors that provide a framework to help organizations identify, control, and where possible, eliminate hazards that threaten psychological well-being. These factors include organizational culture; psychological and social support; clear leadership and expectations; civility and respect; psychological competencies and requirements; growth and development; recognition and reward; involvement and influence; workload management; engagement; balance; psychological protection; and protection of physical safety (MHCC, 2013). The factors identified in the Standard had not been comprehensively evaluated among nurses (Havaei et al., 2021). As such, Havaei et al. (2021) sought to cross-sectionally examine the workplace risk factors among a sample of 3077 direct care nurses using the Guarding Minds at Work instrument. Significant findings from this study included 50% of respondents reporting serious concern about 9 of the 13 workplace factors in the Standard, with the most important areas of concern being psychological protection, workload management, and balance (Havaei et al., 2021). However, these findings are limited as the Guarding Minds at Work instrument was a poor fit for the conceptual model linking the 13 dimensions of the Standard to the 65 items via confirmatory factor analysis (Smith & Oudyk, 2022). Further, similar to the areas of work life, the Standard contains more generic/broad factors influencing any employee and does not consider specific aspects of nursing that may be associated with burnout.

Figure 4

MHCC's (2013) National Standard for Psychological Health and Safety in the Workplace

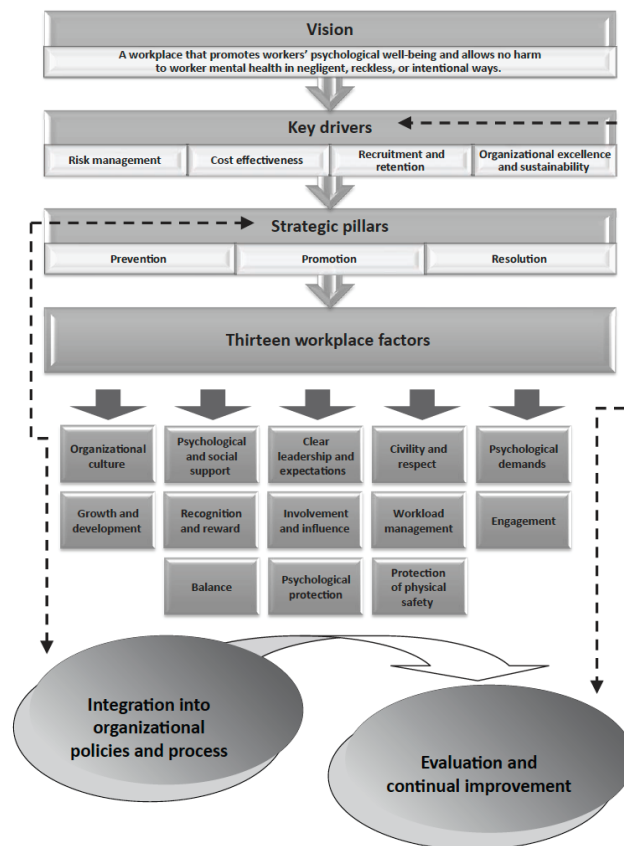


Figure A.1
Model of a planned approach to address thirteen workplace factors known to impact psychological health
(See [Clause A.4.](#))

Summary of Literature Review

The literature demonstrates that burnout is a prevalent problem among nurses across diverse healthcare settings worldwide and frequently co-occurs with mental health conditions. Numerous studies have identified personal, employment, work environment, and support-related factors associated with burnout. However, several important gaps remain.

- **Methodological Weakness:** Most evidence stems from cross-sectional designs, establishing correlation rather than causation (e.g., whether high workload causes burnout or if burnout inflates the perception of workload). The few existing longitudinal studies

show mostly weak associations and lack comprehensive multivariable evaluations.

Incidence among nurses has not been studied

- **Static Perspective:** Cross-sectional data fails to track how burnout levels fluctuate.
- **Measurement Inconsistencies:** The use of various measurement tools hinders comparability due to varied scoring methods. Additionally, recent systematic review questions the MBI's overall reliability and validity compared to alternative tools (e.g., using one of the three domains [depersonalization] as a proxy for burnout).
- **Geographic & Regional Gaps:** Healthcare systems and working conditions vary significantly by region. Canadian nurses are underrepresented in meta-analyses and systematic reviews.
- **Unclear Impact of Personal Variables (e.g., mental health conditions):** The exact role of personal variables alongside work-related stressors requires further investigation.

To address these gaps, this dissertation used a longitudinal design to examine burnout, mental health, and the nursing practice environment among nurses in Northwestern Ontario. Furthermore, this literature review informed the conceptualization of burnout to examine these relationships (Chapter 3).

References

- Adriaenssens, J., De Gucht, V., & Maes, S. (2015a). Determinants and prevalence of burnout in emergency nurses: A systematic review of 25 years of research. *International Journal of Nursing Studies*, 52, 649-661. <https://doi.org/10.1016/j.ijnurstu.2014.11.004>
- Adriaenssens, J., De Gucht, V., & Maes, S. (2015b). Causes and consequences of occupational stress in emergency nurses, a longitudinal study. *Journal of Nursing Management*, 23, 346-358. <https://doi.org/10.1111/jonm.12138>
- Ahmed, H., & Bourgeault, I. (2023). Sustaining the Canadian nursing workforce: Targeted evidence-based reactive solutions in response to the ongoing crisis. *Nursing Leadership (Toronto, Ontario)*, 35(4), 14-29. <https://doi.org/10.12927/cjnl.2023.27076>
- Almen, N., & Jansson, B. (2021). The reliability and factorial validity of different versions of the Shirom-Melamed Burnout Measure/Questionnaire and normative data for a general Swedish sample. *International Journal of Stress Management*, 28(4), 314–325. <https://doi.org/10.1037/str0000235>
- American Psychological Association (APA). (2013). *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5)*. American Psychiatric Publishing, Inc. <https://psycnet.apa.org/doi/10.1176/appi.books.9780890425596>
- Baba, V., Tourigny, L., Wang, X., Lituchy, T., & Monserrat, S. (2013). Stress among nurses: a multi-nation test of the demand-control-support model. *Cross Culture Management*, 20(3), 301-320. <http://dx.doi.org/10.5465/AMBPP.2009.44249856>
- Bianchi, R., & Brisson, R. (2019). Burnout and depression: Causal attributions and construct overlap. *Journal of Health Psychology*, 24(11), 1574-1580. <https://doi.org/10.1177/1359105317740415>

- Bianchi, R., & Schonfeld, I. (2018). Burnout-depression overlap: Nomological network examination and factor-analytic approach. *Scandinavian Journal of Psychology*, 59, 532-539. <https://doi.org/10.1111/sjop.12460>
- Bianchi, R., Boffy, C., Hingray, C., Truchot, D., & Laurent, E. (2013). Comparative symptomatology of burnout and depression. *Journal of Health Psychology*, 18(6), 782-787. <https://doi.org/10.1177/1359105313481079>
- Bianchi, R., Schonfeld, I., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review*, 36, 28-41. <http://dx.doi.org/10.1016/j.cpr.2015.01.004>
- Boamah, S. A., Read, E. A., & Laschinger, H. K. S. (2017). Factors influencing new graduate nurse burnout development, job satisfaction and patient care quality: a time-lagged study. *Journal of Advanced Nursing*, 73(5), 1182-1195. <https://doi.org/10.1111/jan.13215>
- Buckley, L., Berta, W., Cleverley, K., Medeiros, C., & Widger, K. (2020). What is known about pediatric nurse burnout: A scoping review. *Human Resources for Health*, 18(9), 1-23. <https://doi.org/10.1186/s12960-020-0451-8>
- Canu, G., Marca, S.C., Dell’Oro, F., Balazs, A., Bergamaschi, E., Besse, C., Bianchi, R., Bislimovska, J., Bjelajac, A., Bugge, M., Busneag, C., Caglayan, C., Cernitanu, M., Costa Pereira, C., Dernovscek, H., Droz, N., Eglite, M., Godderis, L., Gundel, H...Wahlen, A. (2020). Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries. *Scand J Work Environ Health*, 47(2), 95-107. <https://doi.org/10.5271/sjweh.3935>
- Chunta, K., Robb, M., Hoffman, R., Gerwick, M., & Zuraikat, N. (2024). Examining

- psychological well-being and predictors of burnout in Registered Nurses (RNs) employed in rural and acute care settings. *Hospital Topics*, 1-6.
<https://doi.org/10.1080/00185868.2024.2422120>
- Crowe, S., Howard, F., & Vanderspank, B. (2022). The mental health impact of the COVID-19 pandemic on Canadian critical care nurses. *Intensive and Critical Care Nursing*, 71, 103241. <https://doi.org/10.1016/j.iccn.2022.103241>
- Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, 18(41), 1-17. <https://doi.org/10.1186/s12960-020-00469-9>
- De Witte, H., Verhofstadt, E., & Omeij, E. (2007). Testing Karasek's learning and strain hypotheses on young workers in their first job. *Work & Stress*, 21(2), 131–141.
<https://doi.org/10.1080/02678370701405866>
- Demerouti, E., & Bakker, A. (2008). The Oldenburg Burnout Inventory: A good alternative to measure burnout and engagement. *Handbook of Stress and Burnout in Health*, 65(7), 1-25.
- Demerouti, E., Bakker, A.B., Nachreiner, F. & Schaufeli, W.B. (2001). The job demands resources model of burnout. *Journal of Applied Psychology*, 86, 499–512.
<https://psycnet.apa.org/doi/10.1037/0021-9010.86.3.499>
- Demerouti, E., Bakker, A.B., Vardakou, I. & Kantas, A. (2003). The convergent validity of two burnout instruments – a multitrait-multimethod analysis. *European Journal of Psychological Assessment*, 19, 12–23. <https://psycnet.apa.org/doi/10.1027/1015-5759.19.1.12>
- Edu-Valsania, S., Laguia, A., & Moriano, J.A. (2022). Burnout: A review of theory and

- measurement. *International Journal of Environmental Research and Public Health*, 19(3), 1780. <https://doi.org/10.3390/ijerph19031780>
- Fida, R., Laschinger, H. K. S., & Leiter, M. P. (2018). The protective role of self-efficacy against workplace incivility and burnout in nursing: A time-lagged study. *Health Care Manage Rev*, 43(1), 21-29. <https://doi.org/10.1097/HMR.0000000000000126>
- Figley, C., & Stamm, B. (1996). Psychometric review of compassion fatigue self test. In B. Stamm (Ed) *Measurement of Stress, Trauma, and Adaptation* (pp. 127-130). Sidran Press.
- Freudenberger, H.J. (1975). The staff burnout syndrome in alternative institutions. *Psychotherapy Theory, Research, and Practice*, 12, 72–83.
<http://dx.doi.org/10.1037/h0086411>
- Freudenberger, H. J., & Richelson, G. (1980). Burn-out: the high cost of high achievement. Massachusetts: Anchor Press.
- Galanis, P., Vraka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77, 3286-3302. <https://doi.org/10.1111/jan.14839>
- Gauche, C., de Beer, L., & Brink, L. (2017). Exploring demands from the perspective of employees identified as being at risk of burnout. *International Journal of Qualitative Studies on Health and Well-being*, 12(1), 1361783.
<https://doi.org/10.1080/17482631.2017.1361783>
- Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence

- of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing*, 32(17-18).
<https://doi.org/10.1111/jocn.16708>
- Gelsema, T. I., van der Doef, M., Maes, S., Janssen, M., Akerboom, S., & Verhoeven, C. (2006). A longitudinal study of job stress in the nursing profession: Causes and consequences. *J Nurs Manag*, 14(4), 289-299. <https://doi.org/10.1111/j.1365-2934.2006.00635.x>
- Gomez-Urquiza, J., Albendin-Garcia, L., Velando-Soriano, A., Ortega-Campos, Ramirez-Baena, Membrive-Jimenez, M., & Suleiman-Martos, N. (2020). Burnout in palliative care nurses, prevalence and risk factors: A systematic review with meta-analysis. *International Journal of Environmental Research and Public Health*, 17, 7672.
<https://doi.org/10.3390/ijerph17207672>
- HaGani, N., Yagil, D., & Cohen, M. (2022). Burnout among Oncologists and oncology nurses: A systematic review and meta-analysis. *Health Psychology*, 41(1), 53-64.
<https://psycnet.apa.org/doi/10.1037/hea0001155>
- Hansen, N., Sverke, M., & Naswall, K. (2009). Predicting nurse burnout from demands and resources in three acute care hospitals under different forms of ownership: A cross-sectional questionnaire survey. *Int J Nurs Stud*, 46, 95–107.
<https://doi.org/10.1016/j.ijnurstu.2008.08.002>
- Havaei, F., Park, M., & Olvera Astivia, O.L. (2021). The National Standard of Psychological Health and Safety in the Workplace: A psychometric and descriptive study of the nursing workforce in British Columbia hospitals. *Canadian Journal of Nursing Research*, 53(4), 405-416. <https://doi.org/10.1177/0844562120986032>
- Hudek-Knezevic, J., Maglica, B. K., & Krapic, N. (2011). Personality, organizational stress, and

- attitudes toward work as prospective predictors of professional burnout in hospital nurses. *Croatian Medical Journal*, 52(4), 538-549. <https://doi.org/10.3325/cmj.2011.52.538>
- Johnson, J., & Hall, E. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, 78, 1336-1342. <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.78.10.1336>
- Karasek, R. (1979). Job demand, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, 24(2), 285–308. <https://doi.org/10.2307/2392498>
- Karasek, R. (1998). Demand-control model: a social, emotional, and physiological approach to stress risk and active behaviour development. In J.M. Stellman, *Encyclopedia of Occupational Health and Safety* (4th ed.). International Labour Office, Geneva.
- Koressel, L., Groothius, E., Tanz, R., Palac, H., & Sanguino, S. (2020). Natural history of burnout, stress, and fatigue in a pediatric resident cohort over three years. *Med Educ Online*, 25(1), 1815386. <https://doi.org/10.1080%2F10872981.2020.1815386>
- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005a). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>
- Kristensen, T.S., Hannerz, H., Hogh, A., & Borg, V. (2005b). The Copenhagen Psychosocial Questionnaire (COPSOQ) – A tool for the assessment and improvement of the psychosocial work environment. *Scand J Work Environ Health*, 31(6), 438-449. <https://doi.org/10.5271/sjweh.948>
- Kutney-Lee, A., Wu, E., Sloane, D., & Aiken, L. (2013). Changes in hospital nurse work

- environments and nurse job outcomes: An analysis of panel data. *International Journal of Nursing Studies*, 50, 195-201. <https://doi.org/10.1016/j.ijnurstu.2012.07.014>
- Leiter, M.P. (1993). Burnout as a developmental process: Consideration of models. In W. Schaufeli, C. Maslach, T. Marek. (Eds.). *Professional burnout: Recent developments in theory and research* (pp. 237-250). Taylor & Francis.
- Lopez-Lopez, I., Gomez-Urquiza, J., Canadas, G., De la Fuente, E. I., Albendin-Garcia, L., & Canadas-De la Fuente, G. A. (2019). Prevalence of burnout in mental health nurses and related factors: A systematic review and meta-analysis. *International Journal of Mental Health Nursing*, 28, 1035-1044. <https://doi.org/10.1111/inm.12606>
- Maddigan, J., Brennan, M., McNaughton, K., White, G., & Snow, N. (2023). The prevalence and predictors of compassion satisfaction, burnout and secondary traumatic stress in Registered Nurses in an Eastern Canadian province: A cross-sectional study. *Canadian Journal of Nursing Research*, 55(4), 425-436. <https://doi.org/10.1177/08445621221150297>
- Maslach-Pines, A. (2005). The Burnout Measure, short version. *International Journal of Stress Management*, 12(1), 78-88. <https://psycnet.apa.org/doi/10.1037/1072-5245.12.1.78>
- Maslach, C., & Jackson, S. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2, 99-113. <https://doi.org/10.1002/job.4030020205>
- Maslach, C., Jackson, S., & Leiter. (1996). *The Maslach Burnout Inventory: Test Manual*. CPP.
- Maslach, C., & Leiter, M.P. (1997). *The Truth About Burnout*. Jossey-Bass.
- Maslach, C., & Leiter, M.P. (2022). *The Burnout Challenge: Managing People's Relationships with their Jobs*. The Belknap Press of Harvard University Press.
- Maslach, C., Schaufeli, W.B., & Leiter, M.P. (2001). Job burnout. *Annual Review of Psychology*,

52, 397-422. <https://doi.org/10.1146/annurev.psych.52.1.397>

Mental Health Commission of Canada (MHCC). (2013). *The National Standard for*

Psychological health and safety in the workplace.

[https://www.mentalhealthcommission.ca/wp-content/uploads/drupal/2019-](https://www.mentalhealthcommission.ca/wp-content/uploads/drupal/2019-03/C4HC%20Toolkit_Asset%2036_ATP-HC_EN.pdf)

[03/C4HC%20Toolkit_Asset%2036_ATP-HC_EN.pdf](https://www.mentalhealthcommission.ca/wp-content/uploads/drupal/2019-03/C4HC%20Toolkit_Asset%2036_ATP-HC_EN.pdf)

Michel, J., Shifrin, N., Postier, L., Rotch M., & McGoey, K. (2022). A meta-analytic validation study of the Shirom-Melamed Burnout Measure: Examining variable relationships from a job demands-resources perspective. *Journal of Occupational Health Psychology*, 27(6), 566-584. <https://psycnet.apa.org/doi/10.1037/ocp0000334>

Parr, J., Pinto, N., Hanson, M., Meehan, A., & Moore, P. (2016). Medical graduates, tertiary hospitals, and burnout: A longitudinal cohort study. *Ochsner Journal*, 16, 22-26.

<http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4795494/>

Penz, M., Stalder, T., Miller, R., Ludwig, V., Kanthak, M., & Kirschbaum, C. (2018). Hair cortisol as a biological marker for burnout symptomatology. *Psychoneuroendocrinology*, 87, 218-221. <https://doi.org/10.1016/j.psyneuen.2017.07.485>

Pines, A.M., & Aronson, E. (1988). *Career burnout*. New York: Free Press.

Pisanti, R., van der Doef, M., Maes, S., Meier, L. L., Lazzari, D., & Violani, C. (2016). How Changes in Psychosocial Job Characteristics Impact Burnout in Nurses: A Longitudinal Analysis. *Frontiers in Psychology*, 7. [https://doi.org/ARTN](https://doi.org/ARTN108210.3359/fpsyg.2016.01082)

[108210.3359/fpsyg.2016.01082](https://doi.org/ARTN108210.3359/fpsyg.2016.01082)

Pradas-Hernandez, L., Ariza, T., Gomez Urquiza, J. L., Albendin-Garcia, L., De la Fuente, E. I.,

- & Canadas-De la Fuente, G. A. (2018) Prevalence of burnout in paediatric nurses: A systematic review and meta-analysis. *PLoS ONE*, 13(4), e0195039.
<https://doi.org/10.1371/journal.pone.0195039>
- Qiao, H., & Schaufeli, W.B. (2011). The convergent validity of four burnout measures in a Chinese sample: A confirmatory factor-analytic approach. *Applied Psychology*, 60(1), 87-111. <https://psycnet.apa.org/doi/10.1111/j.1464-0597.2010.00428.x>
- Ramirez-Elvira, S., Romero-Bejar, J., Suleiman-Martos, N., Gomez-Urquiza, J., Monsalve Reyes, C., Canadas-De la Fuente, G., & Albendin-Garcia, L. (2021). Prevalence, risk factors and burnout levels in Intensive Care Unit nurses: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18, 11432.
<https://doi.org/10.3390/ijerph182111432>
- Registered Nurses' Association of Ontario (RNAO). (2022). *Nursing through crisis: A Comparative perspective*.
<https://rnao.ca/sites/default/files/202205/Nursing%20Through%20Crisis%20-%20A%20Comparative%20Analysis%202022.pdf>
- Rubin, B., Goldfarb, R., Satele, D., & Graham, L. (2021). Burnout and distress among nurses in a cardiovascular centre of a quaternary hospital network: A cross-sectional survey. *CMAJ Open*, 9(1), E19-E28. <https://doi.org/10.9778/cmajo.20200058>
- Schaufeli, W., Leiter, M.P., & Maslach, C. (2009). Burnout: 35 years of research and practice. *Career Development International*, 14(3), 204-220.
<https://doi.org/10.1108/13620430910966406>
- Schaufeli, W. (2021). The burnout enigma solved? *Scand J Work Environ Health*, 47(3), 169-170. <https://doi.org/10.5271%2Fsjweh.3950>

- Schaufeli, W., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis*. CRC Press.
- Schonfeld, I., & Bianchi, R. (2015). Burnout and depression: Two entities or one? *Journal of Clinical Psychology*, 72(1), 22-37. <https://doi.org/10.1002/jclp.22229>
- Schutte, N., Toppinen, S., & Kalimo, R. (2000). The factorial validity of the Maslach Burnout Inventory – General Survey (MBI-GS) across occupational groups and nations. *Journal of Occupational and Organizational Psychology*, 73, 53-66.
<https://doi.org/10.1348/096317900166877>
- Sedlar, N., Sprah, L., Tement, S., & Socan, G. (2015). Internal structure of an alternative measure of burnout: Study on the Slovenian adaptation of the Oldenburg Burnout Inventory (OLBI). *Burnout Research*, 2, 1-7. <https://doi.org/10.1016/j.burn.2015.02.001>
- Shirom, A. (1989). Burnout in work organizations. In: C. L. Cooper, & I. Robertson (Eds.), *International review of industrial and organization psychology* (pp. 25–48). Wiley.
- Shoman, Y., Marca, S.C., Bianchi, R., Godderis, L., van der Molen, H.F., & Guseva Canu, I. (2021). Psychometric properties of burnout measures: A systematic review. *Epidemiology and Psychiatric Sciences*, 30, e8, 1-9.
<https://doi.org/10.1017/S2045796020001134>
- Shoman, Y., Rousson, V., Bianchi, R., & Gusea Canu, I. (2022). Holistic assessment of factors associated with exhaustion, the main symptom of burnout: A meta-analysis of longitudinal studies. *International Journal of Environmental Research and Public Health*, 19, 13037. <https://doi.org/10.3390/ijerph192013037>
- Singh, S., Poon, D., Alvarez, E., Anderson, L., Verschor, C., Sutton, A., Zendo, Z., Piggott, T.,

- Apatu, E., Churipuy, D., Culbert, I., & Hopkins, J. (2024). Burnout among public health workers in Canada: A cross-sectional study. *BMC Public Health*, 24(48), <https://doi.org/10.1186/s12889-023-17572-w>
- Smith, P., & Oudyk, J. (2022). Assessing the psychometric properties of the Guarding Minds @ Work questionnaire recommended in the Canadian Standard for Psychological Health and Safety in the Workplace. *Qual Quan*, 56, 3111-3133. <https://doi.org/10.1007/s11135-021-01269-6>
- Spence-Laschinger, H.K., & Finegan, J. (2008). Situational and dispositional predictors of nurse manager burnout: A time-lagged analysis. *Journal of Nursing Management*, 16, 601-607. <https://doi.org/10.1111/j.1365-2834.2008.00904.x>
- Spence-Laschinger, H.K., Grau, A.L., Finegan, J., & Wilk, P. (2012). Predictors of new graduate nurses' workplace well-being: Testing of the job demands-resources model. *Health Care Manag Rev*, 37, 175–186. <https://doi.org/10.1097/hmr.0b013e31822aa456>
- Stamm, B. (2010). The concise ProQOL manual. <https://img1.wsimg.com/blobby/go/dfc1e1a0a1db-4456-9391-18746725179b/downloads/ProQOL%20Manual.pdf?ver=1622839353725>
- Stanley, L. (2006). *An examination of factors related to burnout among mental health nurses* (11469). [Masters Thesis, Memorial University of Newfoundland]. Memorial University Research Repository. <https://research.library.mun.ca/11469/>
- Stelnicki, A., & Carleton, R.N. (2021). Mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 264-276. <https://doi.org/10.1177/0844562120961894>
- Stelnicki, A., Jamshidi, L., Angehrn, A., Hadjistavropoulos, H., & Carleton, R.N. (2021).

- Associations between burnout and mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 254-263.
<https://doi.org/10.1177/0844562120974194>
- Theorell, T., Karasek, R., & Eneroth, P. (1990). Job strain variations in relation to plasma testosterone fluctuations in working men – A longitudinal study. *Journal of Internal Medicine*, <https://doi.org/10.1111/j.1365-2796.1990.tb00115.x>
- Trousselard, M., Dutheil, F., Naughton, G., Cosserant, S., Amadon, S., Duale, C., & Schoeffler, P. (2016). Stress among nurses working in emergency, anesthesiology, and intensive care units depends on qualifications: A job demand-control survey. *Int Arch Occup Environ Health*, 89, 221-229. <https://doi.org/10.1007/s00420-015-1065-7>
- Van Doorn, Y., Ruysseveldt, J., Van Dam, K., Mistiaen, W., & Nikolova, I. (2016). Understanding well-being and learning of Nigerian nurses: A job demand control support model approach. *Journal of Nursing Management*, 24, 915-922.
<https://doi.org/10.1111/jonm.12397>
- Vargas, C., Canadas, G., Aguayo, R., Fernandez, R., & de la Fuente, E. (2014). Which occupational risk factors are associated with burnout in nursing? A meta-analytic study. *International Journal of Clinical and Health Psychology*, 14, 28-38.
[https://psycnet.apa.org/doi/10.1016/S1697-2600\(14\)70034-1](https://psycnet.apa.org/doi/10.1016/S1697-2600(14)70034-1)
- Verweij, H., van der Heijden, F., van Hooff, M., Prins, J., Lagro-Janssen, A., van Ravesteijn, H., & Speckens, A. (2017). The contribution of work characteristics, home characteristics and gender to burnout in medical residents. *Adv in Health Sci Educ*, 22, 803–818.
<https://doi.org/10.1007/s10459-016-9710-9>
- World Health Organization (WHO) (2019). *Burn-out an “occupational phenomenon”*:

International Classification of Diseases. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>

Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>

Wu, S., Singh-Carlson, S., Odell, A., Reynolds, G., & Su, Y. (2016). Compassion satisfaction among oncology nurses in the United States and Canada. *Oncology Nursing Forum*, 1(43), E161-169. <https://doi.org/10.1188/16.onf.e161-e169>

Chapter 3: Methodological Approach and Conceptualizations of Burnout

The following chapter provides an overview of the methodological approach, conceptualizations of burnout, and theoretical underpinnings used in this doctoral dissertation.

Methodological Approach

This dissertation is presented in a manuscript-based format and comprises three interconnected studies that collectively aim to strengthen the evidence base for burnout research among nurses. The studies are based on data from a prospective cohort study, the Northwestern Ontario Workplace and Worker Health Study (NOWWHS), conducted in conjunction with the Enhancing the Prevention of Injury and Disability at Work (EPID@Work) Research Institute at Lakehead University. This study was and continues to be led by Dr. Vicki Kristman, Senior Scientist, and Director of the EPID@Work Research Institute. Any worker within Northwestern Ontario was/is eligible to participate in NOWWHS. If a worker identifies that they are a nurse, a specific nursing survey was/is employed to evaluate pertinent variables for the dissertation.

Using a prospective cohort design allowed for all research objectives to be addressed within one study. Baseline data was used for the 1) psychometric analysis of the Copenhagen Burnout Inventory (CBI), and 2) to analyze cross-sectional data regarding the prevalence of burnout and mental health conditions, and associated factors with burnout. The follow-up data was used for the longitudinal analysis whereby incidence was calculated, along with associations between workplace factors, mental health conditions, and burnout over time. The analyses for each of the manuscripts were done consecutively and therefore have slightly different recruitment/data collection dates and samples. As such, each manuscript should be considered as an independent study.

All documents related to participation in this study (information letter, consent form, REB approval, and survey can be found in Appendices C-E).

Conceptualization of Burnout in this Dissertation

Burnout Definition and Measurement Using the CBI

Burnout is conceptualized throughout this dissertation in accordance with the CBI (Kristensen et al., 2005), which defines burnout as a state of physical and psychological exhaustion attributable to a domain of life. This decision was based on the review of the literature regarding the most common tools to measure burnout (Chapter 2, Table 2). While definitions varied across the five evaluated tools, exhaustion emerged as the single consistent component of burnout. One of the primary inconsistencies across measurement tools was regarding the number of dimensions and the naming of dimensions. This has been an ongoing debate, as some researchers have questioned whether components such as depersonalization, reduced personal accomplishment, disengagement, tedium, among others, represent core components of burnout versus whether they are symptoms or outcomes (Schaufeli et al., 2009). As such, this dissertation focuses on physical and psychological exhaustion as the defining feature of burnout, while acknowledging that accompanying symptoms/outcomes of burnout exist, and require further investigation regarding their temporality.

Recognizing that exhaustion may arise from different aspects of an individual's life, the dimensions of the CBI evaluate the perceived source of exhaustion, including personal, work-related, and client-related domains. The CBI can be used in its entirety (all 3 domains) or independently (1 or 2 domains), allowing researchers to select the dimension that best aligns with the context of interest.

For the purposes of this dissertation, work-related burnout was selected as the primary

outcome for modelling analyses. Work-related burnout was defined as “the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work” (Kristensen et al., 2005, p. 7). This decision was guided by feasibility and conceptual considerations. Given that several objectives of this dissertation involved examining the relationship between workplace characteristics and burnout, work-related burnout was conceptually the most appropriate dimension for capturing exhaustion attributed specifically to the work environment.

Conceptual Approach to the Selection of Study Variables

The variables selected for this study were informed by an extensive review of the literature (Chapter 2 and Appendix A), a review of relevant theoretical models, consultation with the NOWWHS research team, and personal interest. While a single, specific theoretical framework was not formally applied to guide the study design, statistical analysis, or interpretation of findings, two foundational models influenced the identification and inclusion of key variables.

As described in Chapter 2, one of the most cited frameworks for understanding occupational stress is the Job Demand–Control–Support model (JDCS), originally developed by Karasek (1979) and later expanded by Johnson and Hall (1988). The JDCS model proposes that job strain is most likely to occur when workplace demands are high, job control is low, and workplace support is limited (Van Doorn et al., 2016). Although this framework provides a valuable starting point for identifying relevant workplace factors to consider in relation to burnout, it primarily focuses on characteristics of the work environment. Further, the JDCS model has been critiqued for oversimplifying the work environment by reducing job characteristics into three broad categories (e.g., demands, control, support) (de Jonge et al.,

2012). As nursing work environments are complex, burnout may be influenced by other workplace factors not fully captured by these categories such as bullying, violence, staffing, etc. Thus, rather than adopting the JDCS model as a formal analytical framework, it was used pragmatically to guide the selection of key organizational and workplace variables.

To address factors outside of the workplace (e.g., individual factors), Bronfenbrenner's (1979) Social Ecological Model (SEM) informed selection of additional variables. The SEM emphasizes that human behavior and psychological outcomes are shaped by dynamic interactions across nested systems, ranging from individual-level factors to broader organizational and societal structures. Considering this ecological perspective ensured that burnout was not viewed solely in relation to work conditions, and that individual factors were also included. As such, the SEM informed the selection of individual factors such as mental health variables (e.g., depression, anxiety, and post-traumatic stress disorder [PTSD]), as well as personal demographics, providing a more comprehensive conceptualization of burnout being associated with both work-related and personal factors.

Considering the review of the literature and the theoretical frameworks, an extensive range of variables could be considered when studying burnout. However, including all potential factors was neither feasible nor statistically practical. To ensure statistical power to perform analyses, variable selection was purposefully limited. Consequently, we selected specific work-related variables from the JDCS model and individual-level variables from the SEM (e.g., demographic characteristics and key mental health variables) that demonstrated empirical gaps.

Timing of Follow-Up (Incidence)

As no available evidence currently exists regarding the incidence of burnout among nurses, it was important to hypothesize how long burnout may take to develop. Much of the

literature suggested that burnout is a result of chronic stress within the workplace and likely would occur over time. In studies that evaluated the incidence of burnout among other health care providers, follow-up time periods were 6 months (Koressel et al., 2022) and 1 year (Parr et al., 2016). As such, I proposed to study burnout at the six-month period, which allowed at least six months of exposure to the work environment to assess the development of burnout. This was a decision that was considered empirically based on other studies and feasible for the dissertation.

References

- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge, MA: Harvard University Press.
- de Jonge, J., Spoor, E., Sonnentag, S., Dormann, C., & van den Tooren, M. (2012). "Take a break?!" off-job recovery, job demands, and job resources as predictors of health, active learning, and creativity. *European Journal of Work and Organizational Psychology*, 21(3), 321–348. <https://doi.org/10.1080/1359432X.2011.576009>
- de Lisser, R., Lauderdale, J., Dietrich, M. S., Ramanujam, R., & Stollendorf, D. P. (2024). The social ecology of burnout: A framework for research on Nurse Practitioner burnout. *Nursing Outlook*, 72(4), 102188.
- Johnson, J., & Hall, E. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, 78, 1336-1342. <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.78.10.1336>
- Karasek, R. (1979). Job demand, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, 24(2), 285–308. <https://doi.org/10.2307/2392498>
- Koressel, L., Groothuis, E., Tanz, R., Palac, H., & Sanguino, S. (2020). Natural history of burnout, stress, and fatigue in a pediatric resident cohort over three years. *Med Educ Online*, 25(1), 1815386. <https://doi.org/10.1080%2F10872981.2020.1815386>
- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>

Parr, J., Pinto, N., Hanson, M., Meehan, A., & Moore, P. (2016). Medical graduates, tertiary hospitals, and burnout: A longitudinal cohort study. *Ochsner Journal*, 16, 22-26.

<http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4795494/>

Schaufeli, W., Leiter, M.P., & Maslach, C. (2009). Burnout: 35 years of research and practice. *Career Development International*, 14(3), 204-220.

<https://doi.org/10.1108/13620430910966406>

Van Doorn, Y., Ruysseveldt, J., Van Dam, K., Mistiaen, W., & Nikolova, I. (2016).

Understanding well-being and learning of Nigerian nurses: A job demand control support model approach. *Journal of Nursing Management*, 24, 915-922.

<https://doi.org/10.1111/jonm.12397>

Chapter 4: Reliability and Validity of the Copenhagen Burnout Inventory among Nurses in Northwestern Ontario

Abstract

Aim: To evaluate the psychometric properties of the Copenhagen Burnout Inventory among nurses in Northwestern Ontario, Canada.

Design: A cross-sectional survey was conducted as part of a larger longitudinal cohort study.

Methods: Nurses were recruited, and survey data was collected from September 2023 to May 2025. Confirmatory factor analysis was performed on the three burnout dimensions of the Copenhagen Burnout Inventory: personal, work-related, and client-related. Internal consistency was tested using Cronbach's alpha on the full scale and three dimensions. Convergent validity was assessed through correlations with theoretically derived variables.

Results: Five hundred and twenty nurses (n=520) were included in the analysis. Confirmatory factor analysis verified the three-factor structure, and the overall fit was adequate based on several indices. Cronbach's alphas were excellent for all dimensions, and moderate to strong correlations were found between Copenhagen Burnout Inventory scores and criterion measures of workload, emotional demands, role conflict, job satisfaction, and intent to leave.

Conclusion: The Copenhagen Burnout Inventory demonstrated good psychometric properties when administered to nurses in various practice settings in urban and rural communities.

Implications for the profession and/or patient care: The Copenhagen Burnout Inventory is a valid and reliable tool to identify nurses with burnout in Northwestern Ontario.

Impact: There is a lack of consensus regarding which burnout measures to use; many tools have been criticized due to flawed conceptualization, poor psychometric properties, and scoring difficulty. Confirming the acceptable psychometric properties of the Copenhagen Burnout

Inventory is important as it can be used in research and practice to reliably identify burnout, evaluate risk factors, and assess the effectiveness of interventions/support strategies.

Reporting Method: We adhered to STROBE guidelines for the reporting process.

Patient and Public Involvement: Stakeholders were involved in the study design phase, specifically ensuring that the research addressed relevant priorities and survey construction. Nursing leaders disseminated recruitment information within their organizations.

Keywords: Copenhagen Burnout Inventory, burnout, nurses, reliability, validity, psychometrics

1. Introduction

The World Health Organization (2019) has conceptualized burnout as an occupational phenomenon which results from chronic workplace stress that has not been successfully managed. Among nurses, burnout is considered a global crisis, fuelled by unprecedented workplace stressors, such as excessive workloads (e.g., high patient workloads, poor working conditions, staffing inadequacies) (Galanis et al., 2021; Ramirez-Elvira et al., 2021), increasing violence from patients (Li et al., 2019), and more recently, a pandemic that has resulted in added stress and mental health morbidity (Martin et al., 2023). Burnout is known to have multi-level impacts on 1) nurses themselves (e.g., co-occurring mental health conditions, increased risk for chronic conditions) (Hammarström et al., 2023; Salvagioni et al., 2017), 2) the patients they care for (e.g., increased length of stay, higher rates of adverse events, poor patient outcomes) (Jun et al., 2021), and 3) the healthcare organization (e.g., decreased job satisfaction, intent to leave, job turnover) (Jun et al., 2021). Mitigating burnout is more critical than ever for maintaining quality patient care, ensuring workforce retention, preventing deleterious impacts on nurses, and addressing the growing demands placed on healthcare systems.

2. Background

While the importance of addressing burnout among nurses is known, the actual prevalence of burnout among nurses is less clear; studies have reported prevalence rates varying between 11% and 30% (Ge et al., 2023; Woo et al., 2020). This variation in prevalence may be attributable to the use of different burnout measurement tools (Ge et al., 2023; Woo et al., 2020), geographic regions (Woo et al., 2020), healthcare systems (Ge et al., 2023), practice areas (e.g., emergency, pediatrics, oncology, intensive care unit) (Adriaenssens et al., 2015; Buckley et al., 2020; Ramirez-Elvira et al., 2021; Woo et al., 2020); and years of nursing experience/seniority

(Lopez-Lopez et al., 2019; Ramirez-Elvira et al., 2021). The high heterogeneity across studies is not surprising as there has been significant debate regarding how burnout should be conceptualized and measured (Canu et al., 2020). The lack of consensus on the definition of burnout, combined with diverse measures of the construct, have been identified as barriers in establishing reliable estimations of the prevalence and incidence of burnout.

The Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981) has dominated the empirical literature in terms of measuring burnout (Canu et al., 2020). However, it has been criticized as having a flawed conceptualization (Kristensen et al., 2005) and psychometric properties (Shoman et al., 2021; Mukherjee et al., 2020), necessitating the need to consider other burnout measures to obtain a more accurate representation of prevalence. The Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) has been rising in popularity as it has been identified as a superior burnout measure due to its strong psychometric properties (Shoman et al., 2021). The CBI was specifically developed to address the gaps in Maslach and Jackson's (1981) conceptualization and measurement of burnout. The CBI takes a unique approach to evaluating burnout as it focuses on the degree of physical and psychological exhaustion experienced by a person that is attributable to a specific domain of life (Kristensen et al., 2005). As such, the CBI contains three dimensions: personal burnout, work-related burnout, and client-related burnout (Kristensen et al., 2005). Personal burnout is the degree of physical and psychological fatigue and exhaustion experienced by a person. It essentially measures fatigue and exhaustion at a generic level and can be used across individuals regardless of occupational status. Work-related burnout is the degree of physical and psychological fatigue and exhaustion that is perceived by a person as related to his/her work. By specifically asking questions related to the dimension of work, it is possible to compare the personal burnout and work-related burnout scale to evaluate

whether an individual's fatigue or exhaustion are attributable to their everyday life (e.g., family dynamics, health problems, etc.), or more specific to their work. Lastly, the client-related dimension evaluates the degree of physical and psychological fatigue and exhaustion that is perceived by the person as related to his/her work with clients. This dimension should only be used for individuals working with clients (e.g., patients, inmates, children, students, residents, etc.). When the CBI was developed, psychometric testing demonstrated strong internal consistency among a diverse sample (n=1,914) that included nurses, midwives, doctors, social workers, hospital secretaries, administrative staff, prison ward staff, and homecare workers (Kristensen et al., 2005).

The CBI has been validated among teachers (Fiorilli et al., 2015), university professors and academic staff (Rocha et al., 2020), pharmacists (Fadare et al., 2021), and a large sample of healthcare workers that included nurses (Thrush et al., 2021). Few studies have evaluated the psychometric properties of the CBI among nurses specifically. In one such study, Montgomery et al. (2021) evaluated a U.S.-based sample of n=928 nurses and concluded that the CBI was a reliable and valid tool to use among nurses. Further, the authors established convergent validity between the CBI and the nursing practice environment (using the Nursing Practice Environment Scale), job satisfaction, and intent to leave. However, their study had some limitations. Their inclusion criteria specified that only Registered Nurses (RNs) working in inpatient acute care settings were eligible to participate, which excluded Practical Nurses (PNs), Nurse Practitioners (NPs), and nurses practicing outside of an acute care hospital setting. Nurses who worked part-time or casually were also excluded from participating in the study. Additionally, the geographical area in which the study was conducted was limited to the state of Alabama, which may not be generalizable to other areas with different models of healthcare. In another study,

Thrush et al. (2021) included nurses within their validation study of healthcare workers (n=1,679), which represented 38% (n=643) of their sample. While their study included nurses with varying registration types (RN, PN, NP), it was conducted at a single, public, mid-sized academic health center located in the southeastern region of the U.S. among those working in direct patient care-related activities. Results of this study also supported the CBI as a valid and reliable tool among healthcare workers.

Although the CBI has previously demonstrated acceptable psychometric properties in two studies of U.S. nurses, psychometric evidence should be accumulated across independent samples and settings because measurement properties are sample and context-dependent (Knekta et al., 2019). The present study is situated within NWO and includes diverse practice settings in urban, rural, and remote communities. Moreover, we incorporated a broader sample of nurses (e.g., those working in full-time, part-time, or casual positions), in diverse practice settings (e.g., acute care, community, long-term care), and geographic locations (e.g., urban, rural, remote) which can add to the generalizability of results. Lastly, as some confirmatory factor analyses (CFA) fit indices among previous samples of nurses were borderline, this suggests the underlying factor structure may not be fully stable across groups or that certain items may function differently depending on context. As such, replication in Canadian nurses would provide additional evidence to support the stability of the instrument's factor structure, reliability, and validity, thereby strengthening confidence in its use and supporting the generalizability of findings.

2.1 Aim

The purpose of this study was to evaluate the psychometric properties of the CBI among a sample of nurses working in Northwestern Ontario (NWO), Canada. We aimed to 1) assess

construct validity by evaluating a) structural validity and b) convergent validity, and 2) assess the reliability of the CBI among nurses.

3. Methods

Approval for this study was received from the Lakehead University Research Ethics Board (#1469951).

3.1 Study Design

Participants completed a baseline questionnaire as a part of a longitudinal cohort study, the Northwestern Ontario Workplace and Worker Health Study (NOWWHS), conducted by the Enhancing and Preventing Injury and Disability at Work (EPID@Work) Research Institute at Lakehead University. Cross-sectional baseline data collected from September 2023 to May 2025 were evaluated to assess the psychometric properties of the CBI.

3.2 Sampling and Recruitment

We used a multi-pronged sampling strategy within the geographic area of NWO. This included 1) a random selection of workplaces with an invitation to participate, 2) employers volunteering their organization to participate, and 3) the opportunity for nurses to sign up individually. The survey was accessible through the study website (<https://www.workinghealth.ca>) or via QR code. Recruitment efforts included social media, posters, emails to nursing leaders within various healthcare organizations, and radio/television advertisements. A list of mailing addresses (n=1,833) and e-mail addresses (n=1,756) of nurses who have agreed to participate in research was obtained from the College of Nurses of Ontario. Emails and postcards containing study information, a QR code, and a link to the study were sent to all nurses on the address lists. As an incentive for nurses' participation, cash draws were offered monthly from June-December 2024.

3.3 Inclusion/Exclusion Criteria

Nurses were eligible to participate if they were 1) an RN, PN, or NP, currently registered with the College of Nurses of Ontario, 2) currently employed by an organization located in NWO, and 3) able to complete the online survey in English. The boundaries of NWO were defined as extending from Hudson Bay in the north to the United States border in the south, and from the Manitoba border in the west, to just short of White River in the east (Northwest Local Health Integration Network [NWLHIN], 2018). It is approximately 460,000 square kilometers, an area larger than the size of France (Health Quality Ontario, 2017). The Northwest region serves over 232,299 people with a population density of 0.4 people per square kilometer (NWLHIN, 2018). Almost half (45%) of the Northwest population resides in Thunder Bay, a third (34.2%) in rural areas, and the remaining population lives in small- or medium-sized population centres (Health Quality Ontario, 2017). With the region's large geography and relatively small, dispersed population, unique challenges exist in service delivery, including access to care, health human resources, the need for extensive travel, and overall higher healthcare costs per capita (NWLHIN, 2018).

3.4 Data Collection

Participants completed the survey online using the Qualtrics platform (Qualtrics XM, 2025), either independently or during a workplace visit using study-provided tablets or personal mobile devices connected to a secure, non-workplace internet network to prevent workplace tracking. Nurses who began the survey online but didn't complete it were emailed a personalized link to continue completing their survey at a later time. A research assistant followed up on incomplete survey responses via email and phone one week after initial email and weekly for up to three weeks, or until the participant completed the survey or declined to participate.

3.5 Instruments

Demographic and workplace characteristics. Personal demographics including age, sex, race, and marital status were collected. Workplace characteristics included employment status (i.e., full-time, part-time, casual), shift length, job location, nursing registration (i.e., RN, PN, NP), nursing role (e.g., direct patient care, manager, clinical nurse specialist, etc.), and practice area (e.g., medical, specialty area, long-term care, etc.).

Copenhagen Burnout Inventory (CBI). The CBI consists of 19 items divided among the three dimensions of personal burnout (6-items), work-related burnout (7-items), and client-related burnout (6-items) (Kristensen et al., 2005). Items are scored using a five-point Likert scale with a response set that varies with specific questions. Seven items are scored using a five-point Likert scale ranging from 1 (*to a very low degree*) to 5 (*to a very high degree*), and twelve items are scored using a five-point Likert scale ranging from 1 (*never/almost never*) to 5 (*always*). Items are re-coded into scores of 0 = almost never, never/to a very low degree, 25 = seldom/to a low degree, 50 = sometimes/somewhat, 75 = often/to a high degree, and 100 = always/to a very high degree. Each dimension is scored separately to allow for a comprehensive assessment and comparison of burnout across the three dimensions. Scores are calculated by taking the average of the items within each dimension, with higher scores indicating higher levels of burnout (Kristensen et al., 2005).

Criterion Measures. Three measures were employed in this study to examine convergent validity: The *Healthy Work Survey* (Dobson et al., 2023) contains 55 questions largely based on the National Institute for Occupational Safety and Health (NIOSH) General Social Survey (GSS) and Quality of Work Life (QWL) questionnaire, with the addition of “emerging stressors” not included in the QWL that emerged from a review of the literature and

previously validated psychosocial questionnaires (e.g., Copenhagen Psychosocial Questionnaire [COPSOQ]) and subject matter experts. In this study, only the items needed to calculate the following subscales were used: support (supervisor support, coworker support), psychological demands (workload management [demands], role conflict, and emotional demands), involvement and influence (skills discretion, decision authority), workplace bullying, and physical violence. For subscales regarding support, psychological demands, and involvement and influence, participants responded to a Likert scale (1=always, 2=often, 3=sometimes, 4=rarely, 5=never, and 0=not applicable). Mean scores were computed so that higher scores indicated a higher level of support, higher psychological demands, and higher involvement and influence. Items related to physical violence and bullying were dichotomous (no=0, yes=1), with participants responding “yes” if they have experienced physical violence and/or bullying in their workplace. Preliminary analyses suggest the Healthy Work Survey is a reliable and valid tool to use (Dobson et al., 2023). However, limited data exists due to its recent development. *Job satisfaction* was measured using a single item: “How satisfied are you with your main job?”, rated using a 5-point Likert scale (1=very dissatisfied, 2=dissatisfied, 3=neither satisfied nor dissatisfied, 4=satisfied, 5=very satisfied). Higher scores indicate higher levels of satisfaction with one’s job. *Intent to leave* was measured by a single-item question. Participants respond to the question “During the past six months, how often have you considered leaving your main job?” with a 5-point Likert scale (1=never, 2=rarely, 3=sometimes, 4=often, 5=always). Higher scores suggest a greater inclination to leave one’s job.

3.6 Statistical Analysis

Descriptive statistics for the demographic and workplace characteristics were calculated using summary statistics, including mean and standard deviation for continuous measures and

frequency counts and percentages for nominal measures. Mean score and standard deviation for the burnout dimensions were conducted. To evaluate the factorial validity of the CBI, a CFA was conducted. We hypothesized a three-factor structure to include: personal burnout (6 items), work-related burnout (7 items), and client-related burnout (6 items), consistent with the original CBI. Factor loading coefficients > 0.3 and $p < 0.05$ are generally considered the minimum acceptable threshold, with factor loadings > 0.5 suggesting a more substantial contribution of the item to the factor. The model was estimated using the maximum likelihood estimation, a standard approach in CFA that provides efficient parameter estimates under normality assumptions. Following the software default, missing data were handled using listwise deletion, whereby observations without responses for all items were excluded (Acock, 2013). Model fit was assessed using a range of goodness-of-fit indices (e.g., chi-square statistic [χ^2/df], root mean square error of approximation [RMSEA], standardized root mean square residual [SRMR], Tucker-Lewis index [TLI], comparative fit index [CFI], and Coefficient of Determination [CD]). Model fit was judged as acceptable according to the following established cut-offs: $\chi^2/df = < 2$ for models with $df \geq 8$; $RMSEA < 0.05$ = good fit, $0.05-0.09$ = adequate fit, > 0.1 = poor fit; $SRMR \leq 0.08$ indicates good fit; TLI and $CFI \geq 0.95$ indicates good fit; and CD close to 1 indicate high explanatory capacity (Hu & Bentler, 1999). A sensitivity analysis was conducted to examine the robustness of the three-factor CBI structure by testing alternative covariance specifications, including models with pairwise factor covariances specified individually and a model with no covariances, reflecting known conceptual overlap and high correlations among burnout dimensions.

To examine convergent validity, we used Pearson's r correlation coefficients between pairs of continuous, normally distributed variables, and point-biserial correlations were

computed for relationships between dichotomous and continuous variables. Values of the correlation coefficient of $r = 0.10, 0.30$, and 0.50 are considered small, moderate, and large effect size, respectively. We hypothesize that high demands (workload, emotional demands, role conflict), low control (skill discretion, decision authority), low support (supervisor and coworker), and exposure to bullying or physical violence will be associated with higher burnout scores on all dimensions of the CBI. This is consistent with the job demand control support theoretical framework (Karasek, 1979; Karasek, 1998) hypothesis that chronic work stress can occur when job demands are high and when control and social support are low, resulting in negative impacts to an individual's emotional and mental health. We also hypothesize that job satisfaction will be negatively associated with burnout (Salvagioni et al., 2017), while intent to leave will be positively associated with burnout (Jun et al., 2021).

Internal consistency was assessed using Cronbach's alpha (α) for the full CBI scale and its three dimensions: personal, work-related, and client-related burnout. Alpha coefficients can range from 0 to 1, with a coefficient of .70 considered acceptable for newly developed scales but .80 or higher is preferred.

All analyses were conducted using Stata 19/BE.

3.7 Sample Size Calculation

According to the COSMIN guidelines, the sample size for structural validity is computed by the number of items on the instrument, multiplied by 7, and must be greater than or equal to 100 participants (Mokkink et al., 2019). As the CBI contains 19-items, a total sample size of 133 nurses was required. The COSMIN guidelines also recommend at least 100 participants to conduct a "very good" reliability assessment (Mokkink et al., 2019).

4. Results

4.1 Sample Characteristics

Five hundred and twenty (n=520) nurses completed the survey. Fifteen nurses had incomplete data on the CBI and were not included in the CFA. Demographic and employment characteristics are reported in Table 1. The mean age of the sample was 38.3 years, with a range from 20-71 years. Most nurses identified as White/Caucasian, with 9% self-identifying as Indigenous. The majority identified working within a major city (67.4%), with 24.7% working in a small city/town, 3.3% working in a rural location, 1% working in a remote location, and 3.7% working on a reserve. The sample was diverse in terms of registration type, nursing role, and area of practice.

Table 1

Demographic and Employment Characteristics (N = 520)

Characteristics		Mean	SD	Median	Range
Age (years)		38.3	11.9	35	20-71
Years as a nurse		13.8	10.9	10	0-50
Years on current unit		6.6	7.1	4	0-38
Burnout					
Personal Burnout		55.9	22.7	58.3	0-100
Work-Related Burnout		56.5	22.2	57.1	0-100
Client-Related Burnout		33.0	21.6	33.3	0-87.5
		N	%		
Sex					
Female		458	88.1		
Male		60	11.4		
Prefer not to disclose		2	0.4		
Race					
White		431	82.9		
Indigenous		49	9.4		
Other		40	7.7		
Marital Status					

Married/common law	358	68.8
Single	115	22.2
Other	46	8.8
Missing	1	0.2
Nursing Registration		
Registered Nurse	389	75.8
Registered Practical Nurse	98	19.1
Nurse Practitioner	26	5.1
Missing	7	1.3
Nursing Role		
Direct Patient Care	302	58.0
Charge Nurse	16	3.1
Nurse Manager	24	4.0
Clinical Nurse Specialist	15	2.0
Educator	23	4.4
Primary Care	60	11.6
Other	77	14.9
Missing	3	0.6
Nursing Practice Area (Select all that apply)		
Medical	42	8.5
Surgical	50	10.2
Critical Care	28	5.7
Emergency	49	10.0
Mental Health	31	6.3
Maternal Newborn, Labour and Delivery, Pediatrics	23	4.7
Float Pool (e.g., No assigned unit)	10	2.0
Community, Public Health, Primary Healthcare	92	18.7
Long-term Care or Rehabilitative Care	77	15.7
Other	89	18.1
Employment Status		
Full-time	341	65.6
Part-time	92	17.7
Casual	47	9.0
On leave	26	5.0
Missing	14	2.7

Shift Length		
4–8-hour shift	113	21.7
8–12-hour shift	208	40
12+hour shift	179	34.4
Variable	20	3.8
Job Location		
Major City	349	67.4
Small City/Town	128	24.7
Rural	17	3.3
Remote	5	1.0
On Reserve	19	3.7
Missing	2	0.4
Job Satisfaction		
Very dissatisfied	31	6.0
Dissatisfied	88	16.9
Neither satisfied nor dissatisfied	121	23.3
Satisfied	232	44.6
Very satisfied	48	9.2
Intention to Leave the Position		
Never/rarely	210	40.4
Sometimes	139	21.6
Often/always	170	32.7
Missing	1	0.2

4.2 Structural Validity

A CFA confirmed the three-factor structure of the burnout scale (i.e., personal, client-related, and work-related burnout). The model was estimated using maximum likelihood estimation on a sample of 505 participants as fifteen participants were excluded due to missing CBI data. We were unable to run a sensitivity analysis on the 15 participants not included in the CFA due to missing demographic data resulting from the survey flow, as demographic questions were administered at the end of the survey.

4.3 Model Fit

Based on established cut-offs to assess model fit, the findings from the CFA suggested mixed model fit based on multiple indices. The chi-square test was statistically significant ($\chi^2 [149] = 826.60, p < 0.001$), and the χ^2/df ratio exceeded recommended thresholds, suggesting weak model fit. The RMSEA (0.095, 90% CI: 0.089-0.101, $p < 0.001$) fell within the range considered marginally acceptable (i.e., < 0.10), with values ≤ 0.08 generally preferred for close fit). The CFI (0.912) and TLI (0.899) fell just below the 0.95 threshold, suggesting near-adequate incremental fit. The SRMR (0.058) was well within the acceptable limits (≤ 0.08), indicating low residual error. The CD (0.999) indicated a high overall explanatory capacity of the model, reflecting that a large proportion of variance in the observed variables was accounted for by the latent constructs.

The model revealed moderate-to-strong covariances among the three burnout dimensions: 0.58 between personal and client-related burnout, 0.57 between client-related and work-related burnout, and 0.80 between personal and work-related burnout. The latter indicates substantial shared variance between those burnout dimensions.

4.4 Factor Loadings

All standardized factor loadings were statistically significant ($p < .001$). Two items, “Do you feel that you give more than you get back when you work with clients?” and “Do you have enough energy for family and friends during leisure time?”, showed comparatively lower loadings ($\lambda = 0.66$ and $\lambda = 0.57$, respectively). While both exceeded the minimum interpretability threshold, their values were notably lower than other items within their respective dimensions. A full summary of item-level loadings is provided in Figure 1.

4.5 Sensitivity Analysis

To assess the robustness and comparative fit of the three-factor structure, five model specifications were examined: (1) a base model with no covariances among factors; (2) models allowing pairwise covariances between personal and work-related burnout, client-related and work-related burnout, or personal and client-related burnout; and (3) the final model allowing covariances among all three factors. Across models, the pattern of factor loadings remained stable; however, only the fully covaried model met the SRMR threshold (< 0.08) and achieved the best combination of RMSEA, CFI, and TLI values. These findings suggest that while the dimensions of burnout are distinct, modeling their interrelationships yields a more accurate and theoretically coherent representation of the data, aligned with the properties of the CBI scale. The final model thus offers the most parsimonious and best-fitting representation of the burnout construct.

Figure 1

Confirmatory Factor Analysis Path Diagram



4.6 Convergent Validity

Pearson's r correlations between the CBI and criterion measures are presented in Table 2.

All correlations were statistically significant ($p < 0.01$) and in the expected direction.

Table 2

Pearson's Correlation's Evaluating Convergent Validity

	Work-Related Burnout (r)	Personal Burnout (r)	Client-Related Burnout (r)
Work-Related Burnout	1		
Personal Burnout	0.75	1	
Client-Related Burnout	0.56	0.56	1
Supervisor Support¹	-0.40	-0.28	-0.16
Coworker Support¹	-0.33	-0.27	-0.19
Workload Management¹	0.58	0.46	0.36
Emotional Demands¹	0.67	0.54	0.43
Role Conflict¹	0.49	0.37	0.29
Skill Discretion¹	0.25	0.25	0.23
Decision Authority¹	0.31	0.23	0.21
Workplace Bullying²	0.33	0.29	0.27
Physical Violence²	0.35	0.28	0.3
Job Satisfaction³	-0.65	-0.51	-0.38
Intent to Leave⁴	0.67	0.54	0.41

¹Higher scores indicate higher levels of support, psychological demands, and involvement and influence

²Higher scores indicate exposure to bullying and/or violence

³Higher scores indicate higher levels of satisfaction with one's job

⁴Higher scores indicate a greater inclination to leave one's job

4.7 Reliability

Cronbach's alphas were high for all dimensions (personal burnout $\alpha=0.93$, work-related burnout $\alpha=0.91$, and client-related burnout $\alpha=0.90$), indicating good reliability (Figure 1).

5. Discussion

The purpose of this study was to evaluate the psychometric properties of the CBI among a diverse sample of nurses working in various practice settings in urban and rural communities.

Our findings are consistent with the original CBI (Kristensen et al., 2005) and suggest that the CBI is a reliable and valid tool to assess burnout among nurses. These findings are important given that burnout is a prominent issue among nurses and requires measurement using a valid and reliable tool. Our study adds to the existing literature as it further confirms the adequate psychometric properties of the CBI and can be generalized to a broader population of nurses. The registration of nurses in our study are similar to the distribution of registrants in Ontario (College of Nurses of Ontario [CNO], 2025).

5.1 Structural Validity

Overall, our model fit indices demonstrated mixed findings. Although the chi-square test was statistically significant and the RMSEA indicated poor approximate fit, several indices (CFI, SRMR, and CD) supported adequate measurement performance. Evidence suggests that the elevated RMSEA may reflect model misspecification (Goretzko et al., 2024) and the statistically significant chi-square may be due to large sample size (Alavi et al., 2020). Minor misfit may be attributable to the presence of a single reverse-scored item (“Do you have enough energy for family and friends during leisure time?”), which exhibited a comparatively lower factor loading ($\lambda = 0.5250$) and may have introduced acquiescence bias (Zhang & Savalei, 2016). As the item is positively worded in comparison to all other items, it may have influenced participants response patterns and contributed to the lower factor loading and the inflated RMSEA (Rocha et al., 2020). Second, model misfit could be due to the high covariance between work-related and personal burnout, indicating a lack of discriminant validity (Goretzko et al., 2024). However, in the development of the CBI, Kristensen et al. (2005) explained that theoretically, the personal dimension of burnout essentially measures fatigue and exhaustion and can be used regardless of occupational status. As such, the personal and work-related dimensions should be highly

correlated as exhaustion from a nurse's personal life may carry over into the workplace. This high covariance between work-related and personal burnout was also noted by Thrush et al. (2025) and Rocha et al. (2020). Despite the inadequate fit indices of the chi-square and RMSEA, other indices were sufficient, and our model demonstrated that all items loaded significantly on their intended constructs. Thus, the three-factor structure was supported.

Consistent with our results, prior studies have found marginally acceptable fit on some indices (e.g., RMSEA); however, they made modifications to improve the fit of the model (Fadare et al., 2021; Fiorilli et al., 2015; Rocha et al., 2020). In Fadare et al.'s (2021) study among pharmacists, their hypothesized three-factor structure model did not fit until two client-related burnout items were removed ("Are you tired of working with clients?" and "Do you sometimes wonder how long you will be able to continue working with clients?"). Comparatively, Fiorilli et al.'s (2015) study on teachers found a better model fit when two work-related items were removed ("Do you feel worn out at the end of a working day?" and "Does your work frustrate you"). It is possible that modifications were needed in the above studies as they were evaluating validity among Italian teachers (Fiorilli et al., 2005) and pharmacists (Fadare et al., 2021) and burnout may be experienced differently based on profession or culture. In our study, we chose not to overfit the model as it did not improve any of the fit indices compared to the original model. This is consistent with Montgomery et al.'s (2020) findings.

5.2 Convergent Validity

Our analyses of convergent validity determined correlations of varying strength between workplace factors and the dimensions of burnout. Numerous studies have evaluated the association between work-related factors and burnout, noting high demands, low influence, low social support, and lack of role clarity increase the risk of burnout (Galanis et al., 2021; Lopez-

Lopez et al., 2019). These psychosocial workplace factors stem from the Job Demand Control Support Model (Johnson & Hall, 1988; Karasek, 1979), which posit that employee well-being is threatened, and job strain occurs when demands are high and when control and social support are low. Our findings align with this evidence with moderate correlations between burnout and psychosocial workplace factors.

More recently, bullying and violence in the workplace has emerged as a prominent issue for nurses. In a meta-analysis regarding workplace violence and risk for burnout, the authors determined that compared to their counterparts with non-exposure to workplace violence, nurses experiencing workplace violence had 2.25 times higher odds of reporting burnout after adjusting the confounding factors (Wang et al., 2022). Although our findings demonstrated moderate correlations between workplace bullying and violence in comparison to other factors, bullying and violence in the workplace have significant impacts on nurses (mental health), patients (lower quality of care), and the healthcare system (leaving the profession) (Li et al., 2019).

5.3 Reliability

Consistent with the original methodological study (Kristensen et al., 2005), the current study demonstrated the reliability of the CBI. Our estimates were slightly higher than in the original study (Kristensen et al., 2005), which may be attributable to their larger sample. Our estimates are also in line with those of Montgomery et al.'s (2021) among Alabama nurses. These findings suggest that each dimension on the CBI is reliable and should produce consistent results under similar conditions.

5.4 Strengths and Limitations

Strengths of our study include the large sample size, inclusion of nurses with varied nursing roles, areas of practice, and hours worked (i.e., full-time, part-time, and casual).

However, our findings should be considered with some limitations. First, the geographic location of Northwestern Ontario is unique in that it serves northern, rural, and remote residents and may come with significant service challenges (e.g., geographic isolation, lack of support, staffing challenges). As such, our results may not be generalizable to larger urban cities within Canada or internationally. Next, selection bias is a possibility in that participants with an interest in the study objectives (i.e., poor working conditions and burnout) may be overrepresented in the sample. While we had more than enough participants to conduct a robust psychometric analysis, we were unable to stratify the sample to conduct further analyses (e.g., measurement invariance) by registration class, job location, or employment status. Additionally, 15 participants were excluded from the CFA due to incomplete data. Lastly, although the Healthy Work Survey has positive preliminary psychometric properties, further validation of this tool should be conducted. Future research should continue to validate this scale with diverse samples of nurses (e.g., NPs) as their roles and responsibilities differ from that of a RN or PN.

6. Implications for Policy, Research and Practice

Having a valid and reliable tool to measure burnout among nurses has broad implications for policy, research and practice. First, establishing an accurate estimation of the prevalence of burnout is necessary to quantify the problem. Wide ranges of burnout have been reported among nurses worldwide (Ge et al., 2023; Woo et al., 2020). Consistent use of a reliable tool is beneficial in establishing accurate prevalence and incidence estimates and allows for comparability across studies (Canu et al., 2020; Shoman et al., 2021). Additionally, having accurate estimations may assist in developing policy and increased allocation of resources in nursing. Nursing leaders have consistently been advocating for policies regarding minimum staffing levels (Buckley et al., 2025). Moreover, additional resources need to be allocated to

ensure the nursing workforce is sustained and that nurses aren't leaving the profession because of burnout (Lopez-Lopez et al., 2019).

7. Conclusion

The psychometric analysis of the CBI among nurses within NWO determined it to be a reliable and valid tool. The three-factor structure of the CBI was confirmed through CFA, with the items of personal, work-related, and client-related burnout loading adequately on their latent factors. Further, the CBI demonstrated convergent validity among various workplace psychosocial factors consistent with prior literature.

References

- Acock, A. (2013). *Discovering Structural Equation Modelling Using Stata*. Stata Press.
- Alavi, M., Visentin, D., Thapa, D., Hunt, G., Watson, R., & Cleary, M. (2020). Chi-square model fit in confirmatory factor analysis. *Journal of Advanced Nursing*, 76(9), 2209-2211. <https://doi.org/10.1111/jan.14399>
- Adriaenssens, J., De Gucht, V., & Maes, S. (2015). Determinants and prevalence of burnout in emergency nurses: A systematic review of 25 years of research. *International Journal of Nursing Studies*, 52, 649-661. <https://doi.org/10.1016/j.ijnurstu.2014.11.004>
- Buckley, L., Berta, W., Cleverley, K., Medeiros, C., & Widger, K. (2020). What is known about pediatric nurse burnout: A scoping review. *Human Resources for Health*, 18(9), 1-23. <https://doi.org/10.1186/s12960-020-0451-8>
- Buckley, L., McGillis Hall, L., Price, S., Visekruna, S., & McTavish, C. (2025). Nurse retention in peri- and post-COVID-19 work environments: A scoping review of factors, strategies and interventions, *BMJ Open*, 15, e096333. <https://doi.org/10.1136/bmjopen-2024-096333>
- Canu, G., Marca, S.C., Dell'Oro, F., Balazs, A., Bergamaschi, E., Besse, C., Bianchi, R., Bislumovska, J., Bjelajac, A., Bugge, M., Busneag, C., Caglayan, C., Cernitanu, M., Costa Pereira, C., Dernovscek, H., Droz, N., Eglite, M., Godderis, L., Gundel, H...Wahlen, A. (2020). Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries. *Scand J Work Environ Health*, 47(2), 95-107. <https://doi.org/10.5271/sjweh.3935>
- College of Nurses of Ontario (CNO). (2025). *Registrant Statistics*.

<https://www.cno.org/what-is-cno/nursing-demographics/registrant-statistics#id-RegistrantsintheGeneralandExtendedClasses>

Dobson, M., Schnall, P., Pouran, F., & Landsbergis, P. (2023). The Healthy Work Survey: A standardized questionnaire for the assessment of workplace psychosocial hazards and work organization in the United States. *Journal of Occupational and Environmental Medicine*, 65(5), 330-345. <https://doi.org/10.1097/jom.0000000000002820>

Fadare, O. O., Andreski, M., & Witry, M. J. (2021). Validation of the Copenhagen Burnout Inventory in Pharmacists. *INNOVATIONS in Pharmacy*, 12(2), 4. <https://doi.org/10.24926/iip.v12i2.3699>

Fiorilli, C., De Stasio, S., Benevene, P., Iezzi, D. F., Pepe, A., & Albanese, O. (2015). Copenhagen Burnout Inventory (CBI): A validation study in an Italian teacher group. *TPM - Testing, Psychometrics, Methodology in Applied Psychology*, 22(4), 537–551. <https://doi.org/10.4473/TPM22.4.7>

Galanis, P., Vrakka, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77, 3286-3302. <https://doi.org/10.1111/jan.14839>

Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing*, 32(17-18). <https://doi.org/10.1111/jocn.16708>

Goretzko, D., Siemund, K., & Sterner, P. (2024). Evaluating model fit of measurement models in confirmatory factor analysis. *Educational and Psychological Measurement*, 84(1), 123-144. <https://doi.org/10.1177/00131644231163813>

- Hammarstrom, P., Rosendahl, S., Gruber, M., & Nordin, S. (2023). Somatic symptoms in burnout in a general adult population. *Journal of Psychosomatic Research*, 168, 111217. <https://doi.org/10.1016/j.jpsychores.2023.111217>
- Health Quality Ontario. (2017). *Health in the North*. <https://healthinthenorth.hqontario.ca>
- Hu, L-T., & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55, <https://doi.org/10.1080/10705519909540118>
- Johnson, J., & Hall, E. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health*, 78, 1336-1342. <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.78.10.1336>
- Jun, J., Ojemeni, M.M., Kalamani, R., Tong, J., & Crecelius, M.L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, 119, 103933. <https://doi.org/10.1016/j.ijnurstu.2021.103933>
- Karasek, R. (1979). Job demand, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, 24(2), 285–308. <https://doi.org/10.2307/2392498>
- Karasek, R. (1998). Demand-control model: a social, emotional, and physiological approach to stress risk and active behaviour development. In J.M. Stellman, *Encyclopedia of Occupational Health and Safety (4th ed)*. International Labour Office, Geneva.
- Knekta, E., Runyon, C., & Eddy, S. (2019). One size doesn't fit all: Using factor analysis to gather validity evidence when using surveys in your research. *CBE—Life Sciences Education*, 18(1), rm1. <https://doi.org/10.1187/cbe.18-04-0064>

- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>
- Li, H., Dance, E., Poonja, Z., Colmers-Gray, I. (2025). Validity and reliability of an abbreviated Copenhagen Burnout Inventory in Canadian emergency physicians and residents. *Canadian Journal of Emergency Medicine*, 27, 260-267. <https://doi.org/10.1007/s43678-024-00849-3>
- Li, N., Zhang, L., Xiao, G., Chen, J., & Lu, Q. (2019). The relationship between workplace violence, job satisfaction and turnover intention in emergency nurses. *International Emergency Nursing*, 45, 50-55. <https://doi.org/10.1016/j.ienj.2019.02.001>
- Lopez-Lopez, I., Gomez-Urquiza, J., Canadas, G., De la Fuente, E. I., Albendin-Garcia, L., & Canadas-De la Fuente, G. A. (2019). Prevalence of burnout in mental health nurses and related factors: A systematic review and meta-analysis. *International Journal of Mental Health Nursing*, 28, 1035-1044. <https://doi.org/10.1111/inm.12606>
- Martin, B., Kaminski-Ozturk, N., O'Hara, C., & Smiley, R. (2023). Examining the impact of the COVID-19 pandemic on burnout and stress among U.S. nurses. *Journal of Nursing Regulation*, 14(1), 4-12. [https://doi.org/10.1016/S2155-8256\(23\)00063-7](https://doi.org/10.1016/S2155-8256(23)00063-7)
- Maslach, C., & Jackson, S. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2, 99-113. <https://doi.org/10.1002/job.4030020205>
- Mokkink, L., Prinsen, C., Patrick, D., Alonso, J., Bouter, L., de Vet, H., & Terwee, C. (2019). *COSMIN study design checklist for patient-reported outcome measurement instruments*. https://www.cosmin.nl/wp-content/uploads/COSMIN-study-designing-checklist_final.pdf
- Montgomery, A., Azuero, A., & Patrician, P. (2021). Psychometric properties of Copenhagen

- Burnout Inventory among nurses. *Research in Nursing & Health*, 44(2), 308-318.
<https://doi.org/10.1002/nur.22114>
- Mukherjee, S., Tennant, A., & Beresford, B. (2020). Measuring burnout in pediatric oncology staff: Should we be using the Maslach Burnout Inventory? *Journal of Pediatric Oncology Nursing*, 37(1), 55–64. <https://doi.org/10.1177/1043454219873638>
- Northwest Local Health Integration Network (NWLHIN). (2018). *2017/18 NW LHIN Annual Report*. <https://www.healthcareathome.ca/document/2017-18-nw-lhin-annual-report/>
- Qualtrics. (2025). *Qualtrics XM* [Computer software]. <https://www.qualtrics.com>
- Ramirez-Elvira, S., Romero-Bejar, J., Suleiman-Martos, N., Gomez-Urquiza, J., Monsalve Reyes, C., Canadas-De la Fuente, G., & Albendin-Garcia, L. (2021). Prevalence, risk factors and burnout levels in Intensive Care Unit nurses: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18, 11432. <https://doi.org/10.3390/ijerph182111432>
- Rocha, F., de Jesus, L., Marziale, M., Henriques, S., Marôco, J. & Campos, J. A. (2020). Burnout syndrome in university professors and academic staff members: Psychometric properties of the Copenhagen Burnout Inventory–Brazilian version. *Psicologia: Reflexao e Critica*, 33(1). <https://doi.org/10.1186/s41155-020-00151-y>
- Romo, L., Zerhouni, O., Nann, S., Rebuffe, E., Tessier, S., Touzé, C., Cruchet, L., & Duret, C. (2025). Assessment of burnout in the general population of France: Comparing the Maslach Burnout Inventory and the Copenhagen Burnout Inventory. *Mental Health Science*, 3(2). <https://doi.org/10.1002/mhs2.97>
- Salvagioni, D., Melanda, F., Mesas, A., Gonzalez, A., Gabani, F., & de Andrade, S. (2017). Physical, psychological and occupational consequences of job burnout: A systematic

- review of prospective studies. *PLOSone*, 1-29.
<https://doi.org/10.1371/journal.pone.0185781>
- Shoman, Y., Marca, S.C., Bianchi, R., Godderis, L., van der Molen, H.F., & Guseva Canu, I. (2021). Psychometric properties of burnout measures: A systematic review. *Epidemiology and Psychiatric Sciences*, 30, e8, 1-9.
<https://doi.org/10.1017/S2045796020001134>
- Thrush, C. R., Gathright, M. M., Atkinson, T., Messias, E. L., & Guise, J. B. (2021). Psychometric Properties of the Copenhagen Burnout Inventory in an academic healthcare institution sample in the U.S. *Evaluation and the Health Professions*, 44(4), 400–405.
<https://doi.org/10.1177/0163278720934165>
- Wang, J., Zeng, Q., Wang, Y., Liao, X., Xie, C., & Wang, G. (2022). Workplace violence and the risk of post-traumatic stress and burnout among nurses: A systematic review and meta-analysis. *Journal of Nursing Management*, 30, 2854-2868.
<https://doi.org/10.1111/jonm.13809>
- Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>
- World Health Organization (WHO) (2019). *Burn-out an “occupational phenomenon”*: *International Classification of Diseases*. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>
- Zhang, X., & Savalei, V. (2016). Improving the factor structure of psychological scales: The expanded format as an alternative to the Likert scale format. *Educational and Psychological Measurement*, 76(3), 357-386. <https://doi.org/10.1177/0013164415596421>

Chapter 5: Understanding Burnout in Nurses: Prevalence, Mental Health Comorbidity, and Workplace Factors

Abstract

Background: Burnout is a common condition affecting nurses in all areas of practice globally.

While burnout has typically been viewed as a work-related phenomenon, there is growing evidence that mental health conditions among nurses may intersect with burnout. The purpose of this study was to estimate the prevalence of burnout and mental health conditions in a post-pandemic sample, evaluate their co-occurrence, and identify salient workplace factors and mental health conditions associated with burnout.

Methods: A cross-sectional analysis was conducted using baseline survey data from a longitudinal cohort of 588 nurses in Northwestern Ontario. Burnout, depression, anxiety and post-traumatic stress disorder were measured via self-report using validated tools and cut-offs. Various exposures were measured including the Practice Environment Scale of the Nursing Work Index, workplace bullying and violence, demographic and workplace characteristics. A multivariable logistic regression was conducted to determine what factors were independently associated with burnout. All analyses were conducted with Stata and statistical significance was considered at $p < 0.05$.

Results: The prevalence of burnout was high (65.3%). High rates of depression (28.9%), anxiety (26.5%), and posttraumatic stress disorder (PTSD) (20.9%) were also identified. Burnout co-occurred with at least one mental health condition in approximately half of the participants, and 12.2% screened positive for all four conditions (burnout, depression, anxiety, and PTSD). Multivariable modeling revealed seven variables significantly associated with burnout: depression (OR 3.46), PTSD (OR 3.11), exposure to physical violence (OR 2.0), 12-hour shifts

(OR 1.89), and staffing and resources (OR 0.52), job satisfaction (OR 0.19) and being a Nurse Practitioner (OR 0.25).

Conclusions: High rates of burnout were identified in this sample of nurses which often co-occurred with mental health conditions. Our findings also highlight that burnout is strongly associated with both workplace factors and nurses' mental health. Thus, prevention strategies that solely focus on the work environment may be insufficient to mitigate burnout. There is an urgent need for system-level strategies that focus on organizational improvements such as staffing ratios, shift length and violence prevention. Mental health supports are also needed for nurses. These efforts are essential to preserve the sustainability of the nursing workforce.

Keywords: burnout, mental health, nurses, prevalence, workplace factors

Introduction

Burnout is a prevalent condition affecting nurses in all areas of practice and across diverse geographical locations (Ge et al., 2023; Getie et al., 2025; Woo et al., 2019). The World Health Organization (WHO) (2019) defines burnout as a syndrome resulting from chronic workplace stress that has not been successfully managed. A recent estimate of the global prevalence of nurses' burnout is 30% (Ge et al., 2023), consistent with findings from a recent umbrella review estimate that 33% (95% CI: 27.3%-39.6%) of nurses experience high levels of emotional exhaustion – a key component of burnout (Getie et al., 2025). This estimate represents an increase from the global prevalence of “high burnout” of 11% (95% CI: 8.8-13.6%) reported by Woo and colleagues (2019). Taken together, findings suggest that burnout among nurses is not only widespread but may be worsening over time. This is concerning, as burnout affects not only individual nurses (e.g., poor mental health, fatigue, sleep disturbances), but also the patients they care for (e.g., poor patient outcomes/quality of care), and the health care organization they work for (e.g., job dissatisfaction, intent to leave, job turnover) (Dall'Ora et al., 2020; Hammarstrom et al., 2023; Schlak et al., 2021; Wei et al., 2018).

Burnout has long been recognized as a syndrome resulting from chronic workplace stress (World Health Organization [WHO], 2019). For nurses, numerous workplace factors have been associated with burnout, including work-related demands (e.g., workload, staffing adequacy, time pressures, patient and job complexity, role conflict), autonomy, and psychological demands (e.g., exposure to workplace violence and/or bullying) (Dall'Ora et al., 2020; Meredith et al., 2022). Additional workplace factors such as shift work/working patterns (night work, overtime, weekly hours, 12-hour shifts), ward or unit type, low job security, inadequate compensation, and insufficient opportunities for professional development are also associated with burnout

(Meredith et al., 2022; Qtait et al., 2025). Studies have shown that when hospitals had inadequate staffing, limited managerial support, and poor interdisciplinary collaboration, nurses had higher levels of burnout, emotional exhaustion, and psychological distress (Lake et al., 2019).

Conversely, supportive and well-resourced nursing practice environments buffered against these risks and promoted both nurse well-being, job satisfaction, and patient care quality (Lake et al., 2019; Schlack et al., 2021).

While burnout is consistently identified as a work-related phenomenon and workplace factors are a major focus of burnout research, it is important to consider that nurses' mental health (e.g., anxiety, depression, posttraumatic stress disorder [PTSD]) may also interact with the nursing practice environment and shape how workplace demands are experienced (Khammissa et al., 2022; Maslach et al., 2001). However, limited evidence exists regarding the extent to which mental health conditions contribute to the development of burnout among nurses (Meredith et al., 2022), and the direction of the relationship is unknown (e.g., poor mental health may increase vulnerability to burnout, and sustained burnout may contribute to the development or worsening of mental health conditions) or both (Toth-Kiraly et al., 2021).

Although the relationship to burnout remains unclear, the prevalence of mental health concerns among nurses is alarming and warrants attention. In a large pre-COVID-19 Canadian cross-sectional study, the frequency of positive screens among nurses (n=3,257) was 23% for PTSD, 36.4% for major depressive disorder, and 26.1% for generalized anxiety disorder (Stelnicki & Carleton, 2021). Further, those who experienced burnout were much more likely to screen positive for PTSD (OR 17.4, 95% CI: 9.1-33.2%), major depressive disorder (OR 43.3, 95% CI: 22.7-82.7%), generalized anxiety disorder (OR 25.9, 95% CI: 13.6-49.5%), and panic disorder (OR 23.6, 95% CI: 10.4-53.7%) relative to participants without burnout (Stelnicki et al.,

2021). Notably, a high correlation between burnout and mental health conditions (e.g., anxiety and depression) has been established (Chen & Meier, 2021; Koutsimani et al., 2019) and is likely related to overlapping symptomatology (Bianchi & Brisson, 2019; Bianchi et al., 2015).

Nonetheless, the collective findings from these review studies underscore the considerable psychological burden faced by nurses and highlight the potential for burnout to coexist with, or contribute to, serious mental health conditions.

Given that work-related stress has been increasing since the COVID-19 pandemic (Ge et al., 2023), it is likely that nurses continue to experience burnout and mental health comorbidities. However, the prevalence of nurse burnout, mental health conditions, and risk for co-occurrence of burnout and mental health conditions since the end of the COVID-19 pandemic is limited and non-existent for Northwestern Ontario (NWO). Further, little research has investigated workplace factors in tandem with mental health conditions and their association with burnout. This is a significant gap as efforts to prevent or mitigate burnout may need to pivot from targeting the work environment alone and be more inclusive of nurse's mental health. Thus, the objectives of this study were to:

- 1) Estimate the prevalence of burnout and mental health conditions in a post-pandemic sample of nurses in NWO,
- 2) Evaluate the co-occurrence of burnout and mental health conditions,
- 3) Determine workplace factors and mental health conditions associated with burnout.

Methods

Study Design and Setting

A cross-sectional analysis of data from baseline survey responses from a longitudinal cohort study was conducted (the Northwestern Ontario Workplace and Worker Health Study

[NOWWHS]) collected between September 2023 to September 2025. Research ethics board approval was obtained from the Lakehead University Research Ethics Board (#1469951).

The NOWWHS cohort study is situated within NWO, which extends from Hudson Bay in the North to the United States border in the south, and from the Manitoba border in the west, to just short of White River in the East (Northwest Local Health Integration Network [NWLHIN], 2018); it comprises 58% of Ontario's landmass (Ontario Health, 2023). The Northwest region serves over 236,000 people and has a population density of 0.6 people per square kilometer (NWLHIN, 2018). Almost half (46%) of the Northwest population resides in an urban city, a third (34.2%) in rural areas, with the remaining in small- or medium-sized population centres (Health Quality Ontario, 2017).

Sample and Recruitment

The multi-pronged sampling strategy included 1) asking a random selection of workplaces to participate, 2) allowing employers to volunteer their organization, and 3) permitting nurses to sign up individually. The study was advertised using social media, posters, emails to nursing leaders within healthcare organizations, emails to individual nurses (n=1,756) and by postcard (n=1,833). Mailing and e-mail addresses were obtained from nurses who consented to have their information released by the College of Nurses of Ontario (CNO) for research purposes. Thus, nurses may have received multiple invitations to participate from various sources. As an incentive for nurses' participation, random cash draws were offered monthly from June to December 2024.

Nurses were eligible to participate if they were 1) a Registered Nurse (RN), Practical Nurse (PN), or Nurse Practitioner (NP) currently registered with the College of Nurses of

Ontario; 2) currently employed by an organization located in NWO; and 3) able to complete the online survey in English.

Data Collection

Nurses completed the baseline survey through the Qualtrics platform (Qualtrics XM, 2025) after reviewing the informed consent and agreeing to participate. The survey was accessible from the study website (www.workinghealth.ca) or QR code. Research assistants contacted those with incomplete survey responses after one week for up to three weeks or until the participant completed the survey or declined to participate further. All available survey data was used in the analysis.

Measurement Tools

Validated self-report questionnaires were used to evaluate burnout, workplace factors, and mental health conditions. Additionally, sociodemographic characteristics including age, sex, race, and marital status were collected.

Burnout. The work-related dimension (7-items) of the Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) was used to evaluate the degree of physical and psychological fatigue and exhaustion perceived by the person as being related to their work (Kristensen et al., 2005). The seven items included: 1) Is your work emotionally exhausting? 2) Do you feel burnt out because of your work? 3) Does your work frustrate you? 4) Do you feel worn out at the end of the working day? 5) Are you exhausted in the morning at the thought of another day at work? 6) Do you feel that every working hour is tiring for you? and 7) Do you have enough energy for family and friends during leisure time? (Kristensen et al., 2005). Items were scored using a five-point Likert scale and then re-coded into scores of 100 = always/to a very high degree, 75 = often/to a high degree, 50 = sometimes/somewhat, 25 = seldom/to a low degree, and 0 = almost

never, never/to a very low degree (Kristensen et al., 2005, p. 200). Items were averaged to create a total dimension score, with higher scores indicating higher levels of burnout. To establish prevalence estimates, a cut-off score of ≥ 50 indicated having burnout (Table 1) (Borritz et al., 2006). Psychometric testing of this scale has demonstrated strong internal consistency (Cronbach's $\alpha = .87$) among a diverse sample of employees in the human service sector ($n=1,914$) (Kristensen et al., 2005).

Workplace Factors. Workplace factors included current nursing role, work schedule, shift length, hours worked per week, overtime, total years of nursing experience, and total years of experience on current nursing unit.

The *Practice Environment Scale of the Nursing Work Index (PES-NWI)* was used to measure nursing-specific workplace factors that enhance or attenuate a nurse's ability to practice nursing skillfully and deliver high-quality care (Lake, 2002). This scale contains 31 items that make up five empirically derived subscales: nurse participation in hospital affairs (e.g., development of hospital-wide care policies); nursing foundations of quality care (e.g., formal preceptor programs for new hires); nurse manager, leadership, and support of nurses (e.g., manager's skills in leading the unit and supporting staff); staffing and resource adequacy (e.g., sufficient staffing levels, support services, and resources to perform the job effectively); and collegial nurse-physician relations (e.g., quality of working relationships) (Lake, 2002). A 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) was used with higher mean scores indicating more agreement that subscale items were present in the current job. A response of "not applicable" was added as not all nurses surveyed were working in direct patient care roles. Mean scores above the midpoint of 2.5 indicated a favorable practice environment and those below the midpoint were considered to be unfavorable (Table 1) (Lake, 2002). The PES-

NWI has been identified as having a low respondent burden, satisfactory psychometric performance (Cronbach's α = .70-.98 for total scores and .65-.96 for subscales), opportunity for comparison across studies, high discriminant ability, and being free to use (Lake, 2002; Swiger et al., 2017; Warshawsky & Havens, 2011); it has been validated across nursing populations (e.g., intensive care, cardiac, orthopedic, neurological telemetry, outpatient and inpatient surgical care, outpatient, and inpatient dialysis centers) (Warshawsky & Havens, 2011).

Exposure to workplace violence (e.g. been physically assaulted) and bullying (e.g., repeated mistreatment such as abusive conduct that is threatening, intimidating, humiliating, work sabotage or verbal abuse) in the last six months (yes/no) were also assessed using two items from the Healthy Work Survey (Dobson et al., 2023).

Job satisfaction was measured using a researcher-developed single item: "How satisfied are you with your main job?", rated using a 5-point Likert scale (1=very dissatisfied, 2=dissatisfied, 3=neither satisfied nor dissatisfied, 4=satisfied, 5=very satisfied). Higher scores indicate higher levels of satisfaction with one's job.

Mental Health. *The Generalized Anxiety Disorder 7-item scale (GAD-7)* (Spitzer et al., 2006) measures anxiety symptom severity and the extent to which individuals have been affected by symptoms of anxiety in the two weeks prior to screening using a 4-point Likert rating scale (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day) (Kroenke et al., 2007; Spitzer et al., 2006). Scores were calculated as a sum of item responses, with a possible range from zero to 21, with higher scores reflecting greater levels of anxiety. A cut-off score of ≥ 10 was used to indicate probable anxiety (Table 1) (Spitzer et al., 2006). The construct, criterion, divergent, and factorial validity of the GAD-7 is well established (Kroenke et al., 2007; Spritzer

et al., 2006) and demonstrates excellent internal consistency (Cronbach's $\alpha=.89-.95$) (Ochnik et al., 2022).

The *8-item Patient Health Questionnaire (PHQ-8)* was used to measure the severity and extent to which individuals have been affected by symptoms of depression in the two weeks prior to screening using a 4-point Likert rating scale (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day) (Kroenke et al., 2002). Scores are calculated by summing item responses and can range from zero to 24, where higher scores indicate greater levels of symptoms. A cut-off score of ≥ 10 was used to indicate probable depression (Table 1) (Kroenke et al., 2001). The PHQ-8 has been validated cross-culturally (de la Torre et al., 2023) and in large population studies (Kroenke & Spitzer, 2002; Kroenke et al., 2009). Reported internal consistency reliabilities for the PHQ-8 are satisfactory (Cronbach's $\alpha=.77 - .92$) (de la Torre et al., 2023; Shin et al., 2019).

The *Posttraumatic Stress Disorder Checklist (PCL-5)* provides a total symptom severity score (range 0-80) by summing the scores for each of the 20 items. Scores between 31 and 33 can be used as a measure of provisional diagnosis of PTSD (Weathers et al., 2013); this study employed a cut-off score of ≥ 31 to indicate probable PTSD. The PCL-5 has high internal consistency (Cronbach's $\alpha=.94$), good test-retest ability ($r=0.82$), and good convergent, discriminant, and structural validity (Blevins et al., 2015).

One item examining previous diagnoses and/or treatment of mental health disorders was used to determine whether the person had been diagnosed or received treatment for mental health disorders (depression, anxiety, or PTSD) and were assessed using a yes/no format. These items were aggregated to derive an overall binary indicator of prior diagnosis or treatment of a mental health disorder, with a value of "yes" assigned if participants endorsed one or more conditions.

Table 1**Cut-offs and Interpretation of Scores for Measurement Tools**

Measurement Tool	Cut-Off / Interpretation
Copenhagen Burnout Inventory – Work-Related Burnout Dimension (CBI)	≥ 50 indicates burnout
Practice Environment Scale of the Nursing Work Index (PES-NWI)	>2.5 = favorable practice environment <2.5 = unfavorable practice environment
Generalized Anxiety Disorder (GAD-7)	≥ 10 indicates probable anxiety
Patient Health Questionnaire (PHQ-8)	≥ 10 indicates probable depression
Posttraumatic Stress Disorder Checklist (PCL-5)	≥ 31 indicates probable PTSD

Statistical Analyses

Descriptive statistics (mean, standard deviation, frequency) were used for sociodemographic and workplace factors. The internal consistency (Cronbach's alpha) for all measurement tools was determined, with a coefficient of $>.8$ or higher preferred for established tools. All data were analyzed using Stata version 19/BE.

Burnout and mental health conditions were first dichotomized (0 = no, 1 = yes) based on established cut-offs described above. Crude prevalence rates were then estimated with 95% confidence intervals.

Comorbidity prevalence estimates were computed by categorizing participants scoring above the cut-off for a combination of the mental health conditions. A total of 16 categories were created, defined by positive scores for specific conditions and negative for others (e.g., above or below the cut-off scores).

Unadjusted associations of sociodemographic, workplace, and mental health variables with burnout were examined using univariable logistic regression. All categorical variables used the lowest numeric category as the reference unless otherwise specified. Variables associated with the outcome at $p < 0.20$ in the univariable logistic regression were considered for inclusion in the multivariable model to avoid excluding potentially important associations.

To account for potential non-independence of observations among participants within workplaces, we initially considered a multilevel logistic regression model with participants clustered within workplaces. However, highly unbalanced cluster sizes were identified (one workplace contributing a large proportion of participants and most workplaces contributing fewer than five participants), and the multilevel model variance was negligible. This suggested that there was no meaningful variability between clusters. As such, accounting for clustering did not improve the model and a standard logistic regression model was used. The multivariable logistic regression using complete case analysis and was performed using backward stepwise selection with a removal criterion of $p \geq 0.05$. Model performance was evaluated using the likelihood ratio (LR) χ^2 test and pseudo- R^2 values.

Multivariable logistic regression model specification and post-estimation diagnostics were evaluated to verify model fit and adherence to statistical assumptions. Model calibration and goodness-of-fit were evaluated using the Hosmer-Lemeshow test. Model discrimination and classification performance were evaluated using Receiver Operating Characteristic (ROC) analysis to calculate the area under the curve (AUC/c-statistic). Multicollinearity across independent variables was assessed through two approaches: post-estimation evaluation of parameter correlation matrices (VCE) following logistic regression and calculation of Variance Inflation Factors (VIF) and tolerance values ($1/\text{VIF}$) using linear regression diagnostics. Multicollinearity was defined as problematic if individual VIF values exceeded 5.0, tolerance values were <0.20 , or pairwise parameter correlations between distinct covariates exceeded $r > 0.70$ (Thompson et al., 2017). Model fit criteria were summarized using Akaike Information Criterion (AIC) and Bayesian Information Criterion (BIC) statistics.

Results

Sample Characteristics

Five hundred and eighty-eight nurses (n=588) participated in the study; most having heard about the study individually (59.5%). Table 2 shows study sample sociodemographic and workplace factors.

The mean age was 38.5 years, with a range from 20 to 73 years. Most nurses were female (81%), White/Caucasian (76%), and married or common-law (64%). Most were RNs (76%) and worked in direct patient care roles (69%). The average total years of nursing experience was 13.5 years with an average of 6.6 years of experience on the current nursing unit. Nearly half of nurses (45%) worked a regular daytime shift, with over a third working eight to less than 12 hours (38%) and another third working 12 hours or more (34%). Over half of nurses reported working 21-40 hours per week (66%) and three-quarters reported working overtime (74%).

One third of nurses (n=183, 31.1%) experienced physical violence with the source primarily from clients/patients (96.7%). Over half (54.8%) experienced bullying, with the majority experiencing bullying from clients/patients (73.3%); just under one third (29.2%) were bullied by coworkers/colleagues. Over half of the nurses reported being satisfied/very satisfied with their job (53%).

Mean scores for the PES-NWI were ≥ 2.5 for the subscales nursing foundations of quality care (2.7); nurse manager, leadership, and support of nurses (2.7); and collegial nurse-physician relations (3.0). Mean scores were <2.5 for the subscales nurse participation in hospital affairs (2.3) and staffing and resource adequacy (2.3).

Table 2

Descriptive Statistics for Sociodemographic Characteristics (n=588)

Sociodemographic Characteristics	Mean (SD)
Age	38.5 (12)

	n (%)
Age (Categorical)	
<24 years	44 (7.5)
25-35	221 (37.6)
36-46	135 (23.0)
47-57	82 (13.9)
58+	47 (8.0)
Missing	59 (10)
Sex	
Male	61 (10.4)
Female	478 (81.3)
I prefer not to answer	2 (0.3)
Missing	47 (8.0)
Race	
Indigenous	35 (6.0)
White/Caucasian	447 (76.0)
Other	59 (10.0)
Missing	47 (8.0)
Marital status	
Married or common-law	375 (63.8)
Divorced, separated, widowed	47 (8.0)
Never married/single	119 (20.2)
Missing	47 (8.0)
Workplace Factors	n (%)
Nursing Registration	
RN	444 (75.5)
PN	114 (19.4)
NP	30 (5.1)
Nursing Role	
Direct care nurse	407 (69.2)
Leadership, management, or education	93 (15.8)
Other (e.g., case manager, coordinator, research)	88 (15.0)
Years of Experience	Mean (SD)
Total years of experience	13.5 (11)
Years of experience on current unit	6.6 (7)
Work Schedule	n (%)
A regular daytime shift	267 (45.4)
A rotating shift	232 (39.5)
Other	89 (15.1)
Shift Length	
4 to less than 8-hour shift	140 (23.8)
8 to less than 12-hour shift	223 (37.9)
12 hours + shift	198 (33.7)
Variable	27 (4.6)
Hours per Week	

Between 0 and 20 hours per week	43 (7.3)
21-40 hours per week	389 (66.2)
More than 41 hours per week	156 (26.5)
Overtime	
No	154 (26.2)
Yes	434 (73.8)
Exposure to Physical Violence	
No	398 (67.7)
Yes	183 (31.1)
Missing	7 (1.2)
Source of Physical Violence Experienced (Select all that apply)	183
Coworkers/colleagues	5 (2.7)
Manager/supervisor	2 (1.1)
Client/patient	177 (96.7)
Other	4 (2.2)
Exposure to Bullying	
No	258 (43.9)
Yes	322 (54.8)
Missing	8 (1.4)
Source of Bullying Experienced (Select all that apply)	322
Coworkers/colleagues	94 (29.2)
Manager/supervisor	62 (19.3)
Subordinates	8 (2.5)
Client/patient	236 (73.3)
Other	13 (4)
Job Satisfaction	
Very dissatisfied/dissatisfied	129 (24.9)
Neither satisfied nor dissatisfied	146 (24.8)
Satisfied/very satisfied	313 (53.2)
Nursing Practice Environment	
Nurse Participation in Hospital Affairs	2.3 (0.7)
Nursing Foundations of Quality Care	2.7 (0.6)
Nurse Manager, Leadership, and Support of Nurses	2.7 (0.8)
Staffing and Resource Adequacy	2.3 (0.8)
Collegial Nurse-Physician Relations	3.0 (0.6)

RN: Registered Nurse; PN: Practical Nurse; NP: Nurse Practitioner

Psychometric Properties of Measures

The internal consistency of all measures were excellent: work-related burnout ($\alpha=.92$), anxiety ($\alpha=.92$), depression ($\alpha=.90$), PTSD ($\alpha=.96$), nurse participation in hospital affairs ($\alpha=.91$), nursing foundations of quality care ($\alpha=.82$), nurse manager, leadership, and support of

nurses ($\alpha=.89$), staffing and resource adequacy ($\alpha=.92$), and collegial nurse-physician relationships ($\alpha=.86$).

Prevalence of Burnout and Mental Health Conditions

The prevalence of burnout was 65.3%. The most prevalent mental health condition was depression (28.9%), followed by anxiety (26.5%) and PTSD (20.9%) (Table 3). Over half of participants (54.4%) disclosed having a diagnosis or any previous treatment of a mental health disorder.

Table 3

Prevalence of Burnout and Mental Health Conditions (n=588)

	n	Prevalence (%)	LCI	UCI
Burnout	384	65.3	61.4	69.0
Anxiety	156	26.5	23.1	30.2
Depression	170	28.9	25.4	32.7
PTSD	123	20.9	17.8	24.4
Previous diagnoses and/or treatment of mental health disorders	320	54.4	50.4	58.4

LCI: lower 95% confidence interval, UCI: upper 95% confidence interval, PTSD: posttraumatic stress disorder

Co-occurrence of Burnout and Mental Health Conditions

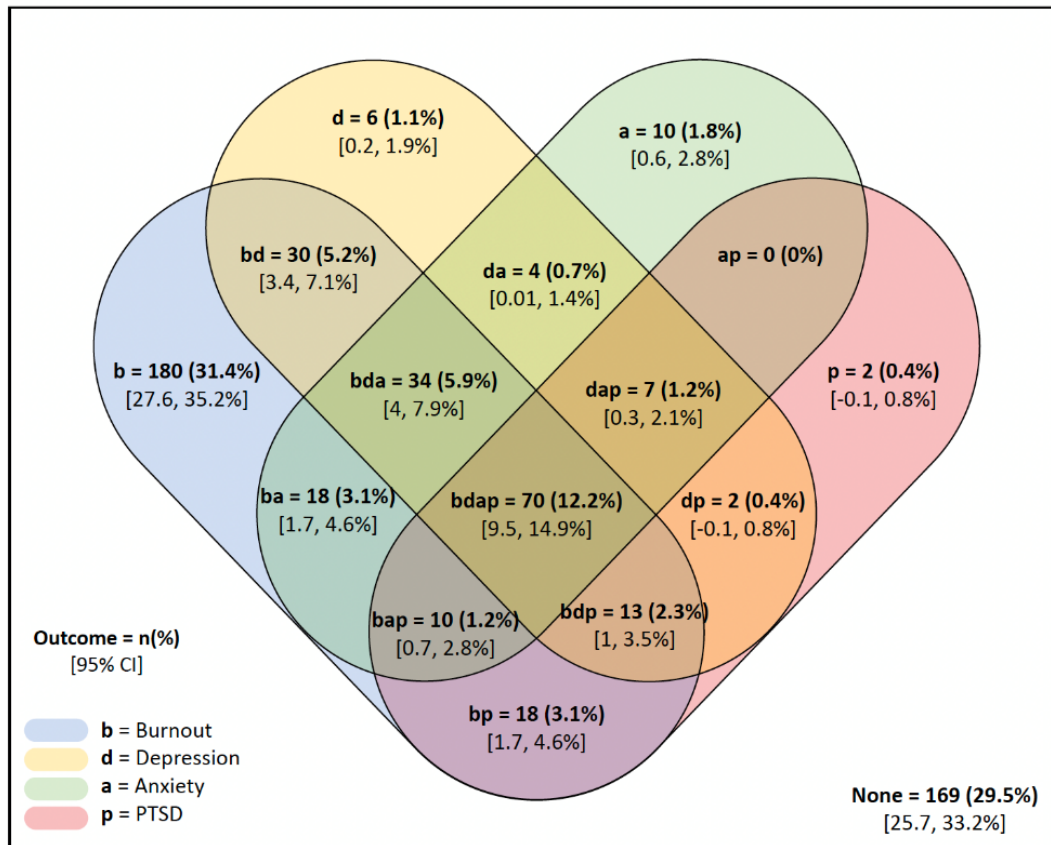
A total of 573 nurses were included in the co-morbidity analysis as they answered all burnout and mental health scales completely. Three hundred and seventy-three (n=373) nurses scored above the threshold for burnout. Of those 373 nurses, 180 (48%) nurses had burnout alone (no other scores above the cut-off for mental health conditions), whereas just over half had a combination of burnout and an additional mental health condition (e.g., anxiety, depression, or PTSD) (n=193, 52%).

Of the total sample (n=573), 70 participants (12.2%, 95% CI: .9-14.9%) scored above the cut-off for burnout and all mental health conditions (anxiety, depression, and PTSD), and 169

participants (29.5%, 95% CI: 25.7-33.2%) scored below the cut-off for burnout and all mental health conditions, indicating they were not experiencing burnout or mental health conditions. All combinations of comorbidity are presented in Figure 1 for the whole sample (n=573).

Figure 1

Four-set Venn Diagram Illustrating Comorbidity Among Mental Health Outcomes (n=573)



Workplace Factors and Mental Health Conditions Associated with Burnout

Table 4 presents the univariate logistic regression associations between burnout and various variables. Most variables were significant ($p < 0.20$) except for sex, race, and recruitment method.

Table 4

Univariable Associations between Burnout and Sociodemographic Characteristics and Workplace Factors

	Odds Ratio (95% CI)	p
Sociodemographic Characteristics		
Age (n=529)		
<24 years	1	
25-35	0.46 (0.2-1.04)	0.062
36-46	0.31 (0.14-0.73)	0.007
47-57	0.41 (0.17-0.99)	0.047
58+	0.21 (0.08-0.55)	0.002
Sex (n=541)		
Male	1	
Female	1.38 (0.8-2.38)	0.240
I prefer not to answer	0.74 (0.04-12.4)	0.836
Race (n=541)		
White/Caucasian	1	
Indigenous	1.06 (0.51-2.18)	0.878
Other	0.86 (0.49-1.5)	0.608
Marital Status (n=541)		
Married or common-law	1	
Widowed, divorced or separated	0.84 (0.46-1.56)	0.582
Never married/single	1.85 (1.16-2.94)	0.009
Recruitment method		
Employer sign-up	1	
Individual sign-up	1.28 (0.91-1.81)	0.158
Workplace Factors		
Nursing Registration (n=588)		
RN	1	
PN	1.26 (0.81-1.98)	0.306
NP	0.26 (0.12-0.56)	0.001
Nursing Role (n=500)		
Direct Care	1	
Leadership, management, or education	0.69 (0.44-1.1)	0.123
Other	0.76 (0.47-1.23)	0.265
Nursing Years		
Total years of nursing experience (n=582)	0.97 (0.96-0.99)	0.001
Total years of nursing experience on current unit (n=580)	1.01 (0.98-1.03)	0.488
Work Schedule (n=588)		
A regular daytime shift	1	
A rotating shift	2.68 (1.83-3.95)	0.000
Other	2.19 (1.3-3.68)	0.003
Shift Length (n=588)		
4 to less than 8-hours	1	

8 to less than 12-hours	1.43 (0.93-2.2)	0.099
12-hour shift or more	3.03 (1.89-4.86)	0.000
Variable	1.26 (0.55-2.9)	0.587
Work Hours (n=588)		
0-20 hours per week	1	
21 to 40 hours per week	1.06 (0.56-2.03)	0.849
More than 41 hours per week	1.96 (0.86-3.99)	0.063
Overtime (n=588)		
No	1	
Yes	2.01 (1.38-2.93)	0.000
Exposure to Physical Violence (n=581)		
No	1	
Yes	4.58 (2.9-7.21)	0.000
Exposure to Bullying (n=580)		
No	1	
Yes	3.14 (2.2-4.47)	0.000
Job Satisfaction (n=588)		
Very dissatisfied/dissatisfied	1	
Neither satisfied nor dissatisfied	0.59 (0.27-1.28)	0.180
Satisfied/very satisfied	0.08 (0.04-0.15)	0.000
Nursing Practice Environment		
Nurse Participation in Hospital Affairs (n=557)	0.48 (0.37-0.63)	0.000
Nursing Foundations of Quality Care (n=558)	0.41 (0.29-0.59)	0.000
Nurse Manager, Leadership, and Support of Nurses (n=546)	0.45 (0.35-0.58)	0.000
Staffing and Resource Adequacy (n=546)	0.35 (0.27-0.46)	0.000
Collegial Nurse-Physician Relations (n=546)	0.56 (0.41-0.75)	0.000
Mental Health		
Anxiety (n=586)		
No	1	
Yes	4.7 (2.87-7.76)	0.000
Depression (n=585)		
No	1	
Yes	6.33 (3.78-10.59)	0.000
PTSD (n=578)		
No	1	
Yes	7.37 (3.86-14.06)	0.000
Previous history of diagnosis/treatment of mental health condition (n=588)		
No	1	
Yes	2.01 (1.43-2.84)	0.000

PTSD: posttraumatic stress disorder; RN: Registered Nurse; PN: Practical Nurse; NP: Nurse Practitioner

The final multivariable logistic regression model ($n = 473$) retained seven variables and demonstrated good explanatory power ($\text{LR } \chi^2(7) = -191.6$, $p < 0.001$; Pseudo $R^2 = 0.3158$), indicating that the retained variables explained approximately 32% of the variability in burnout status (Table 5).

Post-estimation diagnostics confirmed that the final multivariable cross-sectional logistic regression model ($n=425$, $\text{LR } \chi^2(7)=102.67$, $p<0.001$, Pseudo $R^2=0.1874$) satisfied all key statistical assumptions. Variance Inflation Factor diagnostics indicated an absence of problematic multicollinearity across independent variables, with an overall mean VIF of 2.43 and individual VIF values remaining low to moderate (ranging from 1.12 to 5.47 [age], with tolerances >0.18). Post-estimation parameter correlation matrices confirmed weak correlations across retained covariates, with all pairwise correlations remaining well below threshold levels ($|r| \leq 0.432$). The Hosmer-Lemeshow goodness-of-fit test demonstrated good model calibration ($\chi^2(8)=12.22$, $p=0.1415$). Because $p>0.05$, the test failed to reject the null hypothesis, confirming no statistically significant discrepancy between observed and expected frequencies across risk strata. Receiver Operating Characteristic curve analysis demonstrated excellent discrimination and classification capability, yielding an AUC of 0.8697 (c-statistic =0.870). Model fit criteria established baseline information statistics, with an AIC of 464.03 and a BIC of 601.29. As such, the model diagnostics suggest that the final multivariable model is statistically sound and free from problematic multicollinearity. Furthermore, the excellent goodness-of-fit ($p=0.1415$), high classification accuracy ($\text{AUC}=0.870$), and strong explanatory power (Pseudo $R^2=0.3158$) demonstrate that these findings provide a reliable foundation for understanding the key workplace and mental health conditions associated with nurse burnout.

Table 5

Multivariable Logistic Regression Model of Workplace Factors and Mental Health

Conditions Associated with Burnout (n=473)

	Odds Ratio	p
Mental Health		
Depression		
No	1	
Yes	3.46 (1.61-7.44)	0.001
PTSD		
No	1	
Yes	3.11 (1.1-8.87)	0.033
Workplace Factors		
Exposure to Physical Violence		
No	1	
Yes	2 (1.09-3.66)	0.024
Job Satisfaction		
Very Dissatisfied/Dissatisfied	1	
Satisfied/Very Satisfied	0.19 (0.11-0.33)	0.000
Shift Length		
4 to less than 8-hours	1	
12-hour shift or more	1.89 (1.1-3.27)	0.022
Nursing Practice Environment		
Staffing and Resource Adequacy	0.52 (0.37-0.72)	0.000
Nursing Registration		
RN	1	
NP	0.25 (0.07-0.89)	0.032

PTSD: posttraumatic stress disorder; RN: Registered Nurse; NP: Nurse Practitioner

Discussion

This cross-sectional study was conducted within NWO among a sample of nurses to 1) estimate the prevalence of burnout and mental health conditions, 2) evaluate the co-occurrence of burnout and mental health conditions, and 3) determine workplace factors and mental health conditions associated with burnout. Our findings suggest that the prevalence of burnout, mental health conditions (anxiety, depression, PTSD), and co-morbidity of burnout and mental health conditions among nurses across NWO is high. Further, our multivariable model identified that nurse's burnout is strongly associated with both mental health conditions and workplace factors. Our findings provide an important contribution to the existing literature as they shift the

discourse on burnout from primarily a work-related phenomenon to burnout being related to both workplace factors and mental health. Additionally, identification of the salient variables associated with burnout in our study may help guide intervention development. For example, interventions that enhance job satisfaction, address depression and PTSD, improve staffing, reduce exposure to workplace violence from patients/clients, and limit working longer than 12-hours may be effective in mitigating burnout.

The prevalence of burnout among nurses (65.3%) was more than double the 30% global prevalence and the 38% North American prevalence reported in Ge et al.'s (2023) systematic review. Similarly, it is significantly higher than the pan-Canadian study that found 29.3% of nurses experienced clinical levels of burnout and 63.2% had some symptoms of burnout (Stelnicki et al., 2021). Some of this may be explained by the difficulties that continue to be experienced in the healthcare system post-COVID-19 pandemic, and by the unique challenges that exist in delivering care to people in NWO – a large area with an extremely low population density (Health Quality Ontario, 2017).

The high prevalence of mental health conditions among our sample for depression (28.9%), anxiety (26.5%), and PTSD (20.9%) is also concerning. Although these estimates are similar to those among Canadian nurses (Stelnicki and Carleton, 2021), they are significantly higher than the general Canadian population, with a 12-month prevalence of 7.6% for depression and 5.2% for anxiety (Statistics Canada, 2022) and 7.7% receiving a diagnosis of PTSD within their lifetime (Government of Canada, 2024). Understanding and addressing burnout and mental health is critical as these outcomes may be modifiable through organizational and policy-level interventions. High rates of burnout and mental health conditions among nurses also threaten the sustainability of the nursing workforce as nurses are more likely to leave the profession (Buckley

et al., 2025). This is noteworthy as within the Canadian context, a projected shortage of 117,600 nurses by 2030 is estimated (Scheffler & Arnold, 2018), with nursing shortages in Ontario recognized to be higher than the rest of Canada (Registered Nurses Association of Ontario [RNAO], 2021).

We found that among nurses with burnout, approximately half screened positive for a co-occurring mental health condition. Alarming, 12% of nurses scored positive for burnout, depression, anxiety and PTSD. The literature regarding the relationship between burnout and mental health conditions among nurses is not well developed. In the general literature, correlations between burnout and depression and burnout and anxiety have been established (Koutsimani et al., 2019), while the relationship between burnout and PTSD is less understood. Significant debate exists within the literature regarding whether burnout and depression are distinct constructs due to the high correlation and overlapping symptomatology (Bianchi & Brisson, 2019; Bianchi et al., 2015). As half of our participants scored positive for burnout alone, our findings indicate that burnout and depression do not always co-occur and may be distinct entities. However, this may be attributable to the scale used and the emphasis on the workplace. Nonetheless, there may be a causal pathway between burnout and depression, but there is a lack of longitudinal evidence to substantiate the relationship (Koutsimani et al., 2019; Meredith et al., 2022). For example, one longitudinal study found a reciprocal relationship between burnout and depression where levels of burnout were found to predict increases over time in depression, while levels of depression were also found to predict increases over time in burnout (Toth-Kiraly et al., 2021). Future research should employ longitudinal designs to investigate this relationship further.

Our multivariable model findings align with the existing research regarding a relationship between burnout and work-related factors (e.g., staffing and resource adequacy, exposure to physical violence, extended shifts) (Dall’Ora et al., 2020; Meredith et al., 2022). These findings are consistent as burnout has historically been framed as a work-related phenomenon, rooted in job demands, control, and support (Karasek, 1979). Furthermore, the findings validate the saliency of specific modifiable workplace factors that are associated with burnout and highlight the need to advocate for staffing ratio policies and workplace safety from patient/client violence. Further, these findings highlight concerns about working 12-hour shifts or longer, which is currently commonplace in many hospital settings (Muir et al., 2025).

In our study, job satisfaction was the strongest protective factor with satisfied nurses having an 81% reduction in the odds of burnout compared to dissatisfied nurses. Nurses’ job satisfaction has been described as a product of internal (demographic and emotional variables) and external (work character and environmental variables) factors (Liu et al., 2016). As such, investments in various aspects of the nursing work environment are likely to improve job satisfaction and buffer against the development of burnout (Xue et al., 2024).

Overall, our findings expand the evidence from burnout being mainly about workplace conditions to burnout emerging at the intersection of workplace factors and mental health. We found a relationship between burnout and mental health conditions, as those with burnout were more than three times as likely to have depression or PTSD. Thus, while organizational factors remain critical, the strength of the associations with depression and PTSD suggests that burnout prevention strategies confined to the workplace may not be sufficient. Broader mental health-oriented strategies will therefore need to be considered.

Strengths and Limitations

Strengths of this study include the large sample size inclusive of all registration classes of nurses (RN, PN, and NP), working in various practice settings, and with a range of experience. Further, the use of validated tools with high internal consistency adds to the methodological rigor of the study. We found a low likelihood of selection bias as our bivariable analysis determined that recruitment method was not associated with our outcome of burnout. However, our study is not without limitations. The cross-sectional design only captures a point in time of nurses' burnout, mental health conditions, and the nursing practice environment. As such, we are unable to evaluate how these outcomes may fluctuate over time. We were also unable to determine the temporality of the relationship between burnout and various sociodemographic, individual, and workplace characteristics. While our mental health measures have demonstrated good reliability and validity, it should be noted that no diagnostic interviews were conducted to confirm mental illness. Nonetheless, this study has established a high prevalence rate of burnout and mental health conditions among our sample, the co-occurrence of these conditions, and an understanding of salient variables associated with burnout. Future research should continue to investigate these relationships using a longitudinal design and ensure variables beyond the nursing practice environment (e.g., mental health) are included in analyses. Finally, the generalizability of our findings may be limited as NWO is a unique geographical location and may not share similarities with other larger urban locations across Canada or globally.

Conclusion

Our study identified a high prevalence of burnout and co-morbid mental health conditions affecting nurses in NWO. Our multivariable regression modeling identified salient factors associated with burnout, including mental health (depression and PTSD) and workplace factors (exposure to workplace violence, job satisfaction, 12-hour shifts or more, staffing and resource

adequacy, nursing registration). These findings highlight that while burnout is a work-related phenomenon, individual factors (e.g., mental health) may also play a role in its occurrence among nurses. As such, there is an urgent need to address the high rates of burnout and mental health conditions among nurses in order to mitigate negative outcomes for nurses, patients and the health care system. Strengthening the evidence in this field is also crucial for enhancing support for nurses and fostering healthier workplaces.

References

- Bianchi, R., & Brisson, R. (2019). Burnout and depression: Causal attributions and construct overlap. *Journal of Health Psychology, 24*(11), 1574-1580.
<https://doi.org/10.1177/1359105317740415>
- Bianchi, R., Schonfeld, I., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, 28-41. <http://dx.doi.org/10.1016/j.cpr.2015.01.004>
- Blevins, C., Weathers, F., Davis, M., Witte, T., & Domino, J. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress, 28*, 489-498. <https://doi.org/10.1002/jts.22059>
- Borritz, M., Rugulies, R., Christensen, K., Villadsen, E., & Kristensen, T. (2006). Burnout as a predictor of self-reported sickness absence among human service workers: prospective findings from three year follow up of the PUMA study. *Occupational and Environmental Medicine, 63*, 98-106. <https://doi.org/10.1136/oem.2004.019364>
- Buckley, L., McGillis Hall, L., Price, S., Visekruna, S., & McTavish, C. (2025). Nurse retention in peri- and post-COVID-19 work environments: A scoping review of factors, strategies and interventions, *BMJ Open, 15*, e096333. <https://doi.org/10.1136/bmjopen-2024-096333>
- Canadas-De la Fuente, G., Ortega, E., Ramirez-Baena, L., De la Fuente-Solana, E., Vargas, C., & Gomez-Urquiza, J. (2018). Gender, marital status, and children as risk factors for burnout in nurses: A meta-analytic study. *International Journal of Environmental Research Public Health, 15*(10), 2102. <https://doi.org/10.3390/ijerph15102102>
- Chen, C., & Meier, S. (2021). Burnout and depression in nurses: A systematic review and meta

- analysis. *International Journal of Nursing Studies*, 124, 104099.
<https://doi.org/10.1016/j.ijnurstu.2021.104099>
- Dall’Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, 18(41), 1-17. <https://doi.org/10.1186/s12960-020-00469-9>
- de la Torre, J. A., Vilagut, G., Ronaldson, A., Valderas, J. M., Bakolis, I., Dregan, A., Molina, A. J., Navarro-Mateu, F., Perez, K., Bartoll-Roca, X., Elices, M., Perez-Sola, V., Serrano-Blanco, A., Martin, V., & Alonso, J. (2023). Reliability and cross-country equivalence of the 8-item version of the Patient Health Questionnaire (PHQ-8) for the assessment of depression: Results from 27 countries in Europe. *The Lancet Regional Health – Europe*, 31, 100659. <https://doi.org/10.1016/j.lanepe.2023.100668>
- Dobson, M., Schnall, P., Pouran, F., & Landsbergis, P. (2023). The Healthy Work Survey: A standardized questionnaire for the assessment of workplace psychosocial hazards and work organization in the United States. *Journal of Occupational and Environmental Medicine*, 65(5), 330-345. <https://doi.org/10.1097/jom.0000000000002820>
- Filip, R., Puscaselu, R., Anchidin-Norocel, L., Dimian, M., & Savage, W. (2022). Global challenges to public health care systems during the COVID-19 pandemic: A review of pandemic measures and problems. *Journal of Personalized Medicine*, 12, 1295.
<https://doi.org/10.3390/jpm12081295>
- Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing*, 32(17-18).
<https://doi.org/10.1111/jocn.16708>

- Getie, A., Ayenew, T., Amlak, B., Gedfew, M., Edmealem, A., & Kebede, W. (2025). Global prevalence and contributing factors of nurse burnout: An umbrella review of systematic review and meta-analysis. *BMC Nursing*, 24, 296. <https://doi.org/10.1186/s12912-025-03266-8>
- Government of Canada. (2024). Posttraumatic stress disorder among adults in Canada: Results from the survey on mental health and stressful events. <https://health-infobase.canada.ca/ptsd-survey/>
- Hammarstrom, P., Rosendahl, S., Gruber, M., & Nordin, S. (2023). Somatic symptoms in burnout in a general adult population. *Journal of Psychosomatic Research*, 168, 111217. <https://doi.org/10.1016/j.jpsychores.2023.111217>
- Health Quality Ontario. (2017). *Health in the North*. <https://healthinthenorth.hqontario.ca>
- Karasek, R. (1979). Job demand, job decision latitude, and mental strain: implications for job redesign. *Administrative Science Quarterly*, 24(2), 285–308. <https://doi.org/10.2307/2392498>
- Khammissa, R., Nemutandani, S., Feller, G., Lemmer, J., & Feller, L. (2022). Burnout phenomenon: Neurophysiological factors, clinical features, and aspects of management. *Journal of International Medical Research*, 50(9), 1-13. <https://doi.org/10.1177/03000605221106428>
- Koutsimani, P., Montgomery, A., & Georganta, K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology*, 10, 284. <https://doi.org/10.3389/fpsyg.2019.00284>
- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen

- Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>
- Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals*, 32(9), 509-515. <https://psycnet.apa.org/doi/10.3928/0048-5713-20020901-06>
- Kroenke, K., Spitzer, R. L., Williams, J. B. W. (2001). The PHQ-9. Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606-613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- Kroenke, K., Strine, T. W., Spitzer, R. L., Williams, J. B. W., Berry, J. T., & Mokdad, A. H. (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1-3), 163-173. <https://doi.org/10.1016/j.jad.2008.06.026>
- Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., & Löwe, B. (2007). Anxiety disorders in primary care: Prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, 146(5), 317-325. <https://doi.org/10.7326/0003-4819-146-5-200703060-00004>
- Lake, E.T. (2002). Development of the practice environment scale of the nursing work index. *Res Nurse Health*, 25(3), 176-188. <https://doi.org/10.1002/nur.10032>
- Lake, E.T., Sanders, J., Duan, R., Riman, K., Schoenauer, K., & Chen, Y. (2019). A meta-analysis of the associations between the nurse work environment in hospitals and 4 sets of outcomes. *Med Care*, 57(5), 353-361. <https://doi.org/10.1097%2FMLR.0000000000001109>
- Liu, Y., Aungsuroch, Y., & Yunibhand, J. (2016). Job satisfaction in nursing: A concept analysis study. *International Nursing Review*, 63, 84-91. <https://doi.org/10.1111/inr.12215>

- Lopez-Lopez, I., Gomez-Urquiza, J., Canadas, G., De la Fuente, E. I., Albendin-Garcia, L., & Canadas-De la Fuente, G. A. (2019). Prevalence of burnout in mental health nurses and related factors: A systematic review and meta-analysis. *International Journal of Mental Health Nursing*, 28, 1035-1044. <https://doi.org/10.1111/inm.12606>
- Maslach, C., Schaufeli, W.B., & Leiter, M.P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397-422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- Meredith, L., Bouskill, K., Chang, J., Larkin, J., Motala, A., & Hempel, S. (2022). Predictors of burnout among US healthcare providers: A systematic review. *BMJ Open*, 12, e054243. <https://doi.org/10.1136/bmjopen-2021-054243>
- Muir, K.J., Sliwinski, J., Pogue, C., Golinelli, D., Petto, A., Lasater, J., & McHugh, M. (2025). Lower burnout among hospital nurses in California attributed to better nurse staffing ratios. *Policy, Politics, and Nursing Practice*, 26(3), 219-226. <https://doi.org/10.1177/15271544251317506>
- Northwest Local Health Integration Network (NWLHIN). (2018). *2017/18 NW LHIN Annual Report*. <https://www.healthcareathome.ca/document/2017-18-nw-lhin-annual-report/>
- Ochnik, D., Rogowska, A. M., Benatov, J., & Arzenšek, A. (2022). Adaptation and preliminary validation of the Fear of Coronavirus Vaccination Scale in the prospective study among a representative sample of Polish, Israeli, Slovenian, and German adults during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19, 11587. <https://doi.org/10.3390/ijerph191811587>
- Ontario Health. (2023). *North West Region*. <https://www.ontariohealth.ca/about-us/our-programs/ontario-health-regions/north-west-region>
- Qtait, M., Ali, M., & Jaradat, Y. (2025). The impact of rotating shift work on nurse burnout: A

- systematic review of contributing factors and organizational strategies. *SAGE Open Nursing*, 11, 1-9. <https://doi.org/10.1177/23779608251374232>
- Qualtrics. (2025). *Qualtrics XM* [Computer software]. <https://www.qualtrics.com>
- Ramirez-Elvira, S., Romero-Bejar, J., Suleiman-Martos, N., Gomez-Urquiza, J., Monsalve Reyes, C., Canadas-De la Fuente, G., & Albendin-Garcia, L. (2021). Prevalence, risk factors and burnout levels in Intensive Care Unit nurses: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 18, 11432. <https://doi.org/10.3390/ijerph182111432>
- Registered Nurses' Association of Ontario (RNAO). (2021). *Ontario's RN understaffing crisis: Impact and solution*. <https://rnao.ca/sites/default/files/202111/Ontarios%20RN%20understaffing%20Crisis%20Impact%20and%20Solution%20PAB%202021.pdf>
- Scheffler, R. M., & Arnold, D. R. (2018). Projecting shortages and surpluses of doctors and nurses in the OECD: What looms ahead. *Health Economics, Policy and Law*, 14(2), 274–290. <https://doi.org/10.1017/s174413311700055x>
- Schlak, A., Aiken, L., Chittamns, J., Poghosyan, L., & McHugh, M. (2021). Leveraging the work environment to minimize the negative impact of nurse burnout on patient outcomes. *International Journal of Environmental Research and Public Health*, 18, 610. <https://doi.org/10.3390/ijerph18020610>
- Shin, C., Lee, S-H., Han, K-M., Yoon, H-K., & Han, C. (2019). Comparison of the usefulness of the PHQ-8 and PHQ-9 for screening for Major Depressive Disorder: Analysis of psychiatric outpatient data. *Psychiatry Investigation*, 16(4), 300-305. <https://doi.org/10.30773%2Fpi.2019.02.01>

- Singh, S., Poon, D., Alvarez, E., Anderson, L., Verschor, C., Sutton, A., Zendo, Z., Piggott, T., Apatu, E., Churipuy, D., Culbert, I., & Hopkins, J. (2024). Burnout among public health workers in Canada: A cross-sectional study. *BMC Public Health*, 24(48), <https://doi.org/10.1186/s12889-023-17572-w>
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Lowë, B. (2006). A brief measure for assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092-1097. <https://doi.org/10.1001/archinte.166.10.1092>
- Statistics Canada. (2022). Mental disorders in Canada. <https://www150.statcan.gc.ca/n1/pub/11-627-m/11-627-m2023053-eng.htm>
- Stelnicki, A., & Carleton, R.N. (2021). Mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 264-276. <https://doi.org/10.1177/0844562120961894>
- Stelnicki, A., Jamshidi, L., Angehrn, A., Hadjistavropoulos, H., & Carleton, R.N. (2021). Associations between burnout and mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 254-263. <https://doi.org/10.1177/0844562120974194>
- Swiger, P., Patrician, P., Miltner, R., Raju, D., Breckenridge-Sproat, S., & Loan, L. (2017). The Practice Environment Scale of the Nursing Work Index: An updated review and recommendations for use. *International Journal of Nursing Studies*, 74, 76-84. <http://dx.doi.org/10.1016/j.ijnurstu.2017.06.003>
- Thompson, C., Kim, R., Aloe, A., & Becker, B. (2017). Extracting the Variance Inflation Factor and other multicollinearity diagnostics from typical regression results. *Basic and Applied Social Psychology*, 39(2), 81-90. <https://doi.org/10.1080/01973533.2016.1277529>

- Toth-Kiraly, I., Morin, A., & Salmela-Aro, K. (2021). Reciprocal associations between burnout and depression: An 8-year longitudinal study. *Applied Psychology: An International Review*, 70(4), 1691-1727. <https://doi.org/10.1111/apps.12295>
- Warshawsky, N. & Havens, D. (2011). Global use of the Practice Environment Scale of the Nursing Work Index. *Nursing Research*, 60(1), 17-31. <https://doi.org/10.1097/nnr.0b013e3181ffa79c>
- Weathers, F., Litz, B., Keane, T., Palmieri, P., Marx, B., & Schnurr, P. (2013). *The PTSD Checklist for DSM-5 (PCL-5)*. <https://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp>
- Wei, H., Sewell, K., Woody, G., & Rose, M.A. (2018). The state of the science of nurse work environments in the United States: A systematic review. *International Journal of Nursing Sciences*, 5, 287-300. <https://doi.org/10.1016/j.ijnss.2018.04.010>
- Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>
- World Health Organization (WHO) (2019). *Burn-out an “occupational phenomenon”*: *International Classification of Diseases*. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>
- Xue, B., Feng, Y., Hu, Z., Chen, Y., Chao, Y., Li, X., Yang, Y., Zhang, J., Zhang, Y., & Luo, H. (2024). Assessing the mediation pathways: How decent work affects turnover intention through job satisfaction and burnout in nursing. *International Nursing Review*, 71, 860-867. <https://doi.org/10.1111/inr.12939>

Chapter 6: Exploring the Incidence and Course of Burnout among a Cohort of Nurses in Northwestern Ontario

Abstract

Background. Burnout is a widely recognized occupational syndrome, known to have profound negative effects on nurses, patient care quality and the health care system. While burnout is theorized to develop gradually, there is a significant gap in knowledge from longitudinal studies regarding the incidence of burnout among nurses and how it evolves over time. Thus, this study estimates the incidence and course of burnout and determines factors influencing burnout over time.

Methods. Nurses (n=588) from Northwestern Ontario were recruited and followed as part of a prospective longitudinal cohort study; n=361 completed the follow-up survey. Burnout was measured using the 7-item work-related dimension of the Copenhagen Burnout Inventory. Independent variables included mental health (e.g., anxiety, depression, PTSD), nursing practice environment, and workplace factors. Incidence proportion and incidence density were calculated for four groups: incident, resilient, resolved, and persistent and stratified by years of experience and mental health conditions. A mixed-effects linear regression model was used to identify factors associated with burnout over time.

Results. We found a high incidence proportion of burnout (33.8% new cases) and a high persistence rate of 86.8% at follow-up for those affected at baseline. Nurses with persistent burnout had considerably higher rates of mental health conditions when compared to the nurses who were resilient. Nurses with less than five years of experience were also more than twice as likely to develop new-onset burnout (incidence rate ratio: 2.33, 95% CI: 1.15–5.11) compared to more experienced nurses. Workplace demands (working rotating shifts and working more than

41 hours a week), mental health conditions (anxiety, depression, PTSD) and the nursing practice environment subscale nurse foundations of quality care were associated with increased burnout. Higher scores on the nursing practice environment subscales, nurse participation in hospital affairs, nurse leadership/support, and staffing/resource adequacy were protective factors.

Conclusion. Burnout among many nurses was consistent between time 1 and time 2. The high incidence of burnout and the proportion affecting early-career nurses is concerning and has important implications for workforce sustainability. Findings from this study highlight the need for organizational changes that target staffing adequacy, shift structures and leadership support. Additionally, strategies to address nurses' mental health are also needed to mitigate the high rate of persistent burnout.

Keywords: burnout, mental health, nurses, workplace factors, incidence

Introduction

Prolonged exposure to stressful and adverse working conditions threatens nurses' health and well-being, workforce sustainability, and patient satisfaction and care quality (Dall'Ora et al., 2020; Jun et al., 2021). Chronic stress in the workplace typically culminates in burnout, a globally recognized occupational phenomenon (World Health Organization [WHO], 2019). While burnout is variously defined across the literature (Kristensen et al., 2005; Maslach & Jackson, 1981; Schaufeli & Enzmann, 1998), most frameworks identify a state of profound psychological exhaustion as the core component (Canu et al., 2020). Psychological exhaustion can lead to physical exhaustion (WHO, 2019), feelings of helplessness, hopelessness and powerlessness (Bianchi et al., 2015), cynical detachment (Gustavsson et al., 2010), and a diminished sense of personal accomplishment (Maslach & Jackson, 1981).

Two systematic reviews identified a high prevalence of nurse burnout globally, ranging from 11.23% for high-symptom burnout (Woo et al., 2019) to 30% across all severity levels (Ge et al., 2023). In Canada, burnout increased during the COVID-19 pandemic, with up to 94% of nurses reporting symptoms of burnout and 75.3% meeting diagnostic cut-offs (Ahmed & Bourgeault, 2022; Registered Nurses Association of Ontario [RNAO], 2022). Burnout remains elevated since the pandemic, with 78.7% of public health workers, including nurses meeting the cut-off scores (Singh et al., 2024).

Studies on the epidemiology of burnout are scarce (Penz et al., 2018). While it is theorized to develop gradually from chronic stress in the workplace (Leclercq & Hansez, 2024), no longitudinal studies have calculated the incidence of burnout among nurses and very few have described how burnout changes over time (Adriaenssens et al., 2015; Boamah et al., 2017; Fida et al., 2018). Further, in the broader research (beyond nursing), a systematic review and meta-

analysis of predictors of burnout (n=65 studies) identified that none of the included studies separated those with burnout from those who did not have burnout (Shoman et al., 2022).

Therefore, the researchers were unable to capture the onset, incidence, and latency of burnout.

Two longitudinal studies were found that evaluated burnout among medical professionals (e.g., doctors, residents, trainees). One of these studies found that the incidence of burnout was 55.9% among Australian interns (n=180) during the 12-month study period, peaking at 6 months (Parr et al., 2016). The second study, on pediatric residents (n=33), found that the cohort became burned out, stressed, fatigued, less socially connected, and less resilient within 6 months of starting residency (Koressel et al., 2022). Sixty-five percent or more of the residents met the criteria for emotional exhaustion and moderate stress at every 6-month follow-up for their 3-year residency. As the scope of practice and level of responsibility differs between nurses, physicians, and residents, generalization of the findings to nurses is not possible.

Numerous factors have been associated with burnout. High job demands in the nursing practice environment are the most consistently identified drivers of burnout, and often include staffing inadequacies, high acuity of patient care, long working shifts, overtime, insufficient resources, lack of support, poor leadership, and lack of autonomy (Dall'Ora et al., 2020; Galanis et al., 2021; Shah et al., 2021). While workplace factors have been a primary focus, individual factors can also influence how people perceive their work environment and how they manage to cope with workplace demands (Edu-Valsania et al., 2022). For example, newer nurses with less experience may be more vulnerable to burnout given the stress of mastering a new role while also having high job demands (Casey et al., 2004; Laschinger & Grau, 2012). Further, mental health issues may lower a nurse's threshold for coping with high job demands (Toth-Kiraly et al.,

2021). However, much of the existing evidence is from cross-sectional studies, which limits the ability to determine causality.

The lack of longitudinal research on burnout represents a significant gap in the nursing literature. Thus, the purpose of this study was to 1) estimate the incidence and longitudinal course of burnout among nurses, 2) stratify the incidence and longitudinal course of burnout by years of experience and presence of mental health conditions, and 3) identify which workplace factors and mental health conditions are associated with burnout over time.

Methods

Study Design

A prospective longitudinal design was used to evaluate the study objectives among nurses working in Northwestern Ontario (NWO). This study was embedded within a larger cohort study conducted by the Enhancing the Prevention of Injury and Disability at Work (EPID@Work) Research Institute, known as the Northwestern Ontario Workplace and Worker Health Study (NOWWHS) at Lakehead University. Research ethics board (REB) approval was obtained from Lakehead University Research Ethics Board (#1469951).

Setting

The NWO region was defined as extending from Hudson Bay in the north to the United States border in the south, and from the Manitoba border in the west, to just short of White River in the east (Northwest Local Health Integration Network [NWLHIN], 2018). This region covers 47% of Ontario's land mass and a population density of just 0.4 people per square kilometer (NWLHIN, 2018). Almost half (45%) of the population is concentrated in one urban centre (Thunder Bay), with 34.2% of the population residing in rural areas, providing an opportunity to recruit nurses from diverse practice locations.

Relevant Dates

The NOWWHS is an open and ongoing study allowing participants to sign up and complete their baseline survey at any time. Follow-up surveys are sent at 6-month intervals from the time of the baseline survey. There was a delay in the first follow-up survey being sent out which led to varying lengths of time when the first follow-up survey was administered. For this study and analysis, baseline surveys (T1) were collected from September 2023 to September 2025. Follow-up surveys (T2) were collected from August 2024 to September 2025.

Sampling Approach

A multi-pronged sampling approach was used to recruit nurses into NOWWHS. First, a convenience sampling strategy was employed, with nurses recruited via social media and posters across relevant settings. Additionally, mailing address and e-mail addresses were obtained from the College of Nurses (CNO) and nurses who have agreed to participate in research through their governing body, were notified of the study. After hearing about the study, nurses could go to the study website, consent, and take the survey. Alternatively, nurses may have learned about the study from their employer. Employers could 1) volunteer their organization to participate in the survey or 2) be randomly selected from a list of workplaces within NWO. Once an employer agreed to participate, a project coordinator obtained consent and arranged for the study team to collect data from all nurses within the organization. Most workplace representatives opted to distribute a survey link to all employees within their organization.

Participants

To be included in the current study, nurses must have identified being 1) currently licensed with the College of Nurses of Ontario (CNO) as a Registered Nurse (RN), a Practical Nurse (PN), or a Nurse Practitioner (NP); 2) currently employed by an organization located in

NWO; and 3) able to complete the online survey in English. Nurses in all practice areas and roles were eligible to participate.

Survey

All surveys were hosted in Qualtrics (Qualtrics XM, 2025). After accessing the survey link, participants could read the information letter and complete the informed consent. Identifying information was collected at this stage for future contact, completion of incomplete surveys, and sending follow-up surveys. Once the participant consented, they were directed to a separate survey for the questionnaire which ensured that any intercepted information would be nonidentifiable. As an additional precaution, Qualtrics encrypted the data upon entry.

Research assistants were responsible for checking the database for incomplete and missing surveys. If a survey was incomplete, a retake link was sent to the email address provided in the informed consent. One week later, if the survey remained incomplete, the research assistant would send an additional email and call the respondent to prompt them to check their inbox and spam/junk folder. Following this, three additional attempts were made to reach the participant until the survey was completed or the participant declined to participate and was coded as lost to follow-up.

To keep participants engaged in the study, EPID@Work offered various incentives, including online bingo for participants who had completed a baseline survey, random cash draw incentives, and a dashboard showing real-time aggregate preliminary results on the study website (www.workinghealth.ca). Additionally, EPID@Work provided a \$30 gift card through the Tango rewards system for every follow-up survey a participant completed. For nursing participants, a random cash draw was offered monthly from June to December 2024.

Instruments

Burnout. Burnout was measured using the 7-item work-related dimension of the *Copenhagen Burnout Inventory (CBI)* (Kristensen et al., 2005). Items were scored using a five-point Likert scale ranging from 1 (*to a very low degree*) to 5 (*to a very high degree*) or 1 (*never/almost never*) to 5 (*always*). Items were re-coded into scores of 0 = almost never, never/to a very low degree, 25 = seldom/to a low degree, 50 = sometimes/somewhat, 75 = often/to a high degree, and 100 = always/to a very high degree. The mean score was computed, with higher scores indicating higher levels of burnout. A cut-off score of ≥ 50 indicated moderate/high burnout and scores < 50 indicated no/low burnout (Borritz et al., 2006). The CBI has demonstrated good psychometric properties among nurses (Montgomery et al., 2021).

Mental health. Validated screening tools were used to measure mental health. The *Generalized Anxiety Disorder 7-item scale (GAD-7)* has seven items measuring anxiety symptom severity and the extent to which individuals have been affected by symptoms in the prior 2 weeks using a 4-point Likert rating scale (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day) (Spitzer et al., 2006). Scores were calculated as a sum of item responses, with scores ranging from zero (minimum) to 21 (maximum). A cut-off score of ≥ 10 indicated moderate to severe anxiety (Spitzer et al., 2006). The GAD-7 has demonstrated excellent internal consistency (Cronbach's $\alpha = .89-.95$) (Lowe et al., 2008; Ochnik et al., 2022) and convergent validity in the general population (Lowe et al., 2008).

The *8-item Patient Health Questionnaire (PHQ-8)* measures the severity and extent to which individuals have been affected by symptoms of depression in the two weeks prior to screening using a 4-point Likert rating scale (0 = not at all, 1 = several days, 2 = more than half of the days, 3 = nearly every day). The PHQ-8 is an adapted version of the PHQ-9 that omits the ninth item inquiring about suicidal ideation and self-harm and is commonly used in studies

where researchers are unable to provide adequate intervention if required (Kroenke & Spitzer, 2002). Scores are calculated by summing item responses and can range from zero (minimum) to 24 (maximum) (Kroenke & Spitzer, 2002). A cut-off score of ≥ 10 indicates moderate to severe depression (de la Torre et al., 2023; Kroenke et al., 2009). The PHQ-8 has been validated as a measure of depressive symptoms cross-culturally (de la Torre et al., 2023), and in large population studies (Kroenke & Spitzer, 2002; Kroenke et al., 2009; McGuire et al., 2009).

The *Posttraumatic Stress Disorder Checklist (PCL)* (Blevins et al., 2015) is a 20-item self-rated measure that can be used as a measure of provisional posttraumatic stress disorder by summing the scores for each of the 20 items (range 0-80). We used a lower cut-point score (≥ 31) to maximize detection of possible cases (Weathers et al., 2013). It has high internal consistency (Cronbach's $\alpha=.94$), good test-retest ability ($r=0.82$), and good convergent, discriminant, and structural validity (Blevins et al., 2015).

We also asked if participants had been diagnosed or received treatment for 11 mental health disorders (e.g., depression, anxiety) using a dichotomized response (yes/no).

Nursing practice environment. The *Practice Environment Scale of the Nursing Work Index (PES-NWI)* is comprised of organizational traits that support or undermine professional nursing practice (Lake, 2002). There are 31-items and five subscales. The first subscale, *nurse participation in hospital affairs* (9 items), evaluates nurses' involvement in internal governance, policy decisions, committees, and opportunities for advancement (e.g., career development). The second subscale, *nursing foundations of quality care* (10 items), focuses on the provision of high-quality patient care. This includes the use of nursing diagnoses, a quality assurance programs, preceptorship programs for newly hired nurses, patient continuity of care, and an active service education programs for nurses. Next, the subscale *nurse manager, leadership, and*

support of nurses (5 items), focuses on the role and qualities of the nurse manager. The fourth subscale, *staffing and resource adequacy* (4 items), evaluates sufficiency of staff and resources in order to provide quality care. The final subscale, *collegial nurse-physician relations* (3 items), assesses the working relationship between nurses and physicians (Lake, 2002).

A 4-point Likert scale, ranging from 1 (strongly disagree) to 4 (strongly agree) was used with higher mean scores indicating high agreement that the subscale items are present in the current job. We added a response of “not applicable” as not all nurses surveyed were working in direct patient care roles. Mean scores above the midpoint of 2.5 indicated a favorable practice environment and those below the midpoint were unfavorable (Lake, 2002). The PES-NWI has a low respondent burden, satisfactory psychometric performance (Cronbach’s $\alpha=0.7-0.98$ for total scores and 0.65-0.96 for subscales), opportunity for comparison across studies, high discriminant ability, and is free to use (Lake, 2002; Swiger et al., 2017; Warshawsky & Havens, 2011).

Demographic, nursing, and workplace characteristics. Demographic characteristics included age, sex, marital status, and race. Nursing characteristics included nursing designation and nursing role. Workplace characteristics included job location, years of experience, work schedule, shift length, work hours, and overtime.

To address the potential for selection bias, participants were asked to respond to a question regarding how they heard about the survey. Their responses could be either 1) my employer agreed to participate, and I was asked along with other employees from my workplace, or 2) I heard about the study and completed it as an individual worker on my own. Our analysis considered these responses as participants that completed the study independently may have had an interest in the study objectives and overrepresent the sample.

Cohorts

An incident case was defined as a burnout score of <50 at T1 and ≥ 50 at T2. A resilient case was defined as a burnout score of <50 at T1 and <50 at T2. A resolved case was defined as a burnout score of ≥ 50 at T1 and <50 at T2. Finally, a persistent case was defined as a burnout score ≥ 50 at T1 and T2. The denominator for the incident and resilient cases was the population at risk of burnout, which excludes nurses who had burnout scores ≥ 50 at T1 (resolved and persistent cases). The denominator for resolved and persistent cases is the population at risk for continued or improved burnout and excludes nurses who had burnout scores <50 at T1 (incident and resilient cases).

Statistical Analysis

Descriptive statistics were used to characterize the sample. Frequency counts and percentages were calculated for categorical variables, and means with standard deviations were reported for continuous variables. Chi-square tests and independent t-tests were used to compare differences across groups with statistical significance set at $p < 0.05$. Validated cut-off scores were used to compute low/high levels of burnout and mental health conditions (i.e., anxiety, depression, PTSD).

To evaluate the potential for attrition bias, we examined unadjusted associations between nurses who completed both T1 and T2 surveys and those lost to follow-up on a range of sociodemographic and workplace variables using chi-square tests. Statistical significance was assessed at $p < 0.05$.

Incidence proportion was calculated by dividing the number of participants with an incident case of burnout by the total number of participants at risk for burnout and multiplying by 100% (Celentano & Szklo, 2019). The same calculations were performed for the resilient, resolved, and persistent cases. Incidence density was calculated by dividing the number of

participants with an incident case of burnout by the total number of person years of follow-up (Celentano & Szklo, 2019). Person-years were calculated by summing the follow-up time for each participant from T1 to T2. The same calculations were performed for the resilient, resolved, and persistent cases. The incidence density rates were used to calculate the incidence rate ratios (IRR) and 95% confidence intervals (CI) to compare burnout at T2 by nurses' years of experience (<5 years and ≥ 5 years) and mental health scores at T1 (anxiety, depression, PTSD).

A mixed-effects linear regression model was used to examine factors associated with burnout over time. Given the longitudinal structure of the data, with repeated observations nested within individuals, a random intercept for nurses (e.g., using the nurses' "Worker Unique ID") was included to account for within-person correlations. A null model and an adjusted model were performed to first estimate baseline variability in burnout and then assess the effects of included covariates. The outcome variable was burnout as a continuous measure. Covariates included baseline workplace factors, nursing practice environment subscales, and mental health conditions described above. Time was included as a fixed effect to account for changes across measurement timepoints. Categorical variables were modeled using dummy variables, with reference categories specified a priori. Continuous variables were retained in their original scale.

Model parameters were estimated using maximum likelihood estimation. Fixed effects were reported as regression coefficients (β) with corresponding standard errors, 95% CI, and p-values. Statistical significance was set at $p < 0.05$. To assess the overall model fit, the Wald chi-square test was used. A likelihood ratio test comparing the mixed-effects model to an Ordinary Least Squares (OLS) regression model was performed to evaluate the contribution of the random intercept. The random intercept variance was examined to assess the degree to which burnout levels varied between nurses. The intraclass correlation coefficient (ICC) was calculated to

assess how much burnout varied between nurses versus within nurses over time.

Multicollinearity among fixed-effect covariates was evaluated prior to final model interpretation using Variance Inflation Factors (VIF) and tolerance values (1/VIF). Multicollinearity was defined as problematic if individual VIF values exceeded 5.0 or tolerance values were < 0.20 (Thompson et al., 2017).

Results

Sample

A total of 588 nurses completed the baseline survey (T1), and 361 of them also completed the follow-up (T2) survey. Approximately 40% (n=227) of participants were lost to follow-up. No statistically significant differences were observed between participants who completed follow-up and those lost to follow-up on the measured baseline variables (Table 1), suggesting limited evidence of differential attrition based on observed characteristics. However, attrition related to unmeasured factors cannot be excluded. The average length of time between T1 and T2 was 0.61 years (223.4 days) with a range from 0.46-1.3 years (167-481 days).

Table 1

**Baseline Characteristics of Participants that Completed Follow-up Surveys (n = 361)
Compared to Those Lost to Follow-Up (n=227)**

	Completed T1 and T2 surveys n(%)	Completed T1 survey only n(%)	p
N	361 (61.4)	227 (38.6)	
Sex			
Male	40 (11.1)	20 (11.1)	0.881
Female	320 (88.6)	159 (88.3)	
I prefer not to answer	1 (0.3)	1 (0.6)	
Missing			
Race			
Indigenous	20 (5.5)	14 (7.8)	0.177

White/Caucasian	306 (84.8)	141 (78.3)	
Other	35 (9.7)	25 (13.9)	
Missing			
Marital Status			
Married or common-law	246 (68.1)	130 (72.2)	0.168
Widowed, divorced or separated	27 (7.5)	18 (10.0)	
Never married/single	88 (24.4)	32 (17.8)	
Missing			
Job Location			
Urban	243 (67.7)	162 (71.4)	0.348
Rural, remote, on reserve	116 (32.3)	65 (28.6)	
Missing			
Job Years			
<5 years	184 (51.0)	121 (53.3)	0.581
≥5 years	177 (49.0)	106 (46.7)	
Work Schedule			
A regular daytime shift	164 (45.4)	105 (46.3)	0.479
A rotating shift	138 (38.2)	93 (41.0)	
Other	59 (16.3)	29 (12.8)	
Shift Length			
4 to less than 8-hour shift	82 (22.7)	60 (26.4)	0.288
8 to less than 12-hour shift	145 (40.2)	79 (34.8)	
12-hour shift or more	122 (33.8)	75 (33.0)	
Variable	12 (3.3)	13 (5.7)	
Work Hours			
0-20 hours per week	29 (8.0)	12 (5.3)	0.361
21 to 40 hours per week	234 (64.8)	157 (69.2)	
More than 41 hours per week	98 (27.1)	58 (25.6)	
Overtime			
No	96 (26.6)	63 (27.8)	0.758
Yes	265 (73.4)	164 (72.2)	
Invite			
Employer	135 (37.4)	103 (45.4)	0.055
Individual	226 (62.6)	124 (54.6)	
Nursing Role			
Direct care	254 (70.4)	154 (67.8)	0.606
Leadership/management	51 (14.1)	39 (17.2)	
Other	56 (15.5)	34 (15.0)	
Nursing Registration			
RN	277 (76.7)	171 (75.3)	0.499
PN	64 (17.7)	47 (20.7)	
NP	20 (5.5)	9 (4.0)	
Exposure to Physical Violence			
No	241 (67.5)	159 (70.7)	0.423
Yes	116 (32.5)	66 (29.3)	

Exposure to Bullying			
No	156 (43.8)	106 (47.1)	0.437
Yes	200 (56.2)	119 (52.9)	
Burnout (T1)			
No	135 (37.4)	70 (30.8)	0.104
Yes	226 (62.6)	157 (69.2)	
Anxiety (T1)			
No	268 (74.4)	163 (72.1)	0.535
Yes	92 (25.6)	63 (27.9)	
Missing			
Depression (T1)			
No	263 (73.1)	152 (67.3)	0.133
Yes	97 (26.9)	74 (32.7)	
Missing			
PTSD (T1)			
No	292 (81.1)	165 (75.7)	0.120
Yes	68 (18.9)	53 (24.3)	
Missing			
Mental Health Diagnoses (T1)			
No	161 (44.6)	109 (48.0)	0.418
Yes	200 (55.4)	118 (52.0)	

Note: p-values were calculated using chi-square tests

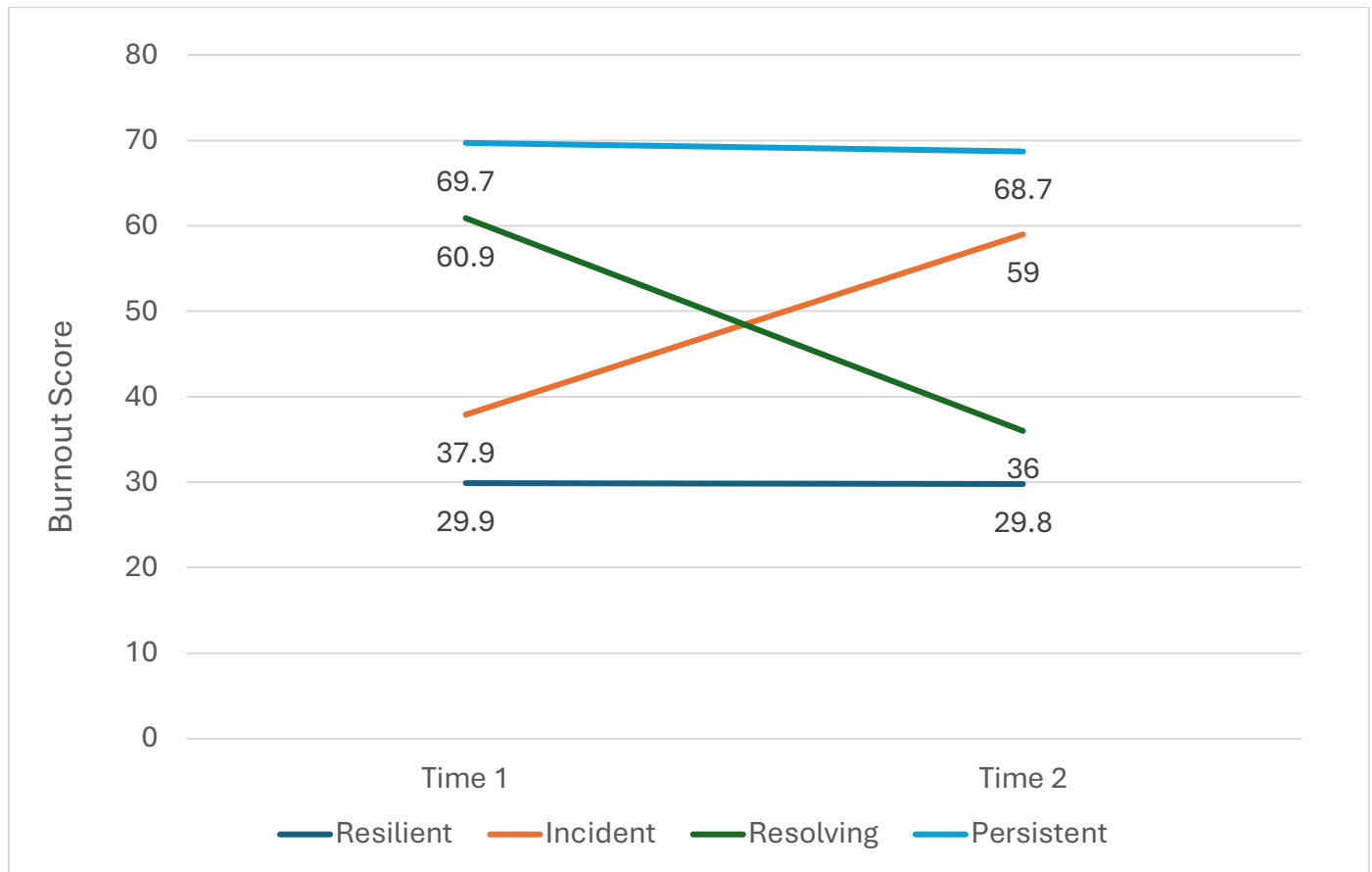
Characteristics of Participants

Characteristics of the total sample and samples by group are presented in Table 2. Three hundred and sixty-one nurses that completed both T1 and T2 surveys; however, the longitudinal analysis was performed on 353 nurses, as 8 participants were excluded to missing CBI scores. We identified 133 nurses with burnout scores of <50 at T1 (incidence cohort) and 220 nurses with burnout scores $\geq$ 50 at T1 (course cohort). The majority of participants were female (88%), White/Caucasian (85%), married or common-law (68%), and were working in an urban location (68%). Approximately half reported working less than 5 years (52%), working a regular daytime shift (46%), working shifts between 8-12 hour (41%); almost three quarters reported working overtime (73.7%). Most participants were RNs (77%) working in a direct patient care role (70%). Over one third of participants experienced physical violence (36%) and more than half experienced bullying (56%). At T1, approximately 26% scored positive for anxiety, 27% for

depression, and 19% for PTSD symptoms. More than half of the sample reported receiving or being treated for a previous mental health diagnosis (55.2%).

As previously described, nurses were categorized based on their T1 and T2 burnout scores (incident, resilient, resolved, persistent). Figure 1 presents the mean burnout scores by group at T1 and T2. Workplace and mental health variables were then compared by burnout profile, revealing differences between groups (Table 2). Among those in the persistent burnout group, 46.2% worked rotating shifts and 43.5% worked shifts of 12 hours or more, compared to only 19.3% and 14.8%, respectively, of those in the resilient group. Nurses in the persistent burnout group experienced more physical violence (45.1%) and bullying (68%) compared to those in the other groups. Furthermore, among those in the resilient group, mean scores of the nursing practice environment scale were more favorable, particularly regarding nurse staffing (mean = 2.69 compared to 2.10 in persistent cases) and nurse leadership (mean = 2.99 compared to 2.47 in persistent cases). Additionally, a greater percentage of NPs were in the resilient group (12.5%) versus the NPs in the persistent group (2.2%).

Baseline mental health differences were also noted between the groups. Among those in the persistent group, mean burnout scores were 69.7 compared to 29.9 among those in the resilient group. This disparity extended to baseline mental health conditions as nearly 40% of those in the persistent group screened positive for anxiety (39.9%) and depression (42.9%) at T1, whereas positive screens in the resilient group remained below 10%.

Figure 1**Mean Burnout Scores at T1 and T2 by Cohort Group****Table 2****Characteristics of Nurses by Cohort Group**

	Total Sample (n=353)	Incidence Cohort (n=133)		Course Cohort (n=220)		p-value
		Incident Cases (n=45)	Resilient Cases (n=88)	Resolved Cases (n=36)	Persistent Cases (n=184)	
		n (%)				
Sex						
Male	40 (11.3)	5 (11.1)	11 (12.5)	6 (16.7)	18 (9.8)	0.21
Female	312 (88.4)	39 (86.7)	77 (87.5)	30 (83.3)	166 (90.2)	
I prefer not to answer	1 (0.3)	1 (2.2)	0	0	0	
Race						
Indigenous	20 (5.7)	2 (4.4)	5 (5.7)	4 (11.1)	9 (4.9)	0.1
White/Caucasian	299 (84.7)	35 (77.8)	80 (90.9)	30 (83.3)	154 (83.7)	
Other	34 (9.6)	8 (17.8)	3 (3.4)	2 (5.6)	21 (11.4)	

Marital Status						
Married or common-law	240 (68.0)	32 (71.1)	62 (70.5)	19 (52.8)	127 (69.0)	0.07
Widowed, divorced or separated	27 (7.6)	2 (4.4)	11 (12.5)	2 (5.6)	12 (6.5)	
Never married/single	86 (24.4)	11 (24.4)	15 (17.0)	15 (41.7)	45 (24.5)	
Job Location						
Urban	237 (67.5)	30 (66.7)	53 (60.9)	27 (75.0)	127 (69.4)	0.4
Rural, remote, on reserve	114 (32.5)	15 (33.3)	34 (39.1)	9 (25.0)	56 (30.6)	
Years of Experience						
<5 years	182 (51.6)	34 (75.6)	39 (44.3)	16 (44.4)	93 (50.5)	0.04
≥5 years	171 (48.4)	11 (24.4)	49 (55.7)	20 (55.6)	91 (49.5)	
Work Schedule						
A regular daytime shift	161 (45.6)	23 (51.1)	59 (67.0)	12 (33.3)	67 (36.4)	<0.001
A rotating shift	134 (38.0)	17 (37.8)	17 (19.3)	15 (41.7)	85 (46.2)	
Other	58 (16.4)	5 (11.1)	12 (13.6)	9 (25.0)	32 (17.4)	
Shift Length						
4 to less than 8-hour shift	79 (22.4)	8 (17.8)	31 (35.2)	7 (19.4)	33 (17.9)	<0.001
8 to less than 12-hour shift	144 (40.8)	23 (51.1)	40 (45.5)	15 (41.7)	66 (35.9)	
12-hour shift or more	119 (33.7)	14 (31.1)	13 (14.8)	12 (33.3)	80 (43.5)	
Variable	11 (3.1)	0	4 (4.5)	2 (5.6)	5 (2.7)	
Work Hours						
0-20 hours per week	27 (7.6)	2 (4.4)	8 (9.1)	4 (11.1)	13 (7.1)	0.09
21 to 40 hours per week	229 (64.9)	29 (64.4)	67 (76.1)	22 (61.1)	111 (60.3)	
More than 41 hours per week	97 (27.5)	14 (31.1)	13 (14.8)	10 (27.8)	60 (32.6)	
Overtime						
No	93 (26.3)	11 (24.4)	33 (37.5)	10 (27.8)	39 (21.2)	0.04
Yes	260 (73.7)	34 (75.6)	55 (62.5)	26 (72.2)	145 (78.8)	
Nursing Role						
Direct care	248 (70.3)	31 (68.9)	58 (65.9)	23 (63.9)	136 (73.9)	0.34
Leadership/management	51 (14.4)	10 (22.2)	13 (14.8)	5 (13.9)	23 (12.5)	
Other	54 (15.3)	4 (8.9)	17 (19.3)	8 (22.2)	25 (13.6)	
Nursing Registration						
RN	272 (77.1)	36 (80.0)	62 (70.5)	31 (86.1)	143 (77.7)	0.007
PN	62 (17.6)	5 (11.1)	15 (17.0)	5 (13.9)	37 (20.1)	
NP	19 (5.4)	4 (8.9)	11 (12.5)	0	4 (2.2)	
Exposure to Physical Violence						
No	236 (67.4)	35 (77.8)	78 (89.0)	23 (63.9)	100 (54.9)	<0.001
Yes	114 (35.6)	10 (22.2)	9 (10.3)	13 (36.1)	82 (45.1)	
Exposure to Bullying						
No	154 (44.1)	24 (53.3)	53 (60.9)	19 (52.8)	58 (32.0)	<0.001
Yes	195 (55.9)	21 (46.7)	34 (39.1)	17 (46.7)	123 (68.0)	
Anxiety (T1)						

No	262 (74.4)	43 (95.6)	81 (92.0)	28 (77.8)	110 (60.1)	<0.001
Yes	90 (25.6)	2 (4.4)	7 (8.0)	8 (22.2)	73 (39.9)	
Depression (T1)						
No	256 (72.7)	41 (91.1)	83 (94.3)	27 (77.1)	105 (57.1)	<0.001
Yes	96 (27.3)	4 (8.9)	5 (5.7)	8 (22.9)	79 (42.9)	
PTSD (T1)						
No	287 (81.3)	43 (95.6)	83 (94.3)	31 (86.1)	130 (70.7)	<0.001
Yes	66 (18.7)	2 (4.4)	5 (5.7)	5 (13.9)	54 (29.3)	
Mental Health Diagnoses						
No	158 (44.8)	23 (51.1)	49 (55.7)	14 (38.9)	72 (39.1)	0.049
Yes	195 (55.2)	22 (48.9)	39 (44.3)	22 (61.1)	112 (60.9)	
Mental Health Scores	Mean (SD)					
Burnout (T1)	55.1 (21.7)	37.9 (9.1)	29.9 (11.5)	60.9 (12.0)	69.7 (13.9)	<0.001
Anxiety (T1)	6.76 (5.0)	4.2 (3.0)	3.84 (3.6)	6.86 (4.5)	8.79 (5.1)	<0.001
Depression (T1)	6.79 (5.4)	3.91 (4.0)	3.67 (3.5)	7.23 (5.2)	8.93 (5.5)	<0.001
PTSD (T1)	17.1 (15.7)	9.09 (9.1)	8.97 (11.4)	15.7 (14.1)	23.04 (16.5)	<0.001
Nursing Practice Environment						
Nursing Participation	2.33 (0.69)	2.57 (0.70)	2.55 (0.70)	2.25 (0.62)	2.2 (0.66)	<0.001
Nursing Foundations	2.73 (0.53)	2.89 (0.60)	2.94 (0.44)	2.65 (0.48)	2.62 (0.53)	<0.001
Nurse Leader	2.66 (0.84)	3.02 (0.72)	2.99 (0.81)	2.51 (0.77)	2.47 (0.82)	<0.001
Nurse Staffing	2.31 (0.78)	2.68 (0.76)	2.69 (0.63)	2.04 (0.78)	2.1 (0.75)	<0.001
Nursing Relationships	3.01 (0.64)	3.13 (0.72)	3.16 (0.58)	2.84 (0.56)	2.94 (0.66)	0.02

Note: p-values were calculated using chi-square tests for categorical variables and independent ANOVA for continuous variables

Incidence Proportion and Incidence Density

The incidence cohort (n=133) consisted of nurses who had a burnout score of <50 at T1. In this cohort, over one third of nurses (n=45) developed burnout at T2, representing an incidence proportion of 33.8% or an incidence density of 56.1 per 100-person years (Table 3). Comparatively, eighty-eight nurses remained resilient (burnout score <50) at T2. This represents an incidence proportion of 66.2% or an incidence density of 110 per 100-person years.

The course cohort (n=220) consisted of nurses who had a burnout score of ≥50 at T1. In this cohort, a large majority (n=184) continued to score ≥50 at T2, representing an incidence proportion of 83.6% or an incidence density of 136 per 100 person-years. Only a small number

(n=36) were resolved (burnout score decreased to <50 at T2). This represents an incidence proportion of 16.4% or an incidence density of 25.8 per 100-per person years.

Table 3

Incidence Proportion and Incidence Density by Group

	n	Sample at Risk	Incidence Proportion	Per-Person Years	Incidence Density (per 100-per person years)
Incident Cases	45	133	33.8%	80.22	56.1
Resilient Cases	88	133	66.2%	80.22	110
Resolving Cases	36	220	16.4%	135.52	25.8
Persistent Cases	184	220	83.6%	135.52	136

Stratification and Per-Person Years

Table 4 contains the number of participants stratified by years of experience and mental health condition for each group. Additionally, the total per-person years was calculated for each cell.

Table 4

Stratification and Per-Person Years

	Incident Cases		Resilient Cases		Resolving Cases		Persistent Cases	
	n	Per Person Years	n	Per Person Years	n	Per Person Years	n	Per Person Years
Years of Experience								
<5 years	34	45.71	39	45.71	16	66.82	93	66.82
≥5 years	11	34.51	49	34.51	20	68.69	91	68.69
Anxiety								
Yes	2	5.19	7	5.19	8	47.78	73	47.78
No	43	75.02	81	75.02	28	87.11	110	87.11
Depression								
Yes	4	4.99	5	4.99	8	52.83	79	52.83
No	41	75.23	83	75.23	27	82.14	105	82.14
PTSD								
Yes	2	4.01	5	4.01	5	35.21	54	35.21
No	43	76.21	83	76.21	31	100.3	130	100.3

Incidence Rate Ratios (IRRs) by Years of Experience and Mental Health Conditions

Table 5 displays the stratification of incidence density and IRR by years of experience and mental health conditions. Nurses with less than five years of experience exhibited a statistically significant higher incidence density (0.74 per 100 person-years) compared to their more experienced counterparts (0.32 per 100 person-years). This translated to an IRR of 2.33 (95% CI: 1.15-5.11) for developing new burnout. Additionally, nurses with less than five years of experience were significantly less likely to be a resilient case (IRR 0.6, 95% CI: 0.38-0.93).

Table 5

Incidence Density and Incidence Rate Ratios (IRR) by Years of Experience and Mental Health and Burnout Trajectory

	Incident Cases		Resilient Cases		Resolved Cases		Persistent Cases	
	Incidence Density	IRR	Incidence Density	IRR	Incidence Density	IRR	Incidence Density	IRR
Years of Experience								
<5 years	0.74 (0.52-1.04)	2.33 (1.15-5.11)	0.85 (0.61-1.17)	0.6 (0.38-0.93)	0.24 (0.14-0.39)	0.82 (0.40-1.67)	1.39 (1.12-1.71)	1.05 (0.78-1.42)
≥5 years	0.32 (0.16-0.57)		1.42 (1.05-1.88)		0.29 (0.18-0.45)		1.32 (1.07-1.63)	
Anxiety								
Yes	0.39 (0.05-1.39)	0.67 (0.08-2.58)	1.35 (0.54-2.78)	1.25 (0.49-2.69)	0.17 (0.07-0.33)	0.52 (0.21-1.17)	1.53 (1.20-1.92)	1.21 (0.89-1.64)
No	0.57 (0.41-0.77)		1.08 (0.86-1.34)		0.32 (0.21-0.46)		1.26 (1.04-1.52)	
Depression								
Yes	0.80 (0.22-2.05)	1.47 (0.38-4.06)	1.00 (0.33-2.34)	0.91 (0.29-2.21)	0.15 (0.07-0.30)	0.46 (0.18-1.04)	1.50 (1.18-1.86)	1.17 (0.86-1.58)
No	0.55 (0.39-0.74)		1.10 (0.88-1.37)		0.33(0.22-0.48)		1.28 (1.05-1.55)	
PTSD								
Yes	0.50 (0.06-1.80)	0.88 (0.10-3.39)	1.25 (0.40-2.91)	1.14 (0.36-2.78)	0.14 (0.05-0.33)	0.46 (0.14-1.19)	1.53 (1.15-2.00)	1.18 (0.85-1.64)
No	0.56 (0.41-0.76)		1.09 (0.87-1.35)		0.31 (0.21-0.44)		1.30 (1.08-1.54)	

Workplace Factors and Mental Health Conditions Associated with Burnout Over Time

To account for the repeated measures and non-independence of data, an unadjusted null mixed-effects linear regression model was evaluated with the “Worker Unique ID” as the intercept and work-related burnout as the outcome (Table 6). The null model included 941 outcome measurements across 588 individual nurses (an average of 1.6 observations per nurse). The null model ICC was 0.703, indicating that 70.3% of the variance in work-related burnout was attributable to between-nurse differences. This substantial degree of between-nurse variance confirmed strong data clustering and demonstrated that a multilevel mixed-effects approach was necessary to prevent biased standard errors. A Likelihood Ratio test comparing the null mixed model to a single-level OLS model confirmed that accounting for random intercepts provided a statistically superior model fit ($\chi^2(01)=232.05, p<0.001$).

Overall model evaluation proceeded with fixed effects testing with workplace factors (nursing practice environment and workplace characteristics) and mental health covariates (anxiety, depression, PTSD). Missing data for covariates resulted in the listwise deletion of 120 observations and 53 individual nurses. Consequently, the final adjusted mixed-effects model was analyzed on a complete-case sample of 821 observations across 535 nurses (an average of 1.5 observations per nurse). The adjusted model was statistically significant (Wald $\chi^2(24) = 762.97, p<0.001$). A Likelihood Ratio test confirmed that the random-intercept structure remained necessary after adjusting for covariates ($\chi^2(01)=100.71, p<0.001$). The ICC for the adjusted model dropped to 0.544, indicating that a meaningful proportion of between-nurse variance in burnout was explained by the included covariates.

Several workplace factors were associated with burnout in the adjusted model (Figure 2). Nurses working rotating shifts was associated with higher burnout compared with those working

regular daytime schedules ($\beta=5.91$, 95% CI: 2.01-9.81). Similarly, working more than 41 hours per week was associated with higher burnout compared with working 0–20 hours per week ($\beta=6.36$, 95% CI: 1.01-11.71). Exposure to physical violence ($\beta=3.62$, 95% CI: 1.03-6.21) and workplace bullying ($\beta=2.72$, 95% CI: 0.60-4.84) were associated with increased burnout. Most subscales of the nursing practice environment were significantly associated with burnout. Higher scores on the nursing participation in hospital affairs subscale ($\beta= -2.99$, 95% CI: -4.66- -1.31) and the staffing and resource adequacy subscale ($\beta= 3.95$, 95% CI: -5.49- -2.41) were negatively associated with burnout, suggesting protective effects of more favourable workplace environments. The nursing foundations for quality care subscale was opposite, where higher scores were associated with higher burnout ($\beta=2.92$, 95% CI: 0.71-5.12).

Mental health conditions were associated with burnout. Higher anxiety symptoms were significantly associated with increased burnout ($\beta=1.09$, 95% CI: 0.75-1.42), as were higher depressive symptoms ($\beta=0.59$, 95% CI: 0.27-0.92) and posttraumatic stress disorder ($\beta=0.21$, 95% CI: 0.10-0.31). The overall time variable was not significantly associated with burnout ($\beta= 0.24$, 95% CI: -1.33-1.80), indicating no evidence of change in burnout over the study period after adjustment for covariates.

Post-estimation collinearity diagnostics revealed no evidence of problematic multicollinearity among the fixed covariates. Across the full set of covariates, the mean VIF was 2.06. Individual VIFs ranged from 1.02 to 4.04, remaining well below the threshold of 5.0, with corresponding tolerance values ($1/\text{VIF}$) remaining above the threshold for all covariates.

Table 6

Unadjusted (null) and Adjusted Linear Mixed-Effects Models Examining Workplace Factors and Mental Health Conditions Associated with Burnout Over Time

Variable/Parameter	Null Model	Adjusted Model		
	Coefficient (SE)	Coefficient (SE)		
Intercept	56.53 (0.85) ***	42.93(4.33) ***		
Fixed Effects	Coefficient (SE)	Coefficient (SE)	95% confidence interval	
Job Years				
<5 years	-	0		
≥5 years	-	2.06 (1.24)	-0.36	4.48
Shift Length				
4 to less than 8-hour shift	-	0		
8 to less than 12-hour shift	-	-1.27 (1.66)	-4.52	1.99
12-hour shift or more	-	0.78 (2.29)	-3.71	5.27
Variable	-	-2.68 (3.72)	-9.97	4.61
Work Schedule				
A regular daytime shift	-	0		
A rotating shift	-	5.91 (1.99)***	2.01	9.81
Other	-	2.77 (2.20)	-1.54	7.08
Job Location				
Urban	-	0		
Rural, remote, on reserve	-	-0.16 (1.34)	-2.79	2.47
Nursing Registration				
RN	-	0		
PN	-	2.81 (1.64)	-0.40	6.01
NP	-	-1.62 (3.06)	-7.61	4.38
Nursing Role				
Direct care	-	0		
Leadership/management	-	1.74 (1.90)	-1.98	5.46
Other	-	0.62 (1.92)	-3.14	4.37
Work Hours				
0-20 hours per week	-	0		
21 to 40 hours per week	-	3.09 (2.58)	-1.97	8.16
More than 41 hours per week	-	6.36 (2.73)*	1.01	11.71
Nursing Practice Environment				
Nursing Participation	-	-2.99 (0.85)***	-4.66	-1.31
Nursing Foundations	-	2.92 (1.13)**	0.71	5.12
Nurse Leader	-	-1.44 (0.74)	-2.88	0.00
Nurse Staffing	-	-3.95 (0.79)***	-5.49	-2.41
Nursing Relationships	-	1.19 (0.84)	-0.45	2.84
Exposure to Physical Violence	-	3.62 (1.32)**	1.03	6.21
Exposure to Bullying	-	2.72 (1.08)*	0.60	4.84
Mental Health				
Anxiety	-	1.09 (0.17)***	0.75	1.42
Depression	-	0.59 (0.17)***	0.27	0.92
PTSD	-	0.21 (0.05)***	0.10	0.31

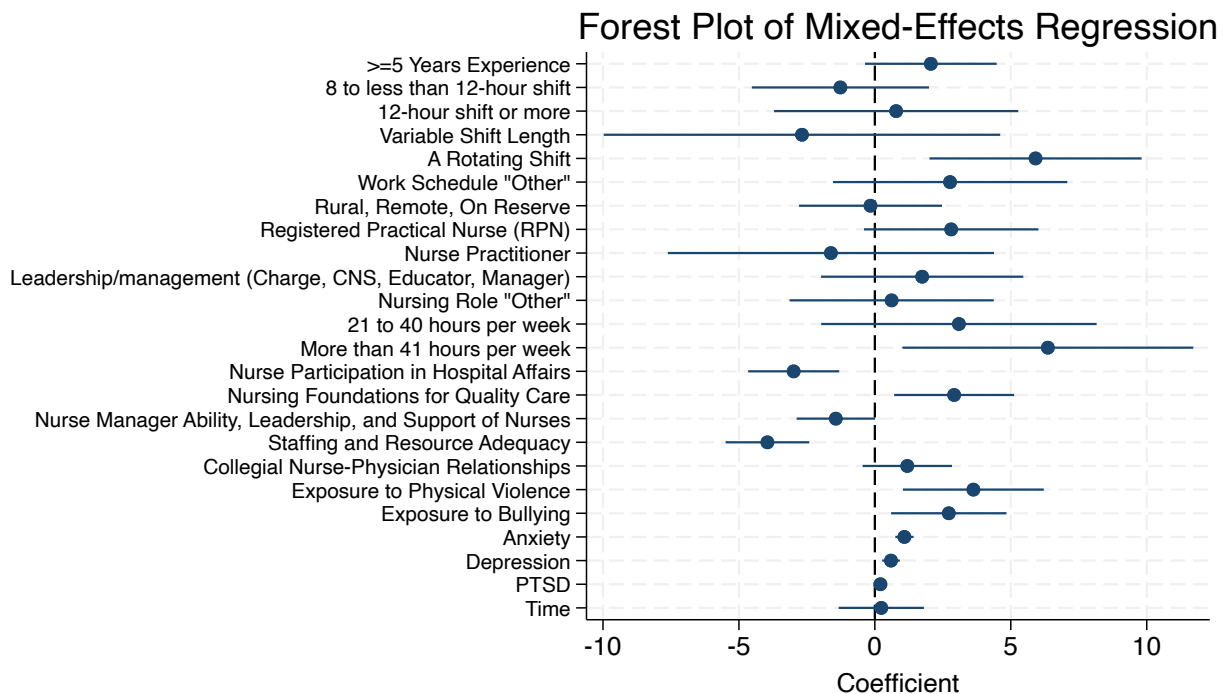
Time	-	0.24 (0.8)	-1.33	1.80
cons		39.5 (4.35)	30.97	48.03
Random Effects and Fit Indices	Estimate (SE)	Estimate (SE)		
Between-worker variance	333.75 (26.13)	121.19 (12.94)		
Within-worker variance	140.89 (10.62)	99.9 (8.28)		
ICC	0.703 (0.03)	0.548 (0.04)		
Log Likelihood	-4114.31	-3329.96		
Overall Model Test	-	Wald χ^2 (24) = 762.97***		
Likelihood Ratio Test vs. OLS	χ^2 (01) = 232.05	χ^2 (01) = 100.71		
Number of Observations	941	821		
Number of Groups	588	535		

$p < 0.05$, $p < 0.01$, $p < 0.001$. Standard error presented in parentheses

Note: Multicollinearity diagnostics for the adjusted model indicated no problematic collinearity across independent variables (Mean VIF = 2.06; individual VIF range: 1.02–4.04; tolerance range: 0.247–0.983).

Figure 2

Forest Plot of Mixed-Effects Regression



Discussion

This study evaluated the incidence and longitudinal course of burnout and workplace factors, and mental health conditions associated with burnout over time in a population of nurses

from Northwestern Ontario. To our knowledge, this is the first longitudinal study to evaluate burnout incidence by explicitly separating nurses with and without burnout at baseline.

Our findings reveal a concerning incidence proportion (e.g., new cases) of 33.8% over an average follow-up time of 0.61 years. Moreover, a high proportion of persistent burnout was identified during that time, with 83.6% of the nurses experiencing burnout at baseline continuing to have burnout at follow-up. Most notably, nurses with less than five years of experience emerged as more vulnerable to burnout than those with five or more years of experience (IRR 2.33; 95% CI: 2.03-8.96).

We also identified considerable between-person variability in burnout such that some nurses consistently report higher or lower burnout than others. Model fit improved significantly after inclusion of the covariates (ICC reduced to 0.54), suggesting that burnout was partially driven by the nursing practice environment, workplace factors, and mental health conditions. Specifically, burnout was associated with rotating shifts, longer working hours, exposure to physical violence and bullying, and mental health conditions. Some favourable workplace environment factors were protective including nurse participation in hospital affairs and staffing and resource adequacy. This highlights both structural workplace and mental health influences on burnout.

The 33.8% incidence proportion, coupled with an 83.6% persistence rate at follow-up is a concerning finding for the nursing workforce in NWO. The high persistence of burnout in this sample aligns with prior evidence that healthcare professionals often have burnout symptoms that progress from initial symptoms into a severe, chronic condition (Karakolias, 2025). This is concerning given the consequences of burnout for organizations, including increased staff turnover, decreased job satisfaction, and worsening quality and safety of patient care (Bianchi &

Schonfeld, 2024; Dall'Ora et al., 2020; Jun et al., 2021). Additionally, if one-third of nurses without burnout develop burnout and only a small number affected by burnout recover over that time, the profession will be unlikely to retain nurses. In the context of a global shortage of nurses, this is problematic (Marc et al., 2018).

Our findings also identified that early-career nurses (<5 years of experience) are more than two times as likely to develop new-onset burnout compared to their more experienced colleagues. The “reality shock” of new nursing graduates transitioning into practice has been widely cited in the literature. Kramer (1974) identified reality shock as a discrepancy between educational preparation and clinical realities. More recently, it is described as a dissonance experienced by newly graduate nurses when their expectations of nursing practice and actual nursing practice is incongruent (Sin & Eun-Young, 2017), also referred to as lower person-job fit (Laschinger et al., 2016). Studies have identified that higher levels of reality or transition shock are associated with increased stress, burnout, decreased job satisfaction, and turnover intention (Labrague et al., 2020; Kim & Yeo, 2023). Workplace incivility and bullying have also been identified as factors associated with emotional exhaustion among new graduates (Read & Laschinger, 2013). Thus, it is not surprising that early-career nurses grappling with the stress of transitioning to a new career, coupled with the current challenges of increased workplace demands (Crowe et al., 2021; Martin et al., 2023; RNAO, 2021) have higher rates of burnout.

Descriptive findings identified several trends regarding workplace factors and the nursing practice environment subscales by burnout trajectory. In particular, nurses in the resilient cohort reported higher mean scores for the nurse staffing subscale (2.69 vs 2.10) and the nursing leadership subscale (2.99 vs 2.47) compared to those in the persistent group. This is congruent with the literature that unfavourable workplace conditions such as inadequate staffing and lack of

supportive management are associated with increased burnout among staff nurses (Dall'Ora et al., 2020; Lake et al., 2019). Furthermore, we found nearly half of the persistent cases (46.2%) were working rotating shifts, and 43.5% were working shifts of 12 hours or more. In contrast, only 14.8% of resilient nurses worked those extended hours. While these variables (workplace demands/support) are consistently associated with burnout in the literature (Shoman et al., 2022), our results provide new evidence that long shifts and an unfavourable nursing practice environment may create a barrier that prevents recovery and contributes to remaining in a persistent burnout state.

The high prevalence of positive screens for mental health conditions at baseline is noteworthy. A substantial portion of nurses entered the study already meeting the criteria for anxiety (25.6%), depression (27.3%), and PTSD (18.7%) at baseline. While the IRRs for mental health conditions did not reach statistical significance, there were trends in the findings suggesting that mental health conditions may contribute to sustained burnout, or vice versa. Specifically, the presence of baseline mental health conditions may be associated with an increased likelihood of remaining in the persistent burnout group, as demonstrated with all IRRs trending above 1.0. This is reinforced with the IRR trends for the resolved cohort. Nurses with pre-existing mental health conditions were potentially half as likely (IRRs 0.46 to 0.52) to be in the resolved group compared to nurses without a mental health condition. The existing evidence is consistent that burnout and mental health, particularly depression and burnout and anxiety and burnout are highly correlated (Shonfeld & Bianchi, 2016). However, Koutsimani et al. (2019) argue that although these conditions appear similar, they are different constructs that share characteristics and develop in tandem. More research is needed on the association of burnout and mental health conditions including their temporal relationship.

Our model evaluating workplace factors and mental health conditions associated with burnout over time demonstrated that burnout among nurses is associated with a combination of workplace factors, nursing practice environment characteristics, and mental health conditions. This is consistent with much of the cross-sectional literature identifying associations between workplace factors and burnout (Dall’Ora et al., 2020; Galanis et al., 2021), and mental health conditions and burnout (Stelnicki & Carleton, 2021). Our findings moved beyond the cross-sectional evidence, as the longitudinal modelling allowed for the examination of associations within individuals over time, rather than relying solely on cross-sectional comparisons between individuals. This approach accounted for stable individual differences and better reflected the trajectory of burnout. In the present study, the use of repeated measures strengthened the interpretation of observed associations, suggesting that factors such as workload, shift patterns, exposure to physical violence and/or bullying, mental health symptoms, and nursing practice environment characteristics are not only correlated with burnout at a single time point, but are consistently associated with burnout across time. Although causal relationships could not be established, the longitudinal analyses provide a stronger basis for identifying potential targets for intervention and informing workplace policy.

Limitations

While this study provides unique longitudinal insights, there are limitations that should be considered. First, our overall sample size was robust; however, there were only a small number of nurses in the incident case group and resolved case group. As such, there was limited statistical power when stratifying incidence density and may have contributed to the lack of statistically significant findings for the IRRs. Second, our longitudinal analysis estimated associations over time rather than evaluating causal or predictive relationships, and conclusions

about temporality were not possible. Further, the long recruitment and inconsistent follow-up time periods (average 0.61 years) may have allowed for potential unmeasured confounding. While attrition was higher than anticipated, our risk of bias due to attrition was low given no differences were identified between the completers and those lost to follow-up. Third, self-reported, validated scales may be subject to recall and social desirability biases. Fourth, sample heterogeneity (RNs, PNs, and NPs in diverse clinical and leadership roles), may obscure role-specific burnout drivers given variations in autonomy, patient ratios, and administrative load. Future research should utilize role-stratified or tailored models to isolate designation-specific workplace associations. Finally, sampling from a single region may limit geographic generalizability.

Implications for Practice

Due to the widespread consequences of burnout for nurses, patients and the healthcare system, it is imperative that efforts are made to decrease burnout among nurses. Our findings point to the importance of early identification of burnout and interventions to mitigate burnout persistence. The prevention of burnout before it becomes well-established may be a more effective strategy than attempting to resolve it at a later stage (Leclercq & Hanssens, 2024). Additionally, targeted support for early-career nurses may be particularly beneficial. This includes sustained mentorship programs, workload management, authentic leadership, and organizational support including opportunities for decision making, which is necessary to help mitigate against the development and continuation of burnout in this population (Boamah et al., 2016; Laschinger et al., 2010; Laschinger et al., 2015). Furthermore, given the higher rates of positive screens for mental health conditions at baseline, occupational wellness programs should be multi-faceted to avoid a one size fits all approach to mitigating burnout. While numerous

studies have been conducted in attempt to prevent burnout, the evidence is still limited due to moderate heterogeneity between studies, bias potential, and moderate to small effect size (Bes et al., 2023). Thus, more research is required to determine the effectiveness of individual and organizational level interventions on burnout.

Conclusion

This longitudinal study identified nursing burnout as a highly stable and persistent state, rather than a transient reaction to workplace stress. Over our follow-up period (average 0.61 years, or roughly 7 months), 33.8% of nurses experienced new-onset burnout, while 83.6% of those with baseline burnout remained affected, highlighting a workforce sustainability challenge in our sample. Early-career nurses (<5 years' experience) were at an increased risk of being an incident case of burnout. Workplace factors (e.g., rotating shifts, working >41 hours/week), nursing practice environment characteristics, and mental health conditions were identified as salient factors associated with burnout over time. This points to the need for multi-faceted strategies (e.g., individual, organizational and policy [funding]) to prevent or improve burnout among nurses. Further research in larger and more diverse nursing samples is required to better understand the causal pathway to the onset, recovery, and persistence of burnout.

References

- Adriaenssens, J., De Gucht, V., & Maes, S. (2015). Causes and consequences of occupational stress in emergency nurses, a longitudinal study. *Journal of Nursing Management*, 23, 346-358. <https://doi.org/10.1111/jonm.12138>
- Ahmed, H., & Bourgeault, I. (2023). Sustaining the Canadian nursing workforce: Targeted evidence-based reactive solutions in response to the ongoing crisis. *Nursing Leadership (Toronto, Ontario)*, 35(4), 14-29. <https://doi.org/10.12927/cjnl.2023.27076>
- Bes, I., Shoman, Y., Al-Gobari, M., Rousson, V., & Canu, I. (2023). Organizational interventions and occupational burnout: A meta-analysis with focus on exhaustion. *International Archives of Occupational and Environmental Health*, 96, 1211-1223. <https://doi.org/10.1007/s00420-023-02009-z>
- Bianchi, R., & Schonfeld, I. (2024). Beliefs about burnout. *Work Stress*, 39, 116–34. <https://doi.org/10.1080/02678373.2024.2364590>
- Bianchi, R., Schonfeld, I., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review*, 36, 28-41. <https://doi.org/10.1016/j.cpr.2015.01.004>
- Blevins, C., Weathers, F., Davis, M., Witte, T., & Domino, J. (2015). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, 28, 489-498. <https://doi.org/10.1002/jts.22059>
- Boamah, S. A., Read, E. A., & Laschinger, H. K. S. (2017). Factors influencing new graduate nurse burnout development, job satisfaction and patient care quality: a time-lagged study. *Journal of Advanced Nursing*, 73(5), 1182-1195. <https://doi.org/10.1111/jan.13215>
- Borritz, M., Rugulies, R., Christensen, K., Villadsen, E., & Kristensen, T. (2006). Burnout as a

- predictor of self-reported sickness absence among human service workers: prospective findings from three year follow up of the PUMA study. *Occupational and Environmental Medicine*, 63, 98-106. <https://doi.org/10.1136/oem.2004.019364>
- Canu, G., Marca, S.C., Dell’Oro, F., Balazs, A., Bergamaschi, E., Besse, C., Bianchi, R., Bislimovska, J., Bjelajac, A., Bugge, M., Busneag, C., Caglayan, C., Cernitanu, M., Costa Pereira, C., Dernovscek, H., Droz, N., Eglite, M., Godderis, L., Gundel, H., Wahlen, A. (2020). Harmonized definition of occupational burnout: A systematic review, semantic analysis, and Delphi consensus in 29 countries. *Scand J Work Environ Health*, 47(2), 95-107. <https://doi.org/10.5271/sjweh.3935>
- Casey, K., Fink, R. R., Krugman, A. M., & Propst, F. J. (2004). The graduate nurse experience. *Journal of Nursing Administration*, 34(6), 303–311. <https://doi.org/10.1097/00005110-200406000-00010>
- Celentano, D., & Szklo, M. (2019). *Gordis Epidemiology* (6th ed.). Elsevier, Inc.
- Crowe, S., Howard, F., & Vanderspank, B. (2022). The mental health impact of the COVID-19 pandemic on Canadian critical care nurses. *Intensive and Critical Care Nursing*, 71, 103241. <https://doi.org/10.1016/j.iccn.2022.103241>
- Dall’Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health*, 18(41), 1-17. <https://doi.org/10.1186/s12960-020-00469-9>
- de la Torre, J. A., Vilagut, G., Ronaldson, A., Valderas, J. M., Bakolis, I., Dregan, A., Molina, A. J., Navarro-Mateu, F., Perez, K., Bartoll-Roca, X., Elices, M., Perez-Sola, V., Serrano-Blanco, A., Martin, V., & Alonso, J. (2023). Reliability and cross-country equivalence of the 8-item version of the Patient Health Questionnaire (PHQ-8) for the assessment of

- depression: Results from 27 countries in Europe. *The Lancet Regional Health – Europe*, 31, 100659. <https://doi.org/10.1016/j.lanepe.2023.100668>
- Edu-Valsania, S., Laguia, A., & Moriano, J.A. (2022). Burnout: A review of theory and measurement. *International Journal of Environmental Research and Public Health*, 19(3), 1780. <https://doi.org/10.3390/ijerph19031780>
- Fida, R., Laschinger, H. K. S., & Leiter, M. P. (2018). The protective role of self-efficacy against workplace incivility and burnout in nursing: A time-lagged study. *Health Care Manage Rev*, 43(1), 21-29. <https://doi.org/10.1097/HMR.0000000000000126>
- Galanis, P., Vraika, I., Fragkou, D., Bilali, A., & Kaitelidou, D. (2021). Nurses' burnout and associated risk factors during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Advanced Nursing*, 77, 3286-3302. <https://doi.org/10.1111/jan.14839>
- Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing*, 32(17-18). <https://doi.org/10.1111/jocn.16708>
- Gustavsson, J., Hallsten, L., & Rudman, A. (2010). Early career burnout among nurses: Modelling a hypothesized process using an item response approach. *Int J Nurs Stud*, 47(7), 864–75. <https://doi.org/10.1016/j.ijnurstu.2009.12.007>
- Jun, J., Ojemeni, M.M., Kalamani, R., Tong, J., & Crecelius, M.L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, 119, 103933. <https://doi.org/10.1016/j.ijnurstu.2021.103933>
- Karakolias, S. (2025). Seeing burnout coming: Early signs and recognition strategies in health

- professionals. *Frontiers in Public Health*, 13, <https://doi.org/10.3389/fpubh.2025.1721220>
- Kim, E. & Yeo, J. (2021). Transition shock and job satisfaction changes among newly graduated nurses in their first year of work: A prospective longitudinal study. *Journal of Nursing Management*, 29(3), 451–458. <https://doi.org/10.1111/jonm.13164>
- Koressel, L., Groothuis, E., Tanz, R., Palac, H., & Sanguino, S. (2020). Natural history of burnout, stress, and fatigue in a pediatric resident cohort over three years. *Med Educ Online*, 25(1), 1815386. <https://doi.org/10.1080%2F10872981.2020.1815386>
- Koutsimani, P., Montgomery, A., & Georganta, K. (2019). The relationship between burnout, depression, and anxiety: A systematic review and meta-analysis. *Frontiers in Psychology*, 10, 284. <https://doi.org/10.3389/fpsyg.2019.00284>
- Kramer, M. (1974). *Reality shock: Why nurses leave nursing*. St. Louis: CV. Mosby.
- Kristensen, T.S., Borritz, M., Villadsen, E., & Christensen, K. (2005). The Copenhagen Burnout Inventory: A new tool for the assessment of burnout. *Work & Stress*, 19(3), 192-207. <https://psycnet.apa.org/doi/10.1080/02678370500297720>
- Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: A new depression diagnostic and severity measure. *Psychiatric Annals*, 32(9), 509-515. <https://psycnet.apa.org/doi/10.3928/0048-5713-20020901-06>
- Kroenke, K., Strine, T. W., Spitzer, R. L., Williams, J. B. W., Berry, J. T., & Mokdad, A. H. (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1–3), 163-173. <https://doi.org/10.1016/j.jad.2008.06.026>
- Labrague, L. & De los Santos, J. (2020). Predictors and outcomes of transition shock among

- newly graduated nurses. *Journal of Nursing Management*, 28(2), 1–9.
<https://doi.org/10.1111/jonm.13033>
- Lake, E.T. (2002). Development of the practice environment scale of the nursing work index. *Res Nurse Health*, 25(3), 176-188. <https://doi.org/10.1002/nur.10032>
- Lake, E.T., Sanders, J., Duan, R., Riman, K., Schoenauer, K., & Chen, Y. (2019). A meta analysis of the associations between the nurse work environment in hospitals and 4 sets of outcomes. *Med Care*, 57(5), 353-361.
<https://doi.org/10.1097%2FMLR.0000000000001109>
- Laschinger, H., Cummings, G., Leiter, M., Wong, C., MacPhee, M., Ritchie, J., Wolff, A., Regan, S., Rheaume-Bruning, A., Jeffs, L., Young-Ritchie, C., Grinspun, D., Gurnham, M., Foster, B., Huckstep, S., Ruggolo, M., Shamian, J., Burkoski, V., Wood, K., Read, E. (2016). Starting out: A time-lagged study of new graduate nurses' transition to practice. *International Journal of Nursing Studies*, 57, 82-95.
<https://doi.org/10.1016/j.ijnurstu.2016.01.005>
- Laschinger, H., & Grau, A. (2012). The influence of personal dispositional factors and organizational resources on workplace violence, burnout and health outcomes in new graduate nurses: A cross-sectional study. *International Journal of Nursing Studies*, 49(3), 282–291. <https://doi.org/10.1016/j.ijnurstu.2011.09.004>
- Laschinger, H., Grau, A., Finnegan, J., & Wilk, P. (2010). New graduate nurses' experiences of bullying and burnout in hospital settings. *Journal of Advanced Nursing*, 66(12), 2732-2742. <https://doi.org/10.1111/j.1365-2648.2010.05420.x>
- Leclercq, C., & Hansez, I. (2024). Temporal stages of burnout: How to design prevention?

- International Journal of Environmental Research in Public Health*, 21(12), 1617.
<https://doi.org/10.3390/ijerph21121617>
- Lowe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. Y. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care*, 46(3), 266-274.
<https://doi.org/10.1097/mlr.0b013e318160d093>
- Marc, M., Bartosiewicz, A., Burzynska, J., Chmiel, Z., & Januszewicz, P. (2018). A nursing shortage – A prospect of global and local policies. *International Nursing Review*, 00, 1-8.
<https://doi.org/10.1111/inr.12473>
- Martin, B., Kaminski-Ozturk, N., O'Hara, C., & Smiley, R. (2023). Examining the impact of the COVID-19 pandemic on burnout and stress among U.S. nurses. *Journal of Nursing Regulation*, 14(1), 4-12. [https://doi.org/10.1016/S2155-8256\(23\)00063-7](https://doi.org/10.1016/S2155-8256(23)00063-7)
- Maslach, C., & Leiter, M. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry*, 15(2), 103-111.
<https://doi.org/10.1002/wps.20311>
- Maslach, C., & Jackson, S. (1981). The measurement of experienced burnout. *Journal of Occupational Behaviour*, 2, 99-113. <https://doi.org/10.1002/job.4030020205>
- Maslach, C., Schaufeli, W.B., & Leiter, M.P. (2001). Job burnout. *Annual Review of Psychology*, 52, 397-422. <https://doi.org/10.1146/annurev.psych.52.1.397>
- McGuire, L. C., Strine, T. W., Allen, R. S., Anderson, L. A., & Mokdad, A. H. (2009). The Patient Health Questionnaire 8: Current depressive symptoms among U.S. older adults, 2006 Behavioural Risk Factor Surveillance System. *The American Journal of Geriatric Psychiatry*, 17(4), 324-334. <https://psycnet.apa.org/doi/10.1097/JGP.0b013e3181953bae>

- Montgomery, A., Azuero, A., & Patrician, P. (2021). Psychometric properties of Copenhagen Burnout Inventory among nurses. *Research in Nursing & Health*, 44(2), 308-318.
<https://doi.org/10.1002/nur.22114>
- Northwest Local Health Integration Network (NWLHIN). (2018). *2017/18 NW LHIN Annual Report*. <https://www.healthcareathome.ca/document/2017-18-nw-lhin-annual-report/>
- Ochnik, D., Rogowska, A. M., Benatov, J., & Arzenšek, A. (2022). Adaptation and preliminary validation of the Fear of Coronavirus vaccination scale in the prospective study among a representative sample of Polish, Israeli, Slovenian, and German adults during the COVID-19 pandemic. *International Journal of Environmental Research and Public Health*, 19, 11587. <https://doi.org/10.3390/ijerph191811587>
- Parr, J., Pinto, N., Hanson, M., Meehan, A., & Moore, P. (2016). Medical graduates, tertiary hospitals, and burnout: A longitudinal cohort study. *Ochsner Journal*, 16, 22-26.
<http://www.ncbi.nlm.nih.gov/pmc/articles/pmc4795494/>
- Penz, M., Stalder, T., Miller, R., Ludwig, V., Kanthak, M., & Kirschbaum, C. (2018). Hair cortisol as a biological marker for burnout symptomatology. *Psychoneuroendocrinology*, 87, 218-221. <https://doi.org/10.1016/j.psyneuen.2017.07.485>
- Qualtrics. (2025). *Qualtrics XM* [Computer software]. <https://www.qualtrics.com>
- Read, E., & Laschinger, H. (2013). Correlates of new graduate nurses' experiences of workplace mistreatment. *Journal of Nursing Administration*, 43(4), 221-228.
<https://doi.org/10.1097/nna.0b013e3182895a90>
- Registered Nurses' Association of Ontario (RNAO). (2021). *Ontario's RN understaffing crisis:*

Impact and solution.

<https://rnao.ca/sites/default/files/202111/Ontarios%20RN%20understaffing%20Crisis%20Impact%20and%20Solution%20PAB%202021.pdf>

Registered Nurses' Association of Ontario (RNAO). (2022). *Nursing through crisis: A Comparative perspective.*

<https://rnao.ca/sites/default/files/202205/Nursing%20Through%20Crisis%20-%20A%20Comparative%20Analysis%202022.pdf>

Schaufeli, W., & Enzmann, D. (1998). *The burnout companion to study and practice: A critical analysis.* CRC Press.

Schaufeli, W., Leiter, M.P., & Maslach, C. (2009). Burnout: 35 years of research and practice. *Career Development International*, 14(3), 204-220.

<https://doi.org/10.1108/13620430910966406>

Shah, M., Gandrakota, N., Cimiotti, J., Ghose, N., Moore, M., & Ali, M. (2021). Prevalence of and factors associated with nurse burnout in the US. *JAMA*, 4(2), e2036469.

<https://doi.org/10.1001/jamanetworkopen.2020.36469>

Shoman, Y., Rousson, V., Bianchi, R., & Gusea Canu, I. (2022). Holistic assessment of factors associated with exhaustion, the main symptom of burnout: A meta-analysis of

longitudinal studies. *International Journal of Environmental Research and Public Health*, 19, 13037. <https://doi.org/10.3390/ijerph192013037>

Sin, M., & Eun-Young, K. (2017). A concept analysis on reality shock in newly graduated nurses using the hybrid model. *Korean Journal of Occupational Health Nursing* 26(1), 19-29.

<https://doi.org/10.5807/kjohn.2017.26.1.19>

Singh, S., Poon, D., Alvarez, E., Anderson, L., Verschor, C., Sutton, A., Zendo, Z., Piggott, T.,

- Apatu, E., Churipuy, D., Culbert, I., & Hopkins, J. (2024). Burnout among public health workers in Canada: A cross-sectional study. *BMC Public Health*, 24(48), <https://doi.org/10.1186/s12889-023-17572-w>
- Spitzer, R. L., Kroenke, K., Williams, J. B. W., & Lowë, B. (2006). A brief measure for assessing Generalized Anxiety Disorder: The GAD-7. *Archives of Internal Medicine*, 166(10), 1092-1097. <https://doi.org/10.1001/archinte.166.10.1092>
- Stelnicki, A., & Carleton, R.N. (2021). Mental disorder symptoms among nurses in Canada. *Canadian Journal of Nursing Research*, 53(3), 264-276. <https://doi.org/10.1177/0844562120961894>
- Swiger, P., Patrician, P., Miltner, R., Raju, D., Breckenridge-Sproat, S., & Loan, L. (2017). The Practice Environment Scale of the Nursing Work Index: An updated review and recommendations for use. *International Journal of Nursing Studies*, 74, 76-84. <http://dx.doi.org/10.1016/j.ijnurstu.2017.06.003>
- Thompson, C., Kim, R., Aloe, A., & Becker, B. (2017). Extracting the Variance Inflation Factor and other multicollinearity diagnostics from typical regression results. *Basic and Applied Social Psychology*, 39(2), 81-90. <https://doi.org/10.1080/01973533.2016.1277529>
- Toth-Kiraly, I., Morin, A., & Salmela-Aro, K. (2021). Reciprocal associations between burnout and depression: An 8-year longitudinal study. *Applied Psychology: An International Review*, 70(4), 1691-1727. <https://doi.org/10.1111/apps.12295>
- Warshawsky, N. & Havens, D. (2011). Global use of the Practice Environment Scale of the Nursing Work Index. *Nursing Research*, 60(1), 17-31. <https://doi.org/10.1097/nnr.0b013e3181ffa79c>
- Weathers, F., Litz, B., Keane, T., Palmieri, P., Marx, B., & Schnurr, P. (2013). *The PTSD*

Checklist for DSM-5 (PCL-5). <https://www.ptsd.va.gov/professional/assessment/adult-sr/ptsd-checklist.asp>

World Health Organization (WHO) (2019). *Burn-out an “occupational phenomenon”:*

International Classification of Diseases. <https://www.who.int/news/item/28-05-2019-burn-out-an-occupational-phenomenon-international-classification-of-diseases>

Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>

Chapter 7: Integrated Discussion

Purpose and Main Findings of the Dissertation

The overall purpose of this dissertation was to investigate burnout, mental health conditions, and the nursing practice environment among a sample of nurses in Northwestern Ontario (NWO). Three manuscripts were developed as part of this dissertation, which provided a comprehensive examination of burnout. In the following chapter, the main results from each manuscript are described and integrated to highlight overarching findings. Implications to inform future research, clinical practice, and health policy are discussed across multiple levels (e.g., individual, organizational, healthcare system) to support meaningful, system-informed change. Finally, strengths and limitations of the dissertation are presented.

Manuscript 1 (Chapter 4): Reliability and Validity of the Copenhagen Burnout Inventory (CBI) among Nurses in Northwestern Ontario

The findings of this study support the CBI as a reliable and valid measure of burnout among nurses across diverse practice settings. Consistent with the original validation study, the three-factor structure demonstrated acceptable performance (Montgomery et al., 2021). Model fit indices were mixed, with some indicators suggesting suboptimal fit (e.g., chi-square, RMSEA), while others supported adequate measurement (e.g., CFI, SRMR, and CD). Evidence of convergent validity was also observed, with burnout dimensions showing expected correlations with workplace factors. Reliability estimates were slightly higher than those reported in the original study, potentially reflecting differences in sample characteristics. Overall, these results supported the use of the CBI as a suitable tool for assessing burnout in nursing populations.

Manuscript 2 (Chapter 5): Understanding Burnout in Nurses: Prevalence, Mental Health Comorbidity, and Workplace Factors

This cross-sectional study examined the prevalence of burnout and mental health conditions, their co-occurrence, and factors associated with burnout (workplace and mental health). The findings indicate a high prevalence of burnout, anxiety, depression, and PTSD, as well as substantial co-occurrence of burnout with mental health conditions. Multivariable analyses further demonstrated that burnout is associated with both workplace factors and mental health conditions. These results extend existing literature by framing burnout not solely as a work-related phenomenon, but as one that occurs at the intersection of occupational conditions and individual mental health status. Identification of these key associated factors, including job satisfaction, staffing, workplace violence, long working hours, and mental health conditions (depression, PTSD), may provide direction for targeted interventions aimed at reducing burnout among nurses.

Manuscript 3 (Chapter 6): Exploring the Incidence and Course of Burnout among a Cohort of Nurses in Northwestern Ontario

The longitudinal study examined the incidence, course, and associated factors of burnout over time among nurses. The findings indicated a high incidence of new burnout cases and a substantial proportion of persistent burnout from baseline to follow-up, suggesting that burnout is both common and enduring. Early-career nurses were particularly vulnerable, with those having less than five years of experience at an increased risk. Mixed-effects analyses demonstrated that burnout was associated with rotating shifts, more than 41 hours/week (overtime), and mental health conditions (anxiety, depression and PTSD), while supportive workplace environments were protective, underscoring the combined influence of structural and mental health conditions on burnout over time.

Integrated Discussion

This dissertation provided a comprehensive examination of burnout among nurses in NWO, including evidence on measurement, prevalence, incidence, longitudinal patterns, and associated risk factors. Collectively, the findings demonstrated that burnout is not only highly prevalent, with new cases emerging (e.g., high incidence), often persistent, and has a relationship with workplace factors and mental health conditions. Reducing nurse burnout is essential because it may improve the health and well-being of nurses, enhances patient safety and quality of care, improves workforce retention and organizational performance, and supports the long-term sustainability of healthcare systems (Getie et al., 2025; Jun et al., 2021; Li et al., 2024). Given the substantial personal, clinical, organizational, and economic consequences associated with burnout, identifying modifiable risk and protective factors is critical for informing effective interventions and policies that foster healthy work environments and strengthen the nursing workforce.

A central finding across the studies is the substantial burden of burnout among nurses, demonstrated by both its elevated prevalence and high incidence. The observed prevalence exceeded pre- and intra-pandemic estimates (Ge et al., 2023; Woo et al., 2020), while the longitudinal study provided critical, novel evidence that new cases continued to emerge during the study period, despite a small initial baseline cohort. Together, the high prevalence and incidence indicate that burnout is a pervasive existing burden and continues to develop over a relatively short time frame within the workforce. These findings highlight the importance and urgent need of early detection, ongoing risk assessment, and proactive organizational strategies to safeguard nurse well-being, patient care, healthcare organizations, and ensure healthcare system sustainability (Dall'Ora et al., 2020; Hammarström et al., 2023; Jun et al., 2021; Khatatbeh et al., 2022; Wei et al., 2018).

A temporal pattern of burnout among nurses was observed, with levels remaining relatively consistent over an average of 0.61 years (approximately 7 months) for most nurses. This consistency suggests that burnout may be more persistent than transient for many nurses (Karakolias, 2025). However, not all nurses followed the same trajectory. Some nurses experienced changes in their burnout levels (e.g., onset or recovery), while others remained resilient and did not develop burnout. These findings indicate that although the experience of burnout can persist over time (e.g., T1 to T2), it is not uniform, and its presentation can be variable between individuals. This highlights the importance of examining not only overall levels, but also how experiences evolve differently across individuals over time.

Workplace factors were consistently associated with burnout across both cross-sectional and longitudinal analyses. While these findings are not novel in identifying the workplace as a central contributor to nurse well-being, they add further evidence by demonstrating the persistence of these associations across analytic approaches and over time. This methodological consistency adds to the evidence that workplace factors act as enduring structural drivers, further supporting the need for targeted organizational-level strategies. Significant variables identified in the multivariable models may be a useful starting point for nurse leaders and policymakers in developing successful strategies to mitigate burnout. For example, interventions that target workplace violence, long working hours, rotating shifts, and characteristics of the nursing practice environment (nurse participation in hospital affairs, nursing foundations of quality care, nurse manager, leadership, and support of nurses, and staffing and resource adequacy) are warranted.

A key finding of this research was the consistent relationship between burnout and mental health conditions. Not only was the prevalence of mental health conditions high among

the sample, but the co-occurrence of burnout with mental health conditions underscored the extent to which these experiences intersect among nurses. Mental health conditions were significantly associated with burnout in regression models, and trends observed in the incidence rate ratio analyses further suggested that nurses reporting mental health conditions at baseline were more likely to experience persistent burnout at follow-up and less likely to remain resilient at follow-up. Taken together, these findings point to a meaningful and potentially intertwined relationship between burnout and mental health conditions. The ongoing debate regarding whether burnout and mental health conditions represent distinct constructs or overlapping manifestations of a shared underlying phenomenon requires further evaluation (Bianchi & Brisson, 2019; Bianchi et al., 2015; Toth-Kiraly et al., 2021). Given the observational nature of the study and the timing of measurements, temporality cannot be definitively established, and causal inferences cannot be drawn. As such, it remains unclear whether mental health conditions contribute to the development and persistence of burnout, whether burnout precedes the development of mental health conditions, or whether both are shaped by shared underlying factors, such as workplace conditions. Future research should utilize prospective designs with frequent follow-up intervals to better understand these bidirectional relationships, establish temporality, and clarify the directional pathway.

The findings also point to differential vulnerability across subgroups of nurses. Early-career nurses appear to be at heightened risk of burnout, potentially reflecting the challenges associated with transition into practice, limited experience, lack of mentorship/leadership, and lower levels of professional autonomy. When considered alongside the observed temporal stability of burnout from time 1 to time 2, these findings raise concern that early experiences of burnout may persist if not addressed. This has important implications for workforce retention, as

supporting new nurses during this critical transition period is essential to sustaining the nursing workforce (Laschinger et al., 2009). Targeted strategies such as structured mentorship, comprehensive orientation programs, and ongoing clinical support may help mitigate early burnout and reduce the risk of longer-term persistence.

The strength of our findings was supported by the measurement properties of the CBI demonstrated in the psychometric study. The findings confirm the reliability and overall validity of the CBI in this population, consistent with prior validation studies (Montgomery et al., 2021), while also noting some mixed evidence regarding structural model fit. Examining the reliability and validity of the instrument provides helpful context for interpreting the observed estimates and tentative burnout trends identified across these studies. As the focus of this dissertation was on work-related burnout, future studies could evaluate similar objectives with client-related burnout as a primary outcome.

This integrated body of work advances understanding of burnout among nurses by demonstrating that it is widespread, that new cases of burnout are emerging, and that burnout was persistent for many nurses during the study timeframe. Manuscripts 2 and 3 both found that burnout was associated with both workplace factors and mental health conditions. This 3-manuscript dissertation investigated prevalence, incidence, and longitudinal trajectories of burnout, with conclusions that burnout represents a continuously evolving and sustained challenge within the nursing workforce. Further, these findings point to a clear need for system-level support (Lee & Cha, 2023) that address staffing adequacy, workload, scheduling practices, workplace safety, and organizational support. Efforts to improve the nursing practice environment and enhance job satisfaction may be particularly impactful in reducing burnout. Lastly, interventions focused solely on individual-level approaches (e.g., mindfulness, yoga,

stress management) are unlikely to be sufficient when burnout and mental health conditions co-occur and may require combined workplace and mental health interventions. However, evidence from systematic reviews on burnout interventions indicate limitations in study methodologies and the need for rigorous evaluation of interventions (Cohen et al., 2023). Similarly, there is a need for additional studies regarding the mental health status of nurses and the effectiveness of single or combined interventions on their mental health and the work environment (Duhoux et al., 2017). Table 1 provides a summary of the main findings in this dissertation along with implications at the research, practice, and policy levels.

Table 1

Summary of Findings and Implications (Research, Practice, Policy)

Key Point	Implications (Research, Practice, Policy)
CBI is a valid and reliable measure in this population	Research: Continue to use and validate the CBI in other samples. Consider the impact of reverse-scored item on model fit.
Burnout (incidence and prevalence) is common	Policy and Practice: Prioritize burnout as a workforce issue; allocate resources for workforce stabilization. Recognize as a core operational risk linked to increased sick time, staff turnover, and worsened care quality and safety. Research: Further examine post-pandemic trends and long-term impacts. Conduct additional studies on burnout incidence and longitudinal course in larger samples.
Early-career nurses more vulnerable to new onset of burnout	Policy and Practice: Implement targeted mentorship and workload management. Research: Additional research on early-career experiences and burnout.
Burnout is chronic for many nurses	Practice: Early identification and intervention are critical. Recognize burnout as a chronic occupational syndrome requiring long-term changes. Policy: Move from short-term fixes to sustained system-level strategies. Research: Explore long-term trajectories and chronicity.
Burnout is not uniform across individuals	Practice: Holistic interventions rather than one-size-fits-all approaches. Research: Identify subgroups at higher risk. Investigate why some nurse's burnout improved where others remained persistent.

Workplace factors are consistently associated with burnout	Policy: Advocate for minimum staffing, workload, workplace safety (e.g., bullying/violence), and scheduling structures. Practice: Redesign work environments to reduce strain. Prioritize strategies to address workplace violence from patients/clients. Invest in nursing leadership and manager training. Research: More research with variables such as resilience, self-efficacy, coping, sleep quality, moral distress, etc. More research regarding job satisfaction and whether job satisfaction is a workplace factor or a product of a combination of factors.
Mental health conditions are associated with burnout	Policy: Improve access to mental health care for nurses.
Burnout and mental health conditions co-occur	Research: Screen for both burnout and mental health conditions together. Study co-occurrence and clustering of conditions.
Conceptual overlap but distinction remains	Research: Clarify whether burnout is a separate construct or part of a mental health spectrum.
Temporality and causality unclear	Research: Conduct longitudinal and lagged analyses to clarify pathways.
Burnout reflects both structural and individual factors	Policy: Advocate for investments in resources/funding at the organizational and individual level. Practice: Provide multifaceted interventions. General wellness initiatives may aid resilient nurses, but persistent cases may require clinical mental health for anxiety, depression, or PTSD.
Generalizability	Research: Investigate outside of NWO (prevalence, incidence, co-morbidities).

Strengths and Limitations of the Dissertation

The following provides an overview of the dissertation's main strengths and limitations.

Each manuscript has specific study strengths and limitations noted.

Strengths

The main strengths of this dissertation include the diverse sample, methodologies to conduct the analyses, methodological rigor, and the research team. The studies had robust sample sizes that included nurses with different registration classes (RN, PN, and NP), practice settings (urban, rural, remote), roles (direct patient care, managerial, education), and levels of experience. Both cross-sectional and longitudinal methods were used to evaluate burnout which permitted the ability to evaluate one point in time and changes over time. Further, the longitudinal study

was one of the first to determine the incidence of burnout among nurses. The study employed methodological rigor with validated tools, multi-pronged sampling, adequate sample size, minimization of bias, and controlling for confounding variables. In study two, we determined that the recruitment method was not associated with burnout outcomes, indicating a low likelihood of selection bias. Additionally, despite the loss to follow-up in study three, the bivariable analysis identified that the individuals lost to follow-up were not different than those who completed. Finally, consultation and collaboration with the dissertation committee and EPID@Work staff, who represent a wealth of knowledge in the areas of epidemiology, psychology, health sciences, biostatistics, knowledge mobilization and more, added to the quality of the research in this dissertation.

Limitations

Limitations of this dissertation include generalizability, statistical power constraints, potential selection bias, measurement timing, and inability to determine causality. All studies focused on nurses in NWO which is a unique region, with low population density and potential service challenges. Thus, the results may not be generalizable to larger, urban centres, or international contexts. Further, the sample was predominately female and Caucasian. Next, there was limited statistical power when stratifying certain sub-groups. Similarly, the small number of nurses without burnout at baseline prohibited further evaluation of the resilient group and the incidence group. Despite our evidence that method of recruitment didn't influence participation, it is possible that nurses with specific interest in working conditions may have overrepresented the sample. Further, while we used validated tools to measure outcomes, the self-report measures for mental health conditions were not corroborated with clinical interviews, precluding confirmation of diagnosis. Delayed timing in sending out the 6-month survey led to inconsistent

follow-up for those recruited at the beginning of the study. Finally, the research estimated associations over time rather than establishing definitive causal relationships.

Conclusion

The overall purpose of this dissertation was to investigate burnout, mental health conditions, and the nursing practice environment among a sample of nurses in NWO. Through diverse methodologies and analyses, burnout was found to be highly prevalent and persistent, to co-occur with mental health conditions, and to be associated with workplace factors and mental health conditions. The findings from this dissertation have important implications for research, practice, and policy.

References

- Bianchi, R., & Brisson, R. (2019). Burnout and depression: Causal attributions and construct overlap. *Journal of Health Psychology, 24*(11), 1574-1580.
<https://doi.org/10.1177/1359105317740415>
- Bianchi, R., Schonfeld, I., & Laurent, E. (2015). Burnout-depression overlap: A review. *Clinical Psychology Review, 36*, 28-41. <http://dx.doi.org/10.1016/j.cpr.2015.01.004>
- Cohen, C., Pignata, S., Bezak, E., Tie, M., & Childs, J. (2023). Workplace interventions to improve well-being and reduce burnout for nurses, physicians and allied healthcare professionals: A systematic review. *BMJ Open, 13*(6), e071203.
<https://doi.org/10.1136/bmjopen-2022-071203>
- Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: A theoretical review. *Human Resources for Health, 18*(41), 1-17. <https://doi.org/10.1186/s12960-020-00469-9>
- Duhoux, A., Menear, M., Charron, M., Lavoie-Tremblay, M., & Alderson, M. (2017). Interventions to promote or improve the mental health of primary care nurses: A systematic review. *Journal of Nursing Management, 25*(8), 597-607.
- Ge, M-W., Hu, F-H., Jia, Y-J., Tang, W., Zhang, W-Q., & Chen, H-L. (2023). Global prevalence of nursing burnout syndrome and temporal trends for the last 10 years: A meta-analysis of 94 studies covering over 30 countries. *Journal of Clinical Nursing, 32*(17-18).
<https://doi.org/10.1111/jocn.16708>
- Getie, A., Ayenew, T., Amlak, B., Gedfew, M., Edmealem, A., & Kebede, W. (2025). Global

- prevalence and contributing factors of nurse burnout: An umbrella review of systematic review and meta-analysis. *BMC Nursing*, 24, 296. <https://doi.org/10.1186/s12912-025-03266-8>
- Hammarstrom, P., Rosendahl, S., Gruber, M., & Nordin, S. (2023). Somatic symptoms in burnout in a general adult population. *Journal of Psychosomatic Research*, 168, 111217. <https://doi.org/10.1016/j.jpsychores.2023.111217>
- Jun, J., Ojemeni, M.M., Kalamani, R., Tong, J., & Crecelius, M.L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, 119, 103933. <https://doi.org/10.1016/j.ijnurstu.2021.103933>
- Laschinger, H. K., Leiter, M., Day, A., & Gilin, D. (2009). Workplace empowerment, incivility, and burnout: Impact on staff nurse recruitment and retention outcomes. *Journal of nursing management*, 17(3), 302-311. <https://doi-org.ezproxy.lakeheadu.ca/10.1111/j.1365-2834.2009.00999.x>
- Lee, M., & Cha, C. (2023). Interventions to reduce burnout among clinical nurses: Systematic review and meta-analysis. *Scientific Reports*, 13(1), 10971. <https://doi.org/10.1038/s41598-023-38169-8>
- Li, L., Yang, P., Singer, S., Pfeffer, J., Mathur, M., & Shanafelt, T. (2024). Nurse burnout and patient safety, satisfaction, and quality of care: A systematic review and meta-analysis. *JAMA*, 7(11), e2443059. <https://doi.org/10.1001/jamanetworkopen.2024.43059>
- Montgomery, A., Azuero, A., & Patrician, P. (2021). Psychometric properties of Copenhagen Burnout Inventory among nurses. *Research in Nursing & Health*, 44(2), 308-318. <https://doi.org/10.1002/nur.22114>
- Toth-Kiraly, I., Morin, A., & Salmela-Aro, K. (2021). Reciprocal associations between burnout

- and depression: An 8-year longitudinal study. *Applied Psychology: An International Review*, 70(4), 1691-1727. <https://doi.org/10.1111/apps.12295>
- Wei, H., Sewell, K., Woody, G., & Rose, M.A. (2018). The state of the science of nurse work environments in the United States: A systematic review. *International Journal of Nursing Sciences*, 5, 287-300. <https://doi.org/10.1016/j.ijnss.2018.04.010>
- Woo, T., Ho, R., Tang, A., & Tam, W. (2019). Global prevalence of burnout symptoms among nurses: A systematic review and meta-analysis. *Journal of Psychiatric Research*, 123, 9-20. <https://doi.org/10.1016/j.jpsychires.2019.12.015>

Appendices

Appendix A: List of Variables Associated with Burnout

The following table provides a summary of variables that are associated with burnout.

BO – burnout, EE – emotional exhaustion, DP – depersonalization, PA – personal accomplishment, PB – personal burnout, WB – work-related burnout, CB – client-related burnout

	Galanis et al. (2021)	Ramirez-Elvira et al. (2021)	Lopez-Lopez et al. (2019)	Buckley et al. (2020)	Vargas et al. (2014)	Pradas-Hernandez et al. (2018)	Dall'Ora (2020)	Suleiman-Martos et al. (2020)	Shoman et al. (2022)	Maslach & Leiter (1997)	Karasek (1978, 1998)
Design	Systematic review	Systematic review	Systematic review	Scoping review	Systematic review	Systematic review	Theoretical review	Systematic review	Meta-analysis	Areas of worklife theory	Job Demand-Control-Support Model
Number of studies included	16	15	11	78	81	34	91	14	65	N/A	N/A
Sample	18,935 nurses during COVID pandemic	1,986 ICU nurses	868 Mental health nurses	Pediatric nurses	All nurses	9,075 Pediatric nurses	All nurses	8,959 Midwives	Various occupations	N/A	N/A
Individual characteristics											
Single		EE	Risk for EE	Married - mixed impact BO		Married - low BO		BO			
Age	Younger - BO	EE	Risk for DP	BO		Younger - BO		BO			
Sex/Gender			Risk for EE (male)								
Ethnicity				Low PA							
Family			Risk for EE (family problems)					Protective BO	EE		
Children								Controversial - reduces PB and WB and some found relationship with CB			
Geographical area								Rural area low BO, Northern Europe low BO			

Commuting distance			Risk for DP, low PA								
Low salary								BO			
Coping strategies				BO							
Anxiety				BO		BO		BO			
Low self-compassion				BO							
Low mindfulness				BO							
Somatic work-related health problems				BO							
Depression		EE		BO				BO			
Resilience		DP, PA									
Neuroticism		EE		BO							
Agreeableness		EE		BO							
Responsibility		EE									
Extroversion		EE									
Moral distress			Risk for EE, DP	BO							
Lack of emotional intelligence						BO					
Negative affectivity			Risk for EE, DP, low PA								
Employment characteristics											
Seniority		Low PA	Risk for DP, low PA	BO (low to moderate experience)		Low seniority - BO					
Job stability			Protect EE				BO				
Staffing	BO			BO			BO	BO			
Shifts > 8 hours				BO		BO	>12 hr BO				
Low schedule flexibility							BO				
Intention to leave			Risk for EE, DP								
Feeling valued at work			Protect EE, high PA				BO			BO	
Job satisfaction			Protect EE	BO	BO	BO, EE					
Progress in the workplace			Risk for low PA								
Inadequate and insufficient resources (material)	BO			BO				BO	EE		
Training	Low - BO										
Fairness										BO	
Work stressors and demands											
Work overload	BO	EE, DP	Risk for EE, low PA	BO			BO			BO	
Work-related stress			Risk for EE, DP, low PA	BO		BO		BO			
Role conflict			Risk for EE, DP				BO				

Aggression at work			Risk for EE, DP								
Predictability of work tasks			Risk for low PA								
High acuity work environment (ICU, oncology, ER)	BO			BO	BO - specialization						
Number of assigned patients				BO		BO					
Increased number of admissions				BO							
Unreasonable policies				BO							
High volume of paperwork				BO							
Lack of regular staff meetings				BO							
Lack of access to work information				BO		BO					
Decision making/uncertainty around treatment				BO			BO				
Role clarity				BO							
Unclear plan of care				BO							
Exposure to suffering, pain, sadness and death				BO							
Hopelessness				BO							
Providing futile care				BO							
Specific patient populations				BO							
Behavioural issues from patients or families				BO							
Mental workload				BO							
Low control							BO		EE	BO	BO
Low reward							BO	BO		BO	BO
Time pressures							BO				
High job and psychological demands							BO				
Low task variety							BO				
Low autonomy							BO	BO			
Negative nurse-physician relationship							BO				
Demand										BO	
Negative work environment								BO			
Longer working time in quarantine areas	BO										

Low family and colleague readiness to cope with COVID-19	BO										
Increased perceived threat of COVID-19	BO										
Support											
Social support	Decreased - BO		Protect EE	BO - unclear some protective, some risk			BO			BO	BO
Institutional support through clinical supervision			Protect EE			BO					
Organizational support				Low BO							
Poor supervision/leader support							BO				
Poor leadership							BO		EE		
Negative team relationship							BO				
Interactions at work									EE		

Appendix B: Recruitment Postcard

NORTHWESTERN ONTARIO NURSES

We are conducting a research study to better understand the physical and mental health of nurses throughout our region. We hope to learn more about your current nursing practice environments and how these influence your mental and physical health.

Your voice matters in shaping a healthier workplace for nursing in Northwestern Ontario!



SCAN THE QR CODE OR VISIT

WWW.WORKINGHEALTH.CA



Lakehead
UNIVERSITY



EPID
at work



NORTHWESTERN ONTARIO NURSES

YOUR VOICE MATTERS!

**Are you a
RN, RPN,
or NP?**

WHAT TO EXPECT?



Questions about leadership, support, nursing stressors, workload, staffing, burnout, mental health, and more!

We care about your well-being! Help us understand your needs for a healthier work environment by completing our survey on **mental** and **physical** health in the workplace

WHY PARTICIPATE?

- Your insights may lead to improvements for a healthier workplace
- Together, we can create a sustainable future for nursing in Northwestern Ontario

**Complete the survey for a chance to win
\$1,000 cash!**

Draws held at the end of July and August.



SCAN ME

QUESTIONS?

EMAIL WORKINGHEALTH@LAKEHEADU.CA
FOR MORE INFORMATION



Conducted by EPID@Work Research
Institute

Appendix C: Information Letter and Consent Form



WORKER INFORMATION SHEET AND CONSENT TO PARTICIPATE IN A RESEARCH STUDY

Title	Northwestern Ontario Workplace and Worker Health Study (NOWWHS)
Principal Investigator	Vicki L Kristman Professor, Dept Health Sciences Director, EPID@Work Research Institute, Lakehead University; (807) 343-8961 or (807) 343-7184
Co-Investigators	Batholomew Chireh, EPID@Work Research Institute Samuel Essien, EPID@Work Research Institute Peter Smith, Institute for Work and Health
Student Investigators	Ainsley Miller Kara Polson Tahsin Anika Umme Saika Kabir
Project Staff	Chantee Steinberg Claudia Jozefina Czechowski Elke Cullis Foruzan Bahrami Kayla Kubinec Kelsey Raynard Kristen McConnell Mannila Sandhu Shauna Fossum Thanusan Sooriyakumar
Funder	Ministry of Labour, Immigration, Training and Skills Development

Dear Potential Participant,

You are invited to participate in this study because you either clicked on the study link or your workplace agreed to participate in the study and gave permission for us to reach out to you. To participate in this study, you will be asked to complete a survey at the beginning of the study, as well as shorter follow-up surveys every 6 months afterwards. This study is being conducted by researchers from the Enhancing the Prevention of Injury and Disability @ Work (EPID@Work) Research Institute at Lakehead University. Please read this explanation about the study and its risks and benefits before you decide if you would like to take part. Participation in this study is completely voluntary, and your decision to participate or not will have no impact on your employment status.

Purpose

The purpose of this study is to establish a group of workplaces and workers that we can follow over time to better understand how the workplace affects mental wellbeing, mental disorders, and other health events in Northwestern Ontario workplaces post-COVID-19. Over time, we will develop and test various interventions with this group.

Study Eligibility

Individuals who are at least 14 years old, currently employed, self-employed, or have been employed in the past year are eligible to participate in this study. Those who would have liked to work in the past year, but could not due to a workplace injury (including mental health disorder) are also eligible to participate. Members and staff of the EPID@Work Research Institute are not eligible to participate in this study.

Study Procedures

If you agree to participate, you will be asked to complete a confidential web-based survey now that should take approximately 40 to 60 minutes to complete. Six months from now, we will email you a link to complete another survey that will be about half the size. The survey includes questions about your mental health, physical health, workplace conditions, personal factors, and workplace/personal demographics. The entire web-based survey does not have to be completed at one time. You may exit and resume the survey as many times as you wish as long as you return on the same browser where you started the survey, or you can email workinghealth@lakeheadu.ca to retrieve your survey.

Risks Related to Participating in the Study

With the sharing of personal health information there are possible risks of breach of confidentiality. We are taking several extra precautions to ensure this doesn't happen. First, we are using premium data collection software that encrypts all the information entered. This means that even if someone were to intercept the data, it would not be able to be understood. Second, the survey itself does not include your name, email address, or workplace name. That information is included in the informed consent. Third, the informed consent document is submitted separately from the survey data so even if someone were to intercept either the consent form or the survey data they would not be able to connect any information to you. Researchers can connect the consent data to the survey data through a Response ID that is generated by the survey software but is only accessible to researchers. Fourth, no identifying information will ever

be shared with your workplace, the Ministry of Labour, Immigration, Training and Skills Development (the study funder) or the WSIB. All study reports and summaries will include only aggregate or grouped findings. You may refuse to answer any question or stop the survey at any time. Finally, to further protect your information from your workplace we ask you to refrain from completing the survey on your workplace computer. Please contact us if you don't have access to a computer outside of your workplace and you would like to participate.

Although we do not foresee any major risks associated with participating in this study, we do understand that some questions included in the survey (especially about mental health) may be emotional or distressing. If you experience any stress or anxiety after participation in this study, please consult the following resources:

Connex Ontario 1-866-531-2600 (Phone, text and live web chat available)

<http://www.mentalhealthhelpline.ca/>

Northern Ontario Distress and Crisis Centre 1-855-554-HEAL (4325) (Available in English, Cree, Ojibway, Ojibway-Cree)

<http://www.talk4healing.com/>

Beendigen Woman's Crisis Line 1-807-346-4357

www.beendigen.com

Benefits to Participating in the Study

You will not receive any immediate direct benefit from being in this study. Information learned from this study may, in the future, help workplaces, supervisors, and worker compensation boards improve efforts and policies related to workplace health. In the longer term, there may be opportunities to participate in interventions within this study. This could confer some direct benefit at that time if the intervention tested is found to enhance worker mental health or improve the workplace for the worker in a positive way.

Voluntary Participation

Your participation in this study is completely voluntary. You may decide not to be in this study without penalty, and your workplace will not be notified of whether you have chosen to participate. You may refuse to answer any question in the survey that you do not wish to answer or end participation at any time.

Confidentiality

All information collected during this study will be kept confidential and will not be shared with anyone outside of the study. The information collected as part of this study will only be used for the purposes of this research study. The survey data will be collected using Qualtrics, which is a secure web-based survey platform. Only the research team will have access to the online data. After each follow-up ends, all information you have provided will be downloaded from the Qualtrics server (which is housed in Canada), deidentified and then stored on a secure password protected server at Lakehead University. This secure server can only be accessed by the research team. The encrypted information stored on the Qualtrics server will be kept until the last follow-up is completed (expected to be 7 to 10 years from now) and then all encrypted information from Qualtrics will be erased. All downloaded and deidentified study information will be stored securely in a locked cabinet and on a password-protected computer at Lakehead University. The

data will be housed on a Lakehead University server for the duration of the project. After the study is completed, all data will be stored at Lakehead University for a minimum of seven years. The research team will not share any personally identifiable information with anyone outside the study. Data will be published in aggregate form (e.g., a summary of results from all participants). All information collected during this study, including your personal information on the consent forms, will be kept confidential. You will not be named in any reports, publications, or presentations that may come from this study.

Expenses Associated with Participating in the Study

There are no expenses associated with participating in this study. If your employer has agreed to participate in this study, we will visit your workplace to collect data from you and your workplace. Your workplace has agreed to provide you with time at work to complete the survey by visiting us at our research van. Although you are able to complete the survey using any computer/tablet/phone, we do not recommend using your workplace computer to complete the survey, just to better protect the confidentiality of your information.

Research Results

We will be maintaining highlights of results on our study website after the first 6 months of the study (<https://www.workinghealth.ca/>), so you may see what we are learning from this study. We will also send highlights to draw your attention to the website when we have recently published an article. We will post a summary of the scientific articles on our study website. No participant will be identified in any of these postings.

To Show our Appreciation

To thank you for taking the time to participate in our study, we will hold twelve random draws for a \$500 gift card. A draw will be held after every 500 surveys completed. Once you have participated, you will remain in the draw until the entire \$6,000 is awarded. We will use the same \$500 gift card procedure to thank participants for completing each follow-up questionnaire.

To thank participating workplaces, they will receive a comprehensive report of all aggregate or grouped findings of their workers (if there are at least 20 participants who would not be able to be identified through provision of the information) after the baseline data collection is complete and yearly thereafter for as long as they continue to participate in the study. For those workplaces that are too small or have too few participants to allow for provision of aggregate data, we will provide aggregate data from all participating workers from organizations of the same size and from the same industrial sector. This is to help them identify where they can improve their workplace for their workers.

Conflict of Interest

Lakehead University, the Enhancing the Prevention of Injury and Disability @ Work (EPID@Work) Research Institute, and the Ministry of Labour, Immigration, Training and Skills Development will pay the researchers for the costs of doing this study. All these people have an interest in completing this study. Their interests should not influence your decision to participate in this study. You should not feel pressured to join this study.

Questions About the Study

This information letter will be available online on our study website (<https://www.workinghealth.ca/>) if you would like a copy. If you have any questions, concerns or would like to speak to the study team for any reason, please email the principal investigator, Dr. Vicki Kristman at epid.director@lakeheadu.ca or phone at (807) 343-8010 x7184. This study has been approved by the Lakehead University Research Ethics Board. If you have any questions about your rights as a research participant or have concerns about this study, contact Sue Wright from the Lakehead University Research Ethics Board at (807) 343-8010 x8283 or research@lakeheadu.ca. The Research Ethics Board is a group of people who oversee the ethical conduct of research studies. These people are not part of the study team. Everything that you discuss with them will be kept confidential.

I have read and understood the information provided above. I have had the opportunity to discuss this study and my questions have been answered to my satisfaction. I understand the potential risks and benefits of the study. Any data I provide will be securely stored at Lakehead University for a minimum of seven years following the completion of the project and I will remain anonymous in any publication/presentation arising from this study. I consent to take part in the study with the understanding I may withdraw at any time or choose not to answer any questions.

Consent Form

No signature in lieu of submit button. Date and time will be captured electronically.

I voluntarily consent to participate in this study.

Yes

No

Name (Please print first, middle and last name) _____

E-mail address _____

Canadian Telephone number _____

Extension (if any) _____

Name of your main job employer (e.g., *the job in which you work the most hours, with the highest income or highest potential for long-term employment*) _____

How were you invited to participate in this study?

My employer agreed to participate and I was asked along with other employees from my workplace

I heard about the study and completed it as an individual worker on my own

Our cohort study aims to follow participants over time, which requires us to contact you in six months. If we are unable to reach you, please provide the contact information of someone who can help us contact you.

Name of individual we can contact if we are unable to connect with you _____

Email address of individual we can contact if we are unable to connect with you _____

Telephone number of individual we can contact if we are unable to connect with you _____

Appendix D: Research Ethics Board Approval



Research Ethics Board
t: 807-343-8010 x.8283
research@lakeheadu.ca

August 23, 2023

Principal Investigator: Dr. Vicki Kristman
Co-Investigators: Dr. Samuel Essien, Dr. Deborah Scharf, Dr. Bartholomew Chireh, and Peter Smith
Partner: Audrey Gilbeau
Project Staff/Research Assistants: Mannila Sandhu, Thanusan Sooriyakumar, Kayla Kubinec, Chantee Steinberg, Logan Marks, Foruzan Bahrami, Elke Cullis, Claudia Czechowski, Kristen McConnell, Shauna Fossum, and Kelsey Raynard
Students: Ainsley Miller, Umme Saika Kabir, Anika Tahsin, and Kara Polson

Health and Behavioural Sciences\Health Sciences
Lakehead University
1294 Balmoral Street
Thunder Bay, ON P7B 5E1

Dear Dr. Vicki Kristman and team:

Re: Romeo File No: 1469951
Granting Agency: EPID@Work Research Institute
Agency Reference #: 1468903

On behalf of the Research Ethics Board, I am pleased to grant ethical approval to your research project titled, "Northwestern Ontario Workplace and Worker Health Study".

Ethics approval is valid until August 23, 2024. Please submit a Request for Renewal to the Office of Research Services via the Romeo Research Portal by July 23, 2024, if your research involving human participants will continue for longer than one year. A Final Report must be submitted promptly upon completion of the project. Access the Romeo Research Portal by logging into myInfo at: <https://erpwp.lakeheadu.ca/>

During the course of the study, any modifications to the protocol or forms must not be initiated without prior written approval from the REB. You must promptly notify the REB of any adverse events that may occur.

Best wishes for a successful research project.

Sincerely,

A handwritten signature in dark ink, appearing to read "C. Pousa", with a horizontal line extending from the end.

Dr. Claudio Pousa

Chair, Research Ethics Board

/sa

Appendix E: Survey

**note: only the instruments being used in the analysis were extracted for this section. There are additional instruments participants will complete as a part of NOWWHS but not all are relevant to this dissertation.*

Thank you for participating in our study. This survey has 5 sections. The first section asks about your current or most recent job (if you're employed or recently employed). Please answer with regard to your current or most recent job. If you have more than one job, please choose your main job (the job in which you work the most hours, with the highest income or highest potential for long-term employment). If you were employed for only part of the year, please answer the questions about that job. If you are off work due to a workplace injury, please answer the questions about the job where you were injured.

Workplace Demographics

1. What is your current employment status? (Select all that apply)
 - ☐ Employed full-time by employer
 - ☐ Employed part-time by employer
 - ☐ Self-employed (paid)
 - ☐ Employed in a permanent position
 - ☐ Employed in a seasonal position
 - ☐ Employed in a temporary position
 - ☐ Employed in a contract position
 - ☐ Employed in a casual position
 - ☐ Off work for workplace illness or injury
 - ☐ On leave for reason other than work illness or injury (e.g. Short- or Long-term disability, Parental leave, Military, etc.)
 - ☐ Unemployed, laid off, looking for work
 - ☐ Other (please specify): _____
2. What job or industrial sector is your employment in? (e.g. If you provide computer or software support for a hospital, please check "Professional, scientific and technical services".)
 - ☐ Agriculture, forestry, fishing and hunting
 - ☐ Mining, quarrying, and oil and gas extraction
 - ☐ Utilities
 - ☐ Construction
 - ☐ Manufacturing
 - ☐ Wholesale trade
 - ☐ Retail trade
 - ☐ Transportation and warehousing
 - ☐ Information and cultural industries
 - ☐ Finance and insurance
 - ☐ Real estate and rental and leasing
 - ☐ Professional, scientific and technical services

- ☐ Management of companies and enterprises
- ☐ Administrative and support, waste management and remediation services
- ☐ Educational services
- ☐ Health care and social assistance
- ☐ Arts, entertainment and recreation
- ☐ Accommodation and food services
- ☐ Other services (except public administration)
- ☐ Public administration

Some researchers at the EPID@Work Research Institute are focusing their research on specific areas of work. They have worked with stakeholders to develop additional questions for these areas, which you will be asked later in the survey.

3. Do you work in or are you off work from any of the following? (Select all that apply)
- ☐ Nursing – trigger **nursing** kickout
 - ☐ None of the above

If you currently hold more than one job, please answer the following questions based on your main job (i.e., the job in which you work the most hours, with the highest income or highest potential for long-term employment).

4. Job title of main job: _____
5. Job description of main job (e.g. primary work tasks, role in the workplace, etc.):

6. Where is your main job located?
- ☐ Major city (e.g. Thunder Bay, etc.)
 - ☐ Small city/town (e.g. Kenora, Dryden, Manitouwadge, etc.)
 - ☐ Rural (outside of a small town, but road access to towns)
 - ☐ Remote (no summer road access)
 - ☐ On Reserve
7. What are the first three digits of the postal code at your workplace? _____
8. How many years have you been working at your main job?
- ☐ Less than 1 year
 - ☐ 1 year to less than 5 years
 - ☐ 5 years to less than 10 years
 - ☐ 10 years or more
9. Which of the following best describes your work schedule for your main job?
- ☐ A regular daytime shift
 - ☐ A regular afternoon shift
 - ☐ A regular evening shift
 - ☐ A regular night or graveyard shift

- ☐ A split shift (two distinct periods each day)
- ☐ A rotating shift (changes from days to evenings to nights)
- ☐ An irregular schedule/on call
- ☐ Other (please specify): _____

10. What is the primary shift length for your main job?

- ☐ Less than 4-hour shift
- ☐ 4 to less than 6-hour shift
- ☐ 6 to less than 8-hour shift
- ☐ 8 to less than 10-hour shift
- ☐ 10 to less than 12-hour shift
- ☐ 12 to less than 16-hour shift
- ☐ 16-hour shift or more
- ☐ Variable
- ☐ Not applicable

11. How many hours do you work in an average week in your main job?

- ☐ Between 0 and 10 hours per week
- ☐ 11-20 hours per week
- ☐ 21-30 hours per week
- ☐ 31-40 hours per week
- ☐ 41-50 hours per week
- ☐ More than 50 hours per week

12. Do you work overtime in your main job?

- ☐ Yes, overtime is mandatory
- ☐ Yes, overtime is not mandatory
- ☐ No

13. During the past six months, how often have you considered leaving your main job?

- ☐ Never
- ☐ Rarely
- ☐ Sometimes
- ☐ Often
- ☐ Always

14. How satisfied are you with your main job?

- ☐ Very dissatisfied
- ☐ Dissatisfied
- ☐ Neither satisfied nor dissatisfied
- ☐ Satisfied
- ☐ Very satisfied

In the next section, we'd like to ask you about your health. We'll start by asking questions about your mental health.

Mental Health History

15. To the best of your knowledge, have you been diagnosed or received treatment for any of the following? (Select all that apply)

15.1. Depression (e.g. major Depression, dysthymia, postpartum, etc.)

☐ Yes

☐ No

15.2. Anxiety (e.g. generalized Anxiety, fear of public spaces, social anxiety, etc.)

☐ Yes

☐ No

15.3. Eating concerns (e.g. anorexia, bulimia, binge eating)

☐ Yes

☐ No

15.4. Bi-polar disorders

☐ Yes

☐ No

15.5. Schizophrenia or psychosis

☐ Yes

☐ No

15.6. Post-traumatic stress disorder (PTSD) or trauma

☐ Yes

☐ No

15.7. Substance use disorder

☐ Yes

☐ No

15.8. Attention-deficit hyperactivity disorder (ADHD)

☐ Yes

☐ No

15.9. Fetal alcohol spectrum disorder (FASD)

☐ Yes

☐ No

15.10. Learning disability

☐ Yes

☐ No

15.11. Personality disorder (e.g. borderline personality disorder, etc.)

- ☐ Yes
- ☐ No

Generalized Anxiety Disorder (GAD-7)

16. Below are some statements about anxiety. Over the last two weeks, how often have you been bothered by the following problems?

16.1. Feeling nervous, anxious, or on edge

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.2. Not being able to stop or control worrying

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.3. Worrying too much about different things

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.4. Trouble relaxing

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.5. Being so restless that it is hard to sit still

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.6. Becoming easily annoyed or irritable

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

16.7. Feeling afraid, as if something awful might happen

- ☐ Not at all (0 days)

- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

Patient Health Questionnaire (PHQ-8)

17. Below are some statements about depression. Over the last two weeks, how often have you been bothered by any of the following problems?

17.1. Little interest or pleasure in doing things

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

17.2. Feeling down, depressed, or hopeless

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

17.3. Trouble falling or staying asleep, or sleeping too much

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

17.4. Feeling tired or having little energy

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

17.5. Poor appetite or overeating

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

17.6. Feeling bad about yourself (that you are a failure or have let yourself or your family down)

- ☐ Not at all (0 days)
- ☐ Several days (1 to 6 days)
- ☐ More than half the days (7 to 10 days)
- ☐ Nearly every day (11 or more days)

- 17.7. Trouble concentrating on things, such as reading the newspaper or watching television
- ☐ Not at all (0 days)
 - ☐ Several days (1 to 6 days)
 - ☐ More than half the days (7 to 10 days)
 - ☐ Nearly every day (11 or more days)
- 17.8. Moving or speaking so slowly that other people could have noticed or the opposite (being so fidgety or restless that you have been moving around a lot more than usual)
- ☐ Not at all (0 days)
 - ☐ Several days (1 to 6 days)
 - ☐ More than half the days (7 to 10 days)
 - ☐ Nearly every day (11 or more days)
-

In the next section, we would like to learn more about your workplace and how you work.

Psychological and Social Support

18. Here is a list of statements about your main job. Please indicate how true each of these statements are with respect to your workplace.

18.1. My supervisor is concerned with the welfare of those under them

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Not applicable

18.2. My supervisor is helpful to me in getting the job done

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Not applicable

18.3. I am exposed to hostility or conflict from my supervisor

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Not applicable

18.4. The people I work with can be relied on when I need help

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Not applicable

18.5. The people I work with take a personal interest in me

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never
- ☐ Not applicable

Psychological Demands/Workload Management

19. Here is a list of statements that may or may not describe your main job. Please indicate how true each of these statements are with respect to your workplace.

19.1. I have too much work to do everything well.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

19.2. I have enough time to get the job done.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

19.3. I am free from the conflicting demands that other people make of me.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

19.4. My work is emotionally demanding.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely

☐ Never

19.5. My work requires that I hide my feelings.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

Involvement and Influence

20. Please indicate how true each of these statements are with respect to your workplace.

20.1. I have an opportunity to develop my own special abilities.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

20.2. I am given a lot of freedom to decide how to do my own work.

- ☐ Always
- ☐ Often
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

21. Please indicate to what extent you agree or disagree with each of these statements with respect to your workplace.

21.1. I get to do a number of different things on my job.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

21.2. My job lets me use my skills and abilities.

- ☐ Strongly agree
- ☐ Agree
- ☐ Disagree
- ☐ Strongly disagree

22. In your job, how often do you take part with others in making decisions that affect you?

- ☐ Often
- ☐ Sometimes

- ☐ Rarely
- ☐ Never

Workplace Injustice/Violence

23. These next questions ask about violence in your workplace.

23.1. Have you personally been exposed to physical violence (e.g. been physically assaulted) at your workplace during the last six months?

- ☐ Yes
- ☐ No – skip to #23.3

23.2. Who was the source of the physical violence? (Select all that apply)

- ☐ Coworkers/colleagues
- ☐ Manager/supervisor
- ☐ Subordinates
- ☐ Client/customer/patient/residents/students or their families
- ☐ Other (please specify): _____

23.3. Have you personally witnessed physical violence (e.g. seen a physical assault) at your workplace during the last six months?

- ☐ Yes
- ☐ No – skip to #23.5

23.4. Who was the source of the physical violence? (Select all that apply)

- ☐ Coworkers/colleagues
- ☐ Manager/supervisor
- ☐ Subordinates
- ☐ Client/customer/patient/residents/students or their families
- ☐ Other (please specify): _____

23.5. At work, have you personally experienced any of the following types of repeated mistreatment: abusive conduct that is threatening, intimidating, humiliating, work sabotage or verbal abuse?

- ☐ Yes
- ☐ No – skip to #23.7

23.6. Who was the source of this repeated mistreatment? (Select all that apply)

- ☐ Coworkers/colleagues
- ☐ Manager/supervisor
- ☐ Subordinates
- ☐ Client/customer/patient/residents/students or their families
- ☐ Other (please specify): _____

23.7. At work, have you personally witnessed any of the following types of repeated mistreatment: abusive conduct that is threatening, intimidating, humiliating, work sabotage or verbal abuse?

- ☐ Yes
- ☐ No – skip to #23.9

23.8. Who was the source of this repeated mistreatment? (Select all that apply)

- ☐ Coworkers/colleagues
- ☐ Manager/supervisor
- ☐ Subordinates
- ☐ Client/customer/patient/residents/students or their families
- ☐ Other (please specify): _____

23.9. In the last six months, were you sexually harassed by anyone while you were on the job?

- ☐ Yes
- ☐ No – skip to #24

23.10. Who was the source of this sexual harassment? (Select all that apply)

- ☐ Coworkers/colleagues
- ☐ Manager/supervisor
- ☐ Subordinates
- ☐ Client/customer/patient/residents/students or their families
- ☐ Other (please specify): _____

In the final section, we are interested in learning a bit more about you. This information will remain confidential.

Personal Demographics

24. Date of birth: _____

(Instructions: To select a date, please click on the text box which will pop up a calendar. Then click on the year and scroll to your year of birth and do the same for the month. Lastly in the calendar pick your day of birth.)

25. First 3 digits of your primary residence postal code: _____

26. What is the biological sex that you were assigned at birth (on your original birth certificate)?

- ☐ Male
- ☐ Female
- ☐ Intersex
- ☐ I am unsure
- ☐ I prefer not to answer

27. What is your current gender identity?

- ☐ Man

- ☐ Woman
- ☐ Two-spirit
- ☐ Transgender man
- ☐ Transgender woman
- ☐ Gender neutral or Gender free
- ☐ Another gender identity, please specify: _____
- ☐ I prefer not to answer

28. What is your highest level of education?

- ☐ Grade 8 or less
- ☐ Higher than grade 8, but did not graduate from high school
- ☐ High school graduate or equivalent
- ☐ Post-secondary (including some college or university, but did not graduate)
- ☐ College graduate
- ☐ University graduate
- ☐ Other, please specify: _____

29. What is your current marital status?

- ☐ Married
- ☐ Common-law
- ☐ Widowed
- ☐ Divorced
- ☐ Separated
- ☐ Never married/single

30. How do you identify your race/ethnicity? (Select all that apply)

- ☐ Indigenous (First Nations, Inuit, Métis)
- ☐ Arab (e.g. West Asia/ Middle East, North Africa, etc.)
- ☐ Asian (e.g. Chinese, Japanese, Korean, etc.)
- ☐ Black Caribbean (e.g. Jamaican, Bahamian, etc.)
- ☐ Black African (e.g. Nigerian, Somali, Sudanese, etc.)
- ☐ Latin American (e.g. Central American, South American, etc.)
- ☐ South Asian (e.g. Indian, Pakistani, Sri Lankan, Afghan, Nepali, etc.)
- ☐ Southeast Asian (e.g. Cambodian, Filipino, Laotian, Malaysian, Thai, Vietnamese, etc.)
- ☐ White/Caucasian (e.g. Western European, Eastern European, etc.)
- ☐ I prefer to self-identify (please specify): _____
- ☐ I prefer not to answer

Thank you for completing this survey. We will add your name to our random draws for \$500. We will reach out to you again in six months with a shorter survey that can be completed online. In the meantime, you can keep up to date on this study at www.workinghealth.ca.

We appreciate your time and effort. Any questions can be directed to workinghealth@lakeheadu.ca.

Nursing Survey

Nursing Demographics

Current nursing registration:

- ☐ Registered Nurse (RN)
- ☐ Registered Practical Nurse (RPN)
- ☐ Nurse Practitioner (NP)

Current nursing role:

- ☐ Direct patient care nurse
- ☐ Charge nurse
- ☐ Nurse manager
- ☐ Clinical nurse specialist
- ☐ Educator
- ☐ Primary care
- ☐ Other: _____

Total years of nursing experience: _____

Years of nursing experience on current unit: _____

Area of Work:

- ☐ Medical-Oncology
- ☐ Medical-Cardiology
- ☐ Medical-General
- ☐ Surgical
- ☐ Operating room
- ☐ Recovery room
- ☐ Critical care
- ☐ Emergency
- ☐ Mental health
- ☐ Maternal-Newborn
- ☐ Labor and Delivery
- ☐ Pediatrics
- ☐ Float pool or nursing resource unit (e.g., not assigned to a specific unit)
- ☐ Community health
- ☐ Public health
- ☐ Long-term care
- ☐ Rehabilitative care
- ☐ Primary healthcare
- ☐ Other: _____

Copenhagen Burnout Inventory (CBI)
Personal Burnout

Below is a list of statements about personal burnout which is a state of prolonged physical and psychological exhaustion. Please indicate to what extent you feel each of the following.

1. How often do you feel tired?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
2. How often are you physically exhausted?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
3. How often are you emotionally exhausted?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
4. How often do you think: "I can't take it anymore"?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
5. How often do you feel worn out?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
6. How often do you feel weak and susceptible to illness?
 - ☐ Never or almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often

☐ Always

Work-related Burnout

Work-related burnout is a state of prolonged physical and psychological exhaustion, which is perceived as related to the person's work. Please indicate to what extent you feel each of the following:

1. Is your work emotionally exhausting?
 - ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
2. Do you feel burnt out because of your work?
 - ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
3. Does your work frustrate you?
 - ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
4. Do you feel worn out at the end of the working day?
 - ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
5. Are you exhausted in the morning at the thought of another day at work?
 - ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always

6. Do you feel that every working hour is tiring for you?
- ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always
7. Do you have enough energy for family and friends during leisure time?
- ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always

Client-related Burnout

Below is a list of statements about client-related burnout which is a state of prolonged physical and psychological exhaustion, which is perceived as related to the person's work with clients, patients, social service recipients, elderly citizens, or inmates. Please indicate to what extent you feel each of the following:

1. Do you find it hard to work with clients?
- ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
2. Do you find it frustrating to work with clients?
- ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
3. Does it drain your energy to work with clients?
- ☐ To a very low degree
 - ☐ To a low degree
 - ☐ Somewhat
 - ☐ To a high degree
 - ☐ To a very high degree
4. Do you feel that you give more than you get back when you work with clients?

- ☐ To a very low degree
- ☐ To a low degree
- ☐ Somewhat
- ☐ To a high degree
- ☐ To a very high degree

Please indicate to what extent you feel each of the following.

5. Are you tired of working with clients?
 - ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always

6. Do you sometimes wonder how long you will be able to continue working with clients?
 - ☐ Never/Almost never
 - ☐ Seldom
 - ☐ Sometimes
 - ☐ Often
 - ☐ Always

Posttraumatic Stress Disorder Checklist (PCL-5)

Instructions: Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then circle one of the numbers to the right to indicate how much you have been bothered by that problem in the past month.

In the past month, how much were you bothered by:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing, and unwanted memories of the stressful experience?	0	1	2	3	4
2. Repeated, disturbing dreams of the stressful experience?	0	1	2	3	4
3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?	0	1	2	3	4
4. Feeling very upset when something reminded you of the stressful experience?	0	1	2	3	4
5. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?	0	1	2	3	4

6. Avoiding memories, thoughts, or feelings related to the stressful experience?	0	1	2	3	4
7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?	0	1	2	3	4
8. Trouble remembering important parts of the stressful experience?	0	1	2	3	4
9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?	0	1	2	3	4
10. Blaming yourself or someone else for the stressful experience or what happened after it?	0	1	2	3	4
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
12. Loss of interest in activities that you used to enjoy?	0	1	2	3	4
13. Feeling distant or cut off from other people?	0	1	2	3	4
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	0	1	2	3	4
15. Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4
16. Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
17. Being “super alert” or watchful or on guard?	0	1	2	3	4
18. Feeling jumpy or easily startled?	0	1	2	3	4
19. Having difficulty concentrating?	0	1	2	3	4
20. Trouble falling or staying asleep?	0	1	2	3	4

Practice Environment Scale of the Nursing Work Index (PES-NWI)

For each item, please indicate the extent to which you agree that the item is present in your current job. Indicate your degree of agreement by circling the appropriate number.

	Strongly disagree	Disagree	Agree	Strongly agree	Not applicable
Nurse Participation in Hospital Affairs Subscale (9-items)					
1. Nurses are involved in the internal governance of the hospital	1	2	3	4	0
2. Opportunity to participate in policy decisions	1	2	3	4	0
3. Opportunities for advancement	1	2	3	4	0

4. Administration that listens and responds to employee concerns	1	2	3	4	0
5. A chief nursing officer who is highly visible and accessible to staff	1	2	3	4	0
6. Career development/clinical ladder opportunity	1	2	3	4	0
7. Nursing administrators consult with staff on daily problems and procedures	1	2	3	4	0
8. Nurses have the opportunity to serve on hospital or nursing committees	1	2	3	4	0
9. A chief nursing officer equal in power and authority to other top-level executives	1	2	3	4	0
Nursing Foundations for Quality of Care Subscale (10-items)					
10. Use of nursing diagnoses	1	2	3	4	0
11. An active quality assurance program	1	2	3	4	0
12. A preceptor program for newly hired nurses	1	2	3	4	0
13. Nursing care is based on a nursing, rather than medical model	1	2	3	4	0
14. Patient care assignments that foster continuity of care	1	2	3	4	0
15. A clear philosophy of nursing that pervades the patient care environment	1	2	3	4	0
16. Written up-to-date care plans for all patients	1	2	3	4	0
17. High standards of nursing care are expected by the administration	1	2	3	4	0
18. Active staff development or continuing education programs for nurses	1	2	3	4	0
19. Working with nurses who are clinically competent	1	2	3	4	0
Nurse Manager Ability, Leadership, and Support of Nurses Subscale (5-items)					
20. A nurse manager who is a good manager and leader	1	2	3	4	0
21. A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician	1	2	3	4	0
22. Supervisors use mistakes as learning opportunities, not criticism	1	2	3	4	0
23. A supervisory staff that is supportive of the nurses	1	2	3	4	0

24. Praise and recognition for a job well done	1	2	3	4	0
Staffing and Resource Adequacy Subscale (4-items)					
25. Enough staff to get the work done	1	2	3	4	0
26. Enough Registered Nurses to provide quality patient care	1	2	3	4	0
27. Adequate support services allow me to spend time with my patients	1	2	3	4	0
28. Enough time and opportunity to discuss patient care problems with other nurses	1	2	3	4	0
Collegial Nurse-Physician Relationships Subscale (3-items)					
29. A lot of teamwork between nurses and doctors	1	2	3	4	0
30. Physicians and nurses have good relationships	1	2	3	4	0
31. Functional collaboration (joint practice) between nurses and physicians	1	2	3	4	0