KU LEUVEN

FACULTY OF PSYCHOLOGY AND
EDUCATIONAL SCIENCES

Occupational and Organizational Psychology and
Professional Learning (O2L)

Caring for the Caregivers

Working Conditions, Leadership, and Motivation for Nurse Well-Being

Dorothea Kohnen

Doctoral thesis offered to obtain the degree
of Doctor of Psychology (PhD)

Supervisor: em. Prof. Dr. Hans De Witte
Co-supervisors: em. Prof. Dr. Wilmar Schaufeli
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This study was funded by the European Union's Horizon 2020 research and innovation programme under the project Magnet4Europe: Improving Mental Health and Wellbeing in the Health Care Workplace (Grant Agreement Number 848031), which ran from 1 January 2020 to 30 June 2024. The materials presented here are the responsibility of the authors only. The European Commission takes no responsibility for any use made of the information presented in this work.

Funded by the Horizon 2020
Framework Programme of the
European Union

Caring for the Caregivers

Working Conditions, Leadership, and Motivation for Nurse Well-Being

Nurses play a central role in healthcare systems, yet their mental well-being is increasingly under pressure. Chronic staff shortages, high turnover rates, and growing complexity in care delivery have intensified concerns about how nurses experience their work. At the same time, researchers and healthcare experts have noted that hospitals cannot recruit their way out of this crisis. A shift in focus is needed from expanding the workforce to supporting those already in it. Sustainable solutions require a better understanding of the factors that support or undermine nurse well-being. This dissertation contributes to this effort by examining how job characteristics that are present in the work environment relate to burnout and work engagement among direct care nurses in acute care hospitals. Drawing on the Job Demands-Resources (JD-R) model and Self-Determination Theory (SDT), it explores the role of intrinsic motivation as a psychological mechanism and investigates how engaging leadership can contribute to a more supportive and motivating work environment. In doing so, this doctoral project addresses four central aims: (1) determining the relative importance of specific job demands and job resources for nurse burnout and work engagement, (2) explaining the underlying mechanisms and boundary conditions that shape these relationships, (3) examining how engaging leadership fosters nurse well-being by shaping work conditions and motivation, and (4) using a comprehensive measure of burnout to capture the full scope of this syndrome.

The objectives were addressed in three empirical studies. To test our hypotheses, we used data collected within the Horizon 2020 project Magnet4Europe, which aimed to improve working conditions for nurses and physicians in hospitals across European countries. Study 1 used a cross-national dominance analysis approach to rank the relative importance of specific job demands and job resources across hospitals in four European countries. The findings showed that emotional dissonance and emotional demands were the strongest predictors of burnout, whereas skill utilization was the most important predictor of work engagement. Study 2 combined SDT and the JD-R model to examine the psychological mechanisms and boundary conditions by which characteristics present in the clinical work environment influence nurses' well-being. Using data from Belgian direct care nurses, the findings showed that job resources were associated with higher levels of intrinsic motivation, which in turn was associated with lower burnout and higher work engagement. While job demands were unrelated to motivation, the results further showed that high levels of job resources buffered the negative effect of high job demands on burnout. Lastly, Study 3 focused on the role of leadership, specifically engaging leadership, in shaping nurse well-being. The findings showed that engaging leadership was indirectly associated with burnout and engagement, primarily through its associations with job resources and intrinsic motivation. No evidence was found for an indirect pathway through job demands and intrinsic motivation, as job demands were not significantly related to motivation.

Zorgen voor zorgverleners

Werkkenmerken, leiderschap, motivatie in relatie tot het welzijn van verpleegkundigen

Verpleegkundigen spelen een essentiële rol in de gezondheidszorg, maar hun mentaal welzijn staat onder toenemende druk. Chronisch personeelstekort, hoge uitstroom en de toenemende complexiteit van de zorgverlening roepen steeds meer vragen op over hoe verpleegkundigen hun werk beleven. Tegelijkertijd wordt steeds duidelijker dat ziekenhuizen deze crisis niet kunnen oplossen door enkel nieuw personeel aan te trekken. De aandacht moet verschuiven van uitbreiding naar ondersteuning van het huidige zorgpersoneel. Duurzame oplossingen vragen om beter inzicht in de factoren die het welzijn van verpleegkundigen versterken of ondermijnen. Dit proefschrift levert een bijdrage aan deze thematiek door te onderzoeken hoe werkkenmerken samenhangen met burn-out en werkbevlogenheid bij verpleegkundigen die directe zorg verlenen in ziekenhuizen. Op basis van het Job Demands-Resources (JD-R) model en de Zelfdeterminatietheorie wordt nagegaan hoe intrinsieke motivatie als psychologisch mechanisme een rol speelt en hoe engaging leiderschap bijdraagt aan een ondersteunende en motiverende werkomgeving. Meer specifiek richten we ons op vier doelstellingen: (1) welke werkkenmerken zijn de sterkste voorspellers van burn-out en werkbevlogenheid, (2) inzicht krijgen in de onderliggende mechanismen en randvoorwaarden die deze verbanden vormgeven, (3) nagaan hoe engaging leiderschap het mentaal welbevinden van verpleegkundigen bevordert via werkkenmerken en motivatie, en (4) het burn-outsyndroom in zijn volle breedte in kaart te brengen met behulp van een uitgebreid meetinstrument.

Deze doelen worden onderzocht in drie empirische studies. De data zijn verzameld in het kader van het Horizon 2020-project Magnet4Europe, dat tot doel had de arbeidsomstandigheden van verpleegkundigen en artsen in Europese ziekenhuizen te verbeteren. In Studie 1 wordt een cross-nationale dominantieanalyse toegepast om te bepalen welke werkeisen en werkgerelateerde hulpbronnen het meest bepalend zijn voor welzijn. De resultaten tonen aan dat emotionele dissonantie en emotionele belasting de sterkste voorspellers van burn-out zijn, terwijl het benutten van vaardigheden de belangrijkste voorspeller is van werkbevlogenheid. In Studie 2 worden het JD-R-model en de Zelfdeterminatietheorie gecombineerd om te onderzoeken hoe kenmerken van de werkomgeving het welzijn beïnvloeden via motivatie. De analyses, gebaseerd op Belgische data, tonen aan dat hulpbronnen samenhangen met intrinsieke motivatie, wat op zijn beurt samenhangt met minder burn-out en meer bevlogenheid. Werkeisen bleken niet gerelateerd aan intrinsieke motivatie, maar werkgerelateerde hulpbronnen temperden wel het negatieve effect van hoge werkeisen op burn-out. Studie 3 richt zich op de rol van engaging leiderschap. De resultaten tonen aan dat leiderschap het welzijn van verpleegkundigen vooral indirect beïnvloedt via de versterking van werkgerelateerde hulpbronnen en intrinsieke motivatie. Er werd geen verband gevonden tussen werkeisen en intrinsieke motivatie, waardoor het pad via eisen en motivatie niet werd bevestigd.

Published or accepted journal articles, and/or articles submitted for or worthy of publication

- Chapter 1: Key Drivers of Nurse Burnout and Work Engagement in Europe: A Dominance Analysis
    - Authors: Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., Aiken, L. H. & Sermeus, W.
    - Original title: Key Drivers of Nurse Burnout and Work Engagement in Europe: A Cross-sectional Dominance Analysis
    - First author: Kohnen, D.
    - Publication status: Published in the *International Journal of Nursing Studies*
    - DOI: https://doi.org/10.1016/j.ijnurstu.2025.105251
- Chapter 2: What Makes Nurses Flourish at Work? The Clinical Work Environment and Its Role in Nurse Motivation and Well-Being
    - Authors: Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L. & Sermeus, W.
    - Original title: What makes nurses flourish at work? How the clinical work environment relates to nurse motivation and wellbeing: A cross-sectional study
    - First author: Kohnen, D.
    - Publication status: Published in the *International Journal of Nursing Studies*
    - DOI: https://doi.org/10.1016/j.ijnurstu.2023.104567
- Chapter 3: Engaging Leadership and Nurse Well-Being: The Role of the Work Environment and Work Motivation
    - Authors: Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L. & Sermeus, W.
    - Original title: Engaging leadership and nurse well-being: the role of the work environment and work motivation—a cross-sectional study.
    - First author: Kohnen, D.
    - Publication status: Published in *Human Resources for Health*
    - DOI: https://doi.org/10.1186/s12960-023-00886-6

Additional forms of publications, or papers with more than two first authors

- None

Relationship between doctoral thesis and master's theses or other papers

- **Chapter related to the own master's thesis or paper**
  - None
- **Chapter related to another master's thesis or paper**
  - None

Statement about the use of Gen-AI

- Generative AI tools (e.g., ChatGPT) were used for language improvements; all content was critically reviewed and finalized by the author.

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GENERAL INTRODUCTION

GENERAL INTRODUCTION

Nurses are the heart of healthcare. They provide care, offer guidance, and accompany patients through every stage of their care journey. Their work is often described as a calling, and many nurses report a strong sense of purpose and meaning in their profession (Galuska et al., 2018; Kallio et al., 2022). According to the World Health Organization (WHO, 2025), there are around 29.8 million nurses, accounting for 57% of the healthcare workforce. At the same time, the nursing profession is under increased pressure due to a global staff shortage and high turnover rates (Buchan & Aiken, 2008; Lu et al., 2019). Projections indicate that this situation will worsen in the coming years, with an aging workforce, increasing healthcare demands, and around 4.1 million nursing positions expected to remain unfilled in 2030 (Buchan et al., 2022; WHO, 2025). This global crisis is expected to place even greater strain on those who remain in the profession, especially in regions like Europe, where nurses already report the highest levels of work-related stress compared to other occupations (Parent-Thirion et al., 2016). There is growing recognition among researchers and healthcare system experts that nurse well-being is deteriorating due to occupational stressors (Broetje et al., 2020; Vargas-Benítez et al., 2023). High workload, emotional demands, time pressure, poor leadership, and insufficient resources are well-documented job demands within the profession (e.g., Adriaenssens et al., 2015; Broetje et al., 2020; McVicar, 2016); factors that have been consistently linked to negative (health) outcomes, including burnout, psychological distress, and physical health complaints (Nahrgang et al., 2011; Nixon et al., 2011).

The year 2020, declared by the WHO (2020) as the Year of the Nurse and the Midwife, was meant to highlight the importance of the nursing profession. Instead of the intended recognition and support, the COVID-19 pandemic has amplified existing stressors, further exposing the vulnerability of nurses and underscoring the urgent need for improved working conditions (De Kock et al., 2021; Greenberg et al., 2021; Moreno-Jimenez et al., 2021). Despite these challenges, nursing remains a profession that is experienced as deeply meaningful and personally fulfilling (Kallio et al., 2022). The opportunity to support patients, promote health, and contribute to something greater than oneself are factors that drive nurses' motivation and engagement (Ziedelis, 2019). These meaningful aspects may help explain why so many nurses remain engaged, even under difficult and demanding conditions (Hakanen, Ropponen, Schaufeli, et al., 2019). Yet, understanding how work environments can support these motivational drivers is crucial, especially in high-demand professions like nursing. Rather than

viewing nurses solely as passive victims of stress, it is important to recognize their role as active agents who can respond to challenging working conditions in a healthy and constructive way (Bakker & Demerouti, 2007; Daniels, 2006).

The aim of this dissertation is to advance our understanding of the factors and processes that drive burnout and work engagement among nurses working in general acute care hospitals. Specifically, it examines (1) the key work-related predictors of nurse well-being, (2) the psychological mechanisms and boundary conditions underlying these relationships, and (3) the antecedents that shape the clinical work environment. Drawing on the Job Demands-Resources (JD-R) model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) and Self-Determination Theory (SDT, Deci & Ryan, 2000; Ryan & Deci, 2000b) particular emphasis is placed on the role of work motivation and leadership. In the following section, we will give a brief overview of both theories, followed by a problem statement and the overall objectives of this dissertation. To address these objectives, three empirical studies were conducted, which are outlined at the end of this chapter.

CONCEPTUAL FRAMEWORK AND THEORETICAL CONCEPTS

The Job Demands-Resources Model

In order to understand the impact of working conditions, namely job characteristics, on burnout and work engagement (as indicators of employee well-being), this dissertation will draw upon the premises of the Job Demands-Resources (JD-R) model (Demerouti et al., 2001; Schaufeli & Bakker, 2004). This model is a well-established job stress model that has been investigated in multiple settings, including healthcare, using various methodologies (Hakanen et al., 2021; Jourdain & Chenevert, 2010; Xanthopoulou et al., 2009). It builds on classic job design theories, including Siegrist's (1996) Effort-Reward Imbalance model, Hackman & Oldham's (1975) Job Characteristics model, and Karasek's (1979) Job Demands-Control model. At its core, the JD-R model proposes that work characteristics can be classified into two overarching categories: job demands and job resources. Job demands are those aspects of the job that require sustained (mental or physical) effort and that, when too high, are associated with certain psychological or physiological costs (Demerouti et al., 2001). Job resources, on the other hand, refer to those aspects of the job that help achieve goals, reduce the impact of job demands, or promote personal growth and development (Demerouti et al., 2001). In addition, the model proposes that job demands lead – via burnout – to adverse health outcomes (the health impairment process)

whereas job resources lead – via work engagement – to positive (motivational) outcomes and reduce burnout (Schaufeli & Taris, 2014).

Beyond the proposed main effects, the JD-R model also suggests that job demands and job resources have a combined (i.e., interaction) effect on job strain and motivation (Demerouti & Bakker, 2011). Specifically, it assumes that job resources can buffer the negative effects of high demands on outcomes such as burnout. This idea is consistent with earlier models like the Job Demands-Control model (Karasek, 1979) and the Effort-Reward Imbalance model (Siegrist, 1996), which suggest that decision latitude or sufficient rewards can reduce the negative impact of demanding work. Alongside this strain-focused perspective, the boost or activation hypothesis suggests a different pathway to motivation: the combination of high job demands and high job resources creates an "active" work environment that fosters growth and motivation. In such circumstances, job resources do not simply protect employees from high job demands but become a joint booster for motivation (Demerouti & Bakker, 2011).

Within the JD-R model, burnout and work engagement are considered distinct psychological states that represent the negative and positive poles of employee well-being, respectively (Schaufeli et al., 2002). Burnout reflects a state of energy depletion, whereas engaged employees experience a sense of energetic and effective connection with their work and see themselves as capable of dealing with the demands of their job. Burnout, in this dissertation, is understood as “a work-related state of exhaustion that occurs among employees, which is characterized by extreme tiredness, reduced ability to regulate cognitive and emotional processes, and mental distancing” (Schaufeli et al., 2020, p. 4). The primary dimensions can be seen as a form of “inability” to invest energy, captured by exhaustion, impaired emotional and cognitive control, while the fourth dimension, mental distancing, refers to the “unwillingness” to invest energy (Schaufeli et al., 2020). Work engagement, on the other hand, is defined as “a positive, fulfilling, work-related state of mind that is characterized by vigor, dedication, and absorption” (Schaufeli et al., 2002, p. 74). Vigor refers to experiencing high levels of energy and mental resilience while working, dedication to a sense of significance, enthusiasm, and challenge, and absorption to being focused and happily engrossed in one’s work (Schaufeli et al., 2002).

The main strength of the JD-R model is that it is considered an open, heuristic rather than a specific model; it is broadly applicable to any organizational and occupational settings as a wide

range of different job demands and resources as well as outcomes can be included (Bakker et al., 2014; Schaufeli & Taris, 2014). A vast amount of studies supported this model and found that excessive job demands such as work overload or emotional demands reduce individual well-being as they have been shown to be related to burnout (Alarcon, 2011; Aronsson et al., 2017; Galanakis & Tsitouri, 2022; Lesener et al., 2019). In contrast, job resources such as job autonomy or performance feedback are considered to have a favorable effect on well-being as they have been found to be positively related to work engagement (Humphrey et al., 2007; Keyko et al., 2016; Lesener et al., 2019; Mauno et al., 2010) and to be negatively associated with burnout (Hakanen et al., 2006; Lesener et al., 2019).

The JD-R model offers a widely accepted framework for identifying which job characteristics relate to employee work-related well-being (i.e., burnout and work engagement). However, the model does not explain the underlying (psychological) mechanisms through which these associations unfold (Schaufeli & Taris, 2014). In particular, it remains unclear why some employees thrive under certain job conditions while others struggle, even when exposed to similar job demands and job resources. To better grasp the underlying mechanisms of both the motivational and the health impairment processes (Demerouti et al., 2001; Schaufeli & Bakker, 2004), we draw on the premises of Self-Determination Theory (SDT, Deci & Ryan, 2000; Ryan & Deci, 2000b), a well-established theory of human motivation. Specifically, it emphasizes the role of individuals' innate psychological resources in fostering psychological growth and optimal functioning. A key feature of the theory is that it explains why people act the way they do at work. Focusing on the role of motivational quality, SDT helps explain why working conditions influence employee functioning. In doing so, it adds a meaningful psychological perspective to the processes outlined in the JD-R model.

Self-Determination Theory

Self-Determination Theory (SDT) is a widely acknowledged theory of human motivation that has been applied in various fields, including education, healthcare, and work and organizational psychology (Ryan et al., 2022). At its core, SDT distinguishes between different types of motivation that can be placed along a continuum, ranging from more controlled to more autonomous forms (Deci & Ryan, 2000; Ryan & Deci, 2000a). In other words, depending on their type of motivation, individuals may engage in certain behaviors or activities for different reasons: sometimes because they feel they have to, and sometimes because they truly want to. The former reflects more controlled forms of motivation, where behavior is driven by external

pressure or internal obligations (such as guilt or fear of disapproval). The latter reflects more autonomous forms of motivation where people act out of genuine interest or enjoyment, such as intrinsic motivation. Intrinsic motivation is the most autonomous and highest-quality form of motivation. It is defined as "the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000a, p. 56). When people are intrinsically motivated to perform a task, they do so simply because they perceive the task as interesting and pleasurable (Ryan & Deci, 2000a).

Whether individuals experience autonomous motivation at work depends on the extent to which their work environment supports the satisfaction of three basic psychological needs. These needs are considered innate and universal, meaning that all individuals possess them regardless of culture, age, or context, and their satisfaction is essential for healthy psychological development and functioning (Deci et al., 2017). The first is the need for autonomy, which refers to the feeling of acting with a sense of volition and choice. The second is the need for competence, which refers to the need to feel a sense of mastery over the environment and develop new skills. Lastly, the third is the need for relatedness which reflects the sense of connection and belonging with others. When these needs are satisfied, people are more likely to experience autonomous forms of motivation, which are associated with more positive (work-related) health outcomes (Deci & Ryan, 2000).

While basic need satisfaction is not the focus of this dissertation, this perspective provides a useful lens for understanding why similar working conditions may lead to different motivational and health outcomes among nurses. Following SDT, individuals feel and perform better at work when their work motivation is autonomous (i.e., intrinsic) in nature. This assumption is supported by a recent meta-analysis (Van den Broeck et al., 2021), which found that intrinsic motivation explained more than 50% of the variance in burnout, engagement, and other work-related outcomes compared to other types of motivation. These findings are particularly relevant in the context of nursing, where demanding working conditions often stand in contrast to the meaningful nature of the job. This dissertation draws on SDT to explore whether intrinsic motivation can help explain why similar work environments lead to different outcomes among nurses. Specifically, it positions intrinsic motivation as a core psychological mechanism that contributes to understanding why some nurses flourish (i.e., become engaged) while others experience burnout.

Engaging Leadership

A key question that follows is how organizations can actively support this type of high-quality motivation among their staff. Building on a self-determination motivational perspective, it has been argued that leaders play an important role in shaping employees' perceptions of their work environment (Schaufeli, 2015). This dissertation will focus on one particular leadership style, namely engaging leadership (EL; Schaufeli, 2015). Rooted in SDT (Deci & Ryan, 2000), the concept postulates that leaders behave in such a way that they fulfill their followers' work-related basic needs, which in turn reduce employees' work-related strain and increase their work engagement (Schaufeli, 2015). Specifically, by inspiring, strengthening, connecting, and empowering employees, engaging leaders are considered to foster employees' needs for autonomy, competence, and relatedness and hence increase their levels of engagement (Schaufeli, 2015). Positive leaders, such as engaging leaders, are therefore expected to create a resourceful work environment that enhances employee work motivation and well-being (Shuck & Herd, 2012). They do so by balancing job demands and job resources in such a way that employees remain healthy, motivated, productive, and satisfied (Schaufeli, 2015). By integrating EL into the JD-R model, Schaufeli (2015) conceptualizes leadership as a unique antecedent of employees' working conditions and their health-related outcomes. This stands in contrast to previous research measuring leadership merely as a job resource, such as social or supervisory support, rather than acknowledging it as a comprehensive, multidimensional construct (Kanste et al., 2007).

PROBLEM STATEMENT

Despite extensive research on the working conditions of nurses, several important theoretical and methodological shortcomings remain. First, although the JD-R model provides a widely acknowledged and accepted framework for studying employee well-being, little is known about the relative importance of specific job demands and job resources. Most studies have tested individual or interaction effects or relied on statistical methods that do not allow for a direct comparison of predictors (Hakanen et al., 2021; Hakanen, Ropponen, De Witte, et al., 2019; Oppel & Mohr, 2021). As a result, it remains unclear which job characteristics are key drivers of nurse burnout and work engagement.

Second, the JD-R model distinguishes between a health impairment and motivational process. However, the underlying (psychological) mechanisms remain insufficiently understood. While

the model outlines which job demands and job resources relate to burnout and work engagement, it does not explain why these effects occur. This limits our understanding of why some employees thrive in demanding environments while others struggle. These limitations highlight the need for complementary theoretical perspectives that can account for the psychological mechanisms underlying these effects. In addition, there is limited understanding about the interaction effect of job demands and job resources as proposed by the JD-R and Karasek's JDC model (de Lange et al., 2003). Although several studies have examined these interaction effects, the empirical findings are mixed; some studies support a buffering effect of job resources, while others do not. At the same time, research has predominantly focused on the strain hypothesis, whereas the activation hypothesis has received comparatively little attention (Vangrieken et al., 2022). This raises important questions about the conditions under which job demands function as challenges that foster motivational outcomes, or as stressors that drain energy and contribute to burnout.

Third, leadership plays a crucial but often overlooked role in employee well-being. Despite the widely acknowledged importance of leadership in creating healthy workplaces, the majority of leadership studies have largely neglected its impact on health-related outcomes mostly in favor of job performance or job satisfaction (Inceoglu et al., 2018). In particular, the potential impact of (poor) leadership on employee well-being and ill-health has often been overlooked, partly due to unclear conceptualizations and inconsistent measurement of both leadership and burnout (Schaufeli, 2015). As noted earlier, the majority of previous (burnout) research considered leadership behavior as rather narrow (e.g., by providing social support) instead of a comprehensive, multidimensional concept (Kanste et al., 2007). In addition, previous leadership concepts, particularly transformational leadership, have been criticized, because they lack a theoretical foundation and detailed description of the underlying processes (Bormann & Rowold, 2018; van Knippenberg & Sitkin, 2013). Accordingly, the underlying (motivational) processes through which leaders influence employee well-being are still debated in the literature (Cummings et al., 2018; Nielsen et al., 2008).

Similarly, burnout research has often focused on single dimensions of the syndrome rather than its multidimensional nature. Specifically, most studies have assessed burnout using the emotional exhaustion dimension of the Maslach Burnout Inventory (MBI) (Aronsson et al., 2017; Demerouti, 2024). While exhaustion is widely accepted as the central symptom of burnout, it is also the least unique symptom (Demerouti et al., 2021). In addition, while the MBI

is the most widely used instrument to assess occupational burnout, it has also been frequently criticized for its conceptual, practical, and psychometric shortcomings (Schaufeli et al., 2020). Burnout, by definition, is a multifaceted syndrome, typically understood as a set of symptoms and signs that tend to occur together. Rather than considering these dimensions in isolation, burnout should be identified when its core symptoms are experienced simultaneously (Demerouti, 2024).

These shortcomings are important to address from both a theoretical and a practical perspective. Theoretically, they limit our understanding of how job characteristics, psychological processes, and leadership relate to employee well-being. From a practical point of view, they hinder the development of effective interventions. Especially in light of ongoing staff shortages and increasingly demanding work environments, it is essential to identify what matters most, how work is experienced, and how leadership can support nurse well-being. By addressing these issues, this dissertation seeks to advance theory and inform practical strategies for fostering a healthy and engaging work environment for nurses.

RESEARCH OBJECTIVES

The overall aim of this doctoral research is to advance knowledge on the relationship between the hospital work environment and nurse well-being. Building on existing research, this dissertation addresses four key gaps: (1) insufficient knowledge about which job demands and resources are the most influential for nurse well-being, (2) limited understanding of the underlying mechanisms and boundary conditions that shape these relationships, and (3) limited evidence on the influence of leadership on nurse well-being, and (4) the need to strengthen the measurement of burnout using a more comprehensive tool. To address these gaps and extend existing literature on JD-R theory and SDT, the following research objectives were formulated:

1) To assess the relative importance of specific job demands and job resources in predicting burnout and work engagement among nurses, using a dominance analysis approach across multiple European countries. 2) To integrate Self-Determination Theory (SDT) into the Job Demands-Resources (JD-R) model to explore the psychological mechanisms underlying the relationship between job characteristics and nurse well-being. This includes investigating whether intrinsic motivation mediates the effect of job characteristics on burnout and work engagement (Objective 2a), and whether job resources moderate the impact of job demands on

motivation and burnout (Objective 2b). 3) To examine the role of engaging leadership as a unique antecedent of nurse well-being, exploring its role in shaping working conditions and fostering work motivation. 4) To adopt a comprehensive view of burnout through the use of a validated, multidimensional instrument, the Burnout Assessment Tool (BAT).

OBJECTIVE 1: EXAMINE THE RELATIVE IMPORTANCE OF JOB DEMANDS AND JOB RESOURCES FOR NURSE WELL-BEING

In this dissertation, we adopt dominance analysis to assess the relative importance of job demands and job resources in predicting burnout and work engagement. Introduced by Budescu (1993), dominance analysis addresses the methodological shortcomings of traditional regression models, such as stepwise or hierarchical approaches, which tend to misinterpret the importance of predictors. While such approaches focus on estimating the effect size of each predictor, dominance analysis provides a more accurate and unbiased picture of each predictor's contribution by ranking them according to their unique contribution to the outcome (Azen & Budescu, 2003; Budescu & Azen, 2004). This makes it particularly suitable for complex models involving multiple variables and in the presence of multicollinearity (Behson, 2005; Johnson, 2000). By using dominance analysis, this dissertation takes a novel approach to quantify the relative contributions of specific job demands and resources, offering a more nuanced understanding of key drivers of nurse well-being. In addition, we extend this approach by using a large dataset of nurses from several European countries. This cross-national perspective enables us to identify key factors influencing burnout and work engagement across different healthcare systems.

OBJECTIVE 2: INTEGRATION OF THE JOB DEMANDS-RESOURCES MODEL AND SELF-DETERMINATION THEORY

To address the second objective, this dissertation incorporates insights from Self-Determination Theory, a framework that guides research on the motivational factors that facilitate optimal functioning and prevent ill-being. In doing so, it adds an explanatory perspective to the JD-R model by highlighting how employees' internal experiences shape their responses to work-related demands and resources. While the JD-R model is widely used to examine how job demands and resources relate to employee well-being, it remains a predominantly descriptive model that outlines associations between variables without specifying the psychological processes involved (Schaufeli & Taris, 2014). SDT complements the JD-R model by offering

a theoretical explanation of how and why specific job characteristics affect motivation and well-being. Yet, previous studies on SDT have mainly focused on positive outcomes, thereby neglecting the "dark side" of human functioning (Van den Broeck et al., 2021). By simultaneously investigating positive and negative work environment factors (i.e., job demands and resources) as well as positive and negative manifestations of individuals' functioning (burnout and work engagement), this dissertation extends existing literature, providing insights into ways of promoting nurse well-being while preventing ill health and its associated costs.

OBJECTIVE 2A: INVESTIGATE THE UNDERLYING PSYCHOLOGICAL MECHANISMS IN THE RELATIONSHIP OF JOB CHARACTERISTICS AND NURSE WELL-BEING

This objective aspires to explore the underlying processes by which characteristics present in the work environment influence nurse well-being. It has been noted that not all employees perceive job demands and resources in the same way, and that these perceptions might be shaped by their personal resources (Sonnentag & Frese, 2012). Personal resources are psychological characteristics or aspects of the self that are associated with resilience and that refer to the ability to control and influence one's environment successfully (Hobfoll et al., 2003). Extensions of the JD-R model suggest that personal resources may play both a mediating and moderating role in the relationship between work characteristics and health outcomes (Demerouti & Bakker, 2011; Xanthopoulou, Bakker, Demerouti, et al., 2007). In this dissertation, we propose that work motivation functions as a personal resource, as it is defined as "energetic forces that initiate work-related behavior and determine its form, direction, intensity, and duration" (Pinder, 2008, p. 11). While work motivation is not typically classified as a personal resource in the sense of Hobfoll's definition (2003), it fulfills a comparable psychological function by regulating how much energy, attention, and persistence individuals invest in their work. In other words, work motivation is believed to influence the way in which employees allocate and balance their resources (e.g., attention, effort, and time spent on certain activities) (Kanfer et al., 2017). For healthcare organizations, in particular, nurses' work motivation is considered a key element in providing high-quality care and in meeting constantly changing demands (Toode et al., 2011). To our knowledge, no study has empirically tested the impact of work motivation on the relationship between nurses' job characteristics and their well-being. Combining JD-R theory and SDT, this dissertation investigates how job characteristics in the clinical environment affect nurse well-being, emphasizing the mediating role of intrinsic motivation as an underlying psychological mechanism.

OBJECTIVE 2B: EXAMINE THE BOUNDARY CONDITIONS OF THE RELATIONSHIP BETWEEN JOB DEMANDS, MOTIVATION, AND BURNOUT

In addition to investigating the underlying processes (i.e., why), this dissertation aims to explore the boundary conditions (i.e., when) by which working conditions affect nurse well-being. Specifically, we will examine under what conditions (i.e., when) the relationship of job demands with burnout and intrinsic motivation changes depending on the availability of job resources. While extensive research emphasizes the harmful effects of high job demands, a few studies report positive links between job stressors and outcomes such as motivation (Janssen et al., 1999). In line with the JD-R and Karasek's Demand-Control model, it is not high job demands per se, but high demands combined with a lack of resources that can harm well-being ("strain hypothesis"). In contrast, high demands alongside high resources might boost motivation and engagement ("activation hypothesis"). Although the activation hypothesis has received some empirical support, it has largely been overlooked in the literature (Vangrieken et al., 2022). In contrast, the strain hypothesis has been studied more extensively, yet the findings remain mixed (de Lange et al., 2003). In addition, most research has focused on job resources such as job control and social support as potential buffers against specific types of demands, particularly workload and time pressure. Therefore, the present dissertation seeks to extend existing research by including a broader range of job-specific demands and resources and by focusing on both the strain and activation hypotheses in relation to burnout and work motivation.

OBJECTIVE 3: INVESTIGATE HOW ENGAGING LEADERS INFLUENCE NURSE WELL-BEING

Following the identified shortcomings in current leadership research, the third objective aims to get a better understanding of the role that leaders play for nurses' well-being. To answer the research question how engaging leaders influence nurse well-being, we draw on the Job Demands-Resources leadership model (Schaufeli, 2015) and SDT. Specifically, we propose an integrated framework that links EL with nurses' perceived work-related well-being through two explanatory mechanisms: perceived job characteristics (job demands and resources) and intrinsic motivation. In doing so, we address several shortcomings in current leadership research, particularly the growing critique of transformational leadership. While transformational leadership has dominated leadership research for decades, scholars have increasingly questioned its conceptual clarity and theoretical foundation (Bormann & Rowold,

2018; van Knippenberg & Sitkin, 2013). In contrast, EL is rooted in SDT, a well-established motivational theory. EL focuses on how leaders can satisfy employees' basic psychological needs for autonomy, competence, and relatedness – key drivers of intrinsic motivation and well-being according to SDT. By grounding leadership behaviors in a well-established psychological theory, EL provides a more precise and testable explanation of how leadership contributes to employee motivation and well-being.

OBJECTIVE 4: ADOPT A COMPREHENSIVE VIEW ON BURNOUT

In this dissertation, we aspire to adopt a comprehensive view on burnout through the use of a validated, multidimensional instrument, the Burnout Assessment Tool (BAT). Since its introduction in 1981, the Maslach Burnout Inventory (MBI) has been considered as the "gold standard" to assess burnout. Although several adaptations have been made for different occupations, various conceptual, psychometrical, and practical criticisms have been raised (Demerouti, 2024; Schaufeli et al., 2020). To strengthen the validity of findings, this dissertation consistently employs the BAT (de Beer et al., 2020; Schaufeli et al., 2020), a validated, multidimensional instrument, offering a more comprehensive and theory-based assessment of the burnout syndrome. By enhancing the assessment of burnout, the research provides more reliable insights into how workplace factors relate to nurse well-being.

CONTEXT OF THIS DISSERTATION

This doctoral research is embedded in the Horizon 2020-funded Magnet4Europe project which aimed to redesign the clinical work environment, particularly for nurses, by applying the Magnet®[1] model and to evaluate its transferability to the European context (Sermeus et al., 2022). The Magnet model emerged in the 1980s when some U.S. hospitals proved far more successful than others in attracting and retaining nurses, despite a nationwide shortage. These hospitals were characterized by decentralized structures, shared decision-making, and transformational leadership (McClure et al., 1983). Over time, these features were integrated into a model with five key components, which became the foundation for Magnet designation. Extensive U.S.-based research has demonstrated the benefits of the Magnet model, including improved staff well-being, reduced burnout, and better patient outcomes (e.g., Kutney-Lee et al., 2015; Schlak et al., 2021). Although international pilots in England, Russia, and Armenia

[1] The Magnet® model is a registered trademark of the American Nurses Credentialing Center (ANCC) in the United States and other jurisdictions. All rights are reserved by ANCC.

also demonstrated its feasibility (Aiken et al., 2008; Aiken & Poghosyan, 2009), the model has seen only limited uptake in European healthcare systems (Sermeus et al., 2022).

Building on the Magnet model, the Magnet4Europe project implemented and evaluated an organizational redesign aimed at improving the mental health and well-being of nurses and physicians in European hospitals (Sermeus et al., 2022). The intervention consisted of several key components: one-to-one twinning between European hospitals and U.S. Magnet-designated hospitals, learning collaboratives that facilitated the exchange of best practices, a critical mass of participating hospitals to strengthen collective learning, structured feedback based on workforce surveys on working conditions and well-being, and a Magnet4Europe gap analysis tool adapted from the ANCC Magnet framework (Sermeus et al., 2022; Svensson et al., 2024).

Although this dissertation is embedded in the Magnet4Europe project, it does not evaluate the intervention itself. Rather than assessing the effectiveness of the Magnet intervention, this dissertation aims to advance theoretical and empirical understanding of workplace factors affecting nurse well-being using the available empirical data collected during the course of the project. The evaluation of the intervention is being conducted separately through a series of qualitative and quantitative studies (e.g., surveys, interviews, and focus groups) led by the broader Magnet4Europe research consortium. Some publications on the Magnet4Europe study are already available (e.g., Aiken et al., 2024; Sermeus et al., 2022; Svensson et al., 2024), while others - particularly those evaluating the interventions' effect - are currently in preparation. In addition, a final project report has been published and is available on the European Commission's CORDIS project page for Magnet4Europe (Project ID: 848031; EU, 2025).

CHAPTER OVERVIEW

The three chapters in this dissertation address distinct research questions, each linked to one or more of the overarching objectives outlined above. Although the studies are based on separate datasets and can be read independently, they are conceptually connected through a shared focus on nurse well-being in the context of job characteristics, motivation, and leadership. Chapter 1 examines which job demands and job resources are most strongly associated with burnout and work engagement using a cross-national sample. Chapter 2 investigates the psychological mechanisms and boundary conditions underlying these associations, with a particular focus on intrinsic motivation. Chapter 3 explores how engaging leadership may shape working

conditions and nurse well-being through motivational processes. Together, these chapters provide a complementary perspective that contributes to a more comprehensive understanding of how structural, motivational, and relational factors contribute to nurse well-being. Table 1 provides an overview of how each empirical chapter addresses the overarching research objectives of this dissertation. A conceptual framework of this dissertation, summarizing the theoretical pathways and focus of each empirical chapter is presented in Figure 1.

Table 1: Overview of different chapters and their corresponding objectives

Objective	**Chapter 1**	**Chapter 2**	**Chapter 3**
1. Examine the relative importance of job demands and job resources for nurse well-being	✓		
2. Integration of the Job Demands-Resources model and Self-Determination theory		✓	✓
2a. Investigate the underlying psychological mechanisms in the relationship of job characteristics and nurse well-being		✓	✓
2b. Examine the boundary conditions of the relationship between job demands, motivation, and burnout		✓	
3. Investigate how engaging leaders influence nurse well-being			✓
4. Adopt a comprehensive view on burnout	✓	✓	✓

Chapter 1: Key Drivers of Nurse Burnout and Work Engagement in Europe: A Dominance Analysis

In line with the first objective of this dissertation, the aim of Study 1 is to investigate the relative importance of specific job demands and job resources for burnout and work engagement among direct care nurses in several European countries. Using dominance analysis, our study takes a novel approach to quantify the relative contributions of specific job demands and resources, offering a more nuanced understanding of the key drivers of nurse well-being. In addition, we advance existing research on Job Demands-Resources theory by adopting a cross-national perspective, allowing us to examine whether the most influential predictors of nurse burnout and work engagement are consistent across different European healthcare contexts.

Chapter 2: What Makes Nurses Flourish at Work? The Clinical Work Environment and Its Role in Nurse Motivation and Well-Being

In the second study, we explore the underlying (psychological) mechanisms (why) and boundary conditions (when) through which the clinical work environment influences nurses' well-being. Specifically, we investigate the mediating role of intrinsic motivation in the relationship of job demands and job resources with burnout and work engagement. With regard to the boundary conditions, we test two theoretical assumptions: (1) that low job resources amplify the negative effects of high job demands on burnout (strain hypothesis), and (2) that high levels of job resources combined with high levels of job demands foster intrinsic motivation (activation hypothesis).

Chapter 3: Engaging Leadership and Nurse Well-Being: The Role of The Work Environment and Work Motivation

The third study examines the role of engaging leadership in shaping nurse burnout and work engagement. In particular, it advances the respective relationship by two explanatory mechanisms: job characteristics (i.e., job demands and resources) and intrinsic motivation. Our main argument is that engaging leaders shape nurses' perceptions of their work environment by balancing their job demands and job resources. Through improved working conditions, they foster nurses' intrinsic motivation, which ultimately contributes to lower burnout and higher work engagement.

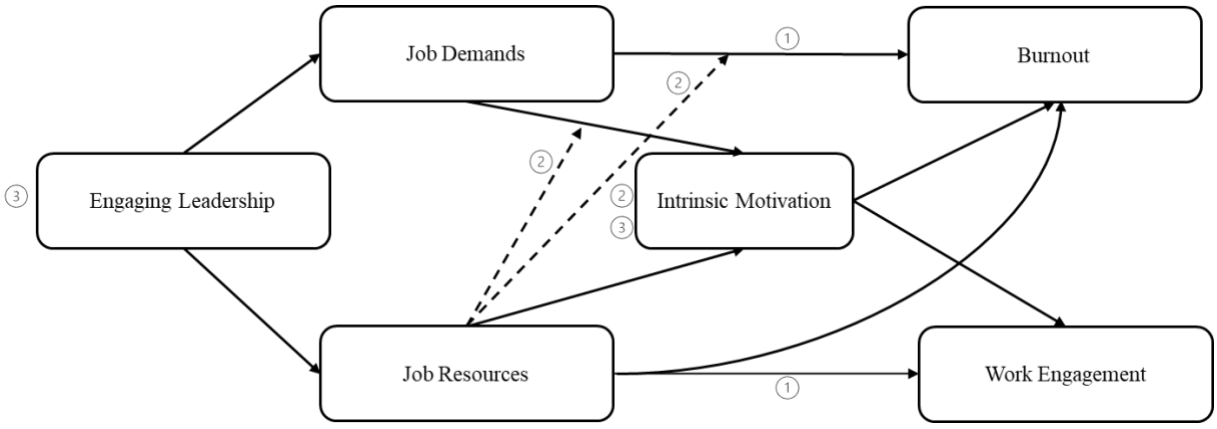

Figure 1: Conceptual framework of this dissertation.

Note. (1) Focus of Chapter 1, (2) Focus of Chapter 2, (3) Focus of Chapter 3. Solid lines represent direct associations between constructs. Dashed lines represent moderation effects on the respective associations.

Data Collection

The data used in this dissertation were collected at two different time points as part of the Magnet4Europe study. The first wave (T0), referred to as the baseline survey, was conducted between October 2020 and July 2021 and included 1,729 direct care nurses from 14 hospitals in the Flemish (Dutch-speaking) region of Belgium. The second wave (T1) was conducted between May and August 2022 and included 5,023 direct care nurses from 64 hospitals in six European countries: Belgium, Germany, Ireland, England, Sweden, and Norway.

Chapters 1 and 3 are based on data from T1, while Chapter 2 draws on the T0 dataset. Chapter 1 adopts a cross-national perspective by analyzing data from six countries, whereas Chapters 2 and 3 focus on the Belgian healthcare context. By zooming in on a single country, we are able to test more complex models within a controlled environment. This national focus provides deeper insight into underlying psychological mechanisms, thereby complementing the cross-national scope of Chapter 1. An overview of the different study samples is presented in Table 2.

Table 2: Overview of different samples across chapters

Chapter	**Country**	**N (hospitals)**	**N (nurses)**	**Time of Collection**
1	BE, DE, IE, SE, NO, ENG	64	5,023	May – Aug 2022
2	BE	14	1,729	Oct 2020 – Jul 2021
3	BE	13*	1,117	May – Aug 2022

Note. BE = Belgium, DE = Germany, IE = Ireland, SE = Sweden, NO = Norway, ENG = England; *one Belgian hospital left the Magnet4Europe study in Oct 2021.

OUTLOOK

In the final chapter of this dissertation, the key findings from the three empirical studies will be synthesized to draw overarching conclusions regarding the four research gaps identified earlier. In doing so, this chapter will reflect on how the integration of the JD-R model and SDT contributes to a more comprehensive understanding of nurse well-being. Moreover, the results will be discussed with regard to their practical and policy implications for healthcare organizations, with a particular focus on how to foster supportive work environments that sustain nurse motivation and reduce burnout. By bridging theoretical insight and practical relevance, this dissertation aims to inform future research, guide organizational interventions, and contribute to healthier and more sustainable work environments for nurses across Europe.

CHAPTER 1

Key Drivers of Nurse Burnout and Work Engagement in Europe: A Dominance Analysis

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This chapter is based on Kohnen, D., De Witte, H., Schaufeli, W.B., Dello, S., Bruyneel, L., Aiken, L.H. & Sermeus, W. (2026). Key Drivers of Nurse Burnout and Work Engagement in Europe: A Cross-sectional Dominance Analysis. *International Journal of Nursing Studies.* https://doi.org/10.1016/j.ijnurstu.2025.105251

ABSTRACT

Following the Job Demands-Resources (JD-R) model, job resources are key drivers of work engagement, while excessive job demands and insufficient job resources lead to job strain and burnout. Yet, little is known about the relative importance of different job demands and resources in comparison to one another. Using dominance analysis (DA), this study aimed to investigate the relative importance of specific job demands and job resources for burnout and work engagement among direct care nurses in Europe. A cross-sectional survey study was conducted in 64 general acute care hospitals in Belgium (13), Germany (20), Ireland (15), Norway (1), Sweden (4), and England (11) with a sample of 5,023 direct care nurses. Data were collected between May 2022 and August 2022. Structural equation modeling was performed to test the measurement model in the pooled sample and within each country. Due to model misfit (TLI < .88), Norway and Sweden were excluded from further analyses, resulting in a final sample of 4,591 nurses. Multiple-group confirmatory factor analysis was used to test configural and metric measurement invariance across countries. Based on the SEM results, the main propositions of the JD-R model were tested, followed by dominance analysis to determine the relative importance of specific job demands and resources for overall work engagement and burnout. In line with the JD-R model, job demands contributed to burnout (β = 0.681, p < 0.001), while job resources were positively linked to work engagement (β = 0.614, p < 0.001) and negatively associated with burnout (β = -0.258, p < 0.001). These relationships were consistent across countries. Dominance analyses further revealed that skill utilization was the strongest predictor of work engagement, explaining between 27.4% and 41.9% of the variance, while emotional dissonance (%R^2 = 17.0%-23.8%) and emotional demands (%R^2 = 17.3%-20.8%) were the strongest predictors of burnout. Overall, these findings were consistent across all countries. This study adds to the existing research on JD-R theory by uncovering the relative importance of specific job demands and resources for burnout and work engagement among European nurses. The findings can guide hospitals in prioritizing policies and practices to enhance nurses' well-being.

Keywords: Burnout; Burnout assessment tool; Work engagement; Job Demands-Resources model; Nursing; Dominance analysis; Europe

INTRODUCTION

BURNOUT AND WORK ENGAGEMENT IN NURSING

Nurses play a key role in healthcare (WHO, 2020). At work, they perform a wide and varied array of tasks ranging from acute emergencies to end-of-life palliative care. They treat patients who are sometimes in life-threatening conditions, make critical decisions under time pressure, and face emotionally demanding situations (Montgomery et al., 2015; Sinclair et al., 2015). Consequently, nurses are exposed to several work-related stressors that may deplete their available resources and hamper their normal functioning. In this sense, high levels of workload, role conflict, emotional demands, low autonomy, limited support from co-workers, and poor leadership have been associated with job strain and burnout among nursing professionals (Dall'Ora et al., 2020; McVicar, 2016; Sundin et al., 2011). Particularly in Europe, healthcare employees, including nurses, report the highest levels of work-related stress compared to other professionals (Parent-Thirion et al., 2016). Despite the emotional and interpersonal stressors, nursing can be extraordinarily rewarding, too. Nurses relieve patients' pain and suffering, they save lives, teach patients to care for themselves, and comfort distressed family members. These positive factors are often experienced as meaningful and provide them with essential resources which in turn help them cope with the demands and challenges of their work (Hakanen, Ropponen, De Witte, et al., 2019; Sinclair et al., 2015). In this context, research has shown that job resources such as autonomy or performance feedback have a favorable effect on well-being, fostering work engagement and reducing burnout (Christian et al., 2011; Halbesleben, 2010). In this study, burnout is defined as a work-related state of mental exhaustion, which is characterized by extreme tiredness and mental distancing. This extreme tiredness impairs the functional capacity to regulate emotional and cognitive processes (Schaufeli et al., 2020). Work engagement, in contrast, refers to a positive, fulfilling, work-related state of mind that is characterized by vigor (experiencing high levels of energy and mental resilience while working), dedication (referring to a sense of significance, enthusiasm, and challenge), and absorption (being focused and happily engrossed in one's work) (Schaufeli et al., 2002; Schaufeli & Bakker, 2004).

While there is sound evidence that various workplace characteristics play an important role in nurses' well-being (Holland et al., 2019; Jourdain & Chenevert, 2010; Montgomery et al., 2015), previous research has fallen short when it comes to examining the differential predictive validity of such characteristics. Most studies have focused on the independent or combined

effects of job demands and resources and therefore, very little is known about the relative importance of different job demands and resources in comparison to one another (Hakanen et al., 2021; 2019). This, however, is crucial to assess, as it seems unlikely that nurses will experience them in isolation (Oppel & Mohr, 2021). A central question that remains is whether some job demands and resources are key drivers of nurses' burnout and work engagement. Following the Job Demands-Resources (JD-R) model, the present study aims to fill this void by using dominance analysis to compare the relative importance of job demands and job resources of nurse well-being in a large European sample. By using dominance analysis, our study takes a novel approach to quantify the relative contributions of these job demands and resources, offering a more nuanced understanding of the key drivers of nurse well-being. In addition, by adopting a cross-national perspective, this study acknowledges that healthcare systems and workplace conditions vary significantly across countries, influencing nurses' autonomy, workload, and access to critical job resources (Aiken et al., 2012). These structural differences might lead to variation in how specific job demands and job resources impact well-being. However, despite these contextual differences, there may be common patterns across countries, indicating that certain job characteristics are universally critical for nurses' well-being. Identifying the most influential predictors is crucial, theoretically and practically, given the severe consequences of nurse burnout such as high turnover, reduced patient safety, and lower quality of care (Garcia et al., 2019; Heinen et al., 2013; Jun et al., 2021). In addition, such insights can inform targeted interventions to prevent burnout and foster work engagement among nursing professionals, strengthening healthcare sustainability and improving patient outcomes (Bargagliotti, 2012).

THE JOB DEMANDS-RESOURCES MODEL

The Job Demands-Resources (JD-R) model is well-established in occupational health psychology (Bakker & Demerouti, 2014; Bakker & Demerouti, 2017). It posits that every job comes with job demands and resources. Job demands are those "aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (Demerouti et al., 2001, p. 501). Their presence is not necessarily problematic, as long as they do not exceed the capacity of resources available, but if they do, they may turn into stressors fostering burnout. Job resources, in turn, are defined as "those physical, psychological, social, or organizational aspects of the job that are either/or (1) functional in achieving work goals, (2) reduce job demands and the associated physiological

and psychological costs, (3) stimulate personal growth, learning, and development" (Demerouti et al., 2001, p. 501). Job resources are said to have both extrinsic and intrinsic motivational potential as they may not only promote work engagement but also reduce burnout. An extension of the original JD-R model further proposes two key processes: the *health impairment process*, wherein excessive demands lead to burnout, and second, the *motivational process*, wherein resources promote engagement and reduce burnout (Schaufeli & Taris, 2014). The main advantage of the JD-R model is that it is considered an open, heuristic rather than a specific one. Due to its flexibility, it has been widely applied in research, including in healthcare, using different methodologies, ranging from diary studies (Xanthopoulou et al., 2009) to long-term follow-up studies (Hakanen et al., 2008), demonstrating that job demands and resources have unique and independent effects on employee well-being.

THE RELATIVE IMPORTANCE OF JOB DEMANDS AND RESOURCES FOR NURSE BURNOUT AND ENGAGEMENT

While the JD-R model is based on the universality of job demands (health-impairing potential) and job resources (motivating potential) (Schaufeli & Taris, 2014), earlier motivational theories (Hackman & Oldham, 1975; Herzberg et al., 1959) propose that task-level job resources (such as job autonomy, skill use, and feedback) are the main predictors of employee well-being and motivation. Work engagement, in particular, emerges in the process of working, i.e., when dealing with a specific task. Following Sonnentag (2017), we argue that task-related resources substantially contribute to the experience of work engagement. For instance, tasks that require the use of skills and abilities may contribute to the feeling of competence, thus fostering work engagement. Tasks that provide clear and immediate feedback provide the opportunity to learn, grow, and develop, and hence stimulate motivation and work engagement. The absence of feedback, on the other hand, can increase ambiguity and interpersonal conflicts as employees lack guidance on how to complete certain tasks, which can in turn lead to increased feelings of stress. Therefore, in a similar vein, we argue that task-related job demands (such as workload and emotional demands) essentially contribute to burnout. In line with this reasoning, various meta-analyses and reviews show that task-level job resources are stronger predictors of work engagement than, for example, organizational or interpersonal resources (Christian et al., 2011; Hakanen et al., 2021; Sonnentag, 2017). Similarly, task-related demands such as role conflict, high workload, and emotional demands have been consistently reported as key predictors of burnout among healthcare professionals (e.g., Dall'Ora et al., 2020; Marzocchi et al., 2024).

Yet, an important question that remains is: are some task-related job demands and resources more important in the emergence of burnout and work engagement than others? Previous research using the JD-R model usually relies on correlational designs or traditional multiple regression analyses to identify relationships between predictors and outcomes (Lesener et al., 2019). While such statistical methods are valuable in identifying relationships between variables, they fail to determine the relative importance of individual predictors, especially when predictors are highly interrelated (Hakanen et al., 2019, 2021; Oppel & Mohr, 2021). Dominance analysis, introduced by Budescu (1993), addresses this challenge by offering a way to better quantify and compare the influence of predictors, even in cases of multicollinearity. Based on the present state of knowledge, only a few studies have investigated the relative importance of job demands and resources for burnout and work engagement. For instance, Hakanen et al. (2021) showed in their study among Finnish employees, that skill discretion and job feedback made the strongest contribution to concurrent and future work engagement. Among health professionals, particularly nurses, job feedback and skill discretion contributed most to explaining work engagement. In a large-scale study using aggregated national data from 30 European countries, Hakanen et al. (2019) further examined the relative importance of job demands and resources for employees' vitality (i.e., burnout and work engagement) among different employment contract groups. The results revealed that regardless of the employment group, job feedback made the strongest contribution by explaining 37–41% of the total variance in work engagement. In relation to job demands, workload made the strongest contribution to exhaustion in all three groups, accounting for 34–37% of the total variance explained by dominance analysis in exhaustion (a core dimension of burnout), followed by emotional demands. Similarly, in a sample of 2423 Finnish physicians, Gluschkoff et al. (2022) found that time pressure was the most important predictor of emotional exhaustion.

THE PRESENT STUDY

In the present study, the focus is on five job demands: workload, role conflict, emotional demands, emotional dissonance, and red tape (i.e., bureaucracy), and four job resources: job autonomy, performance feedback, role clarity, and skill utilization. These task-related job demands and resources were selected based on their prominence in existing literature (Galanakis & Tsitouri, 2022; Marzocchi et al., 2024) and documented relevance to nurse work engagement and burnout (Broetje et al., 2020; Keyko et al., 2016; McVicar, 2016). A unique aspect of this study is its cross-national perspective, which allows for a comparison of how

different healthcare systems shape nurses' working conditions and well-being. Across Europe, these systems vary in organization and financing, potentially influencing job demands, available resources, and stress levels among nurses (Pisljar et al., 2011). For example, the UK's National Health Service (NHS) and Ireland's Health Service Executive (HSE) operate as publicly funded systems, where healthcare is largely financed through taxation, and access to care is generally free at the point of use. In contrast, Belgium and Germany follow a social health insurance model, where multiple sickness funds provide coverage, and both public and private providers coexist within a highly regulated framework. Importantly, while this study uses a cross-national approach, it does not aggregate data at the country level. Instead, it examines individual-level relationships within and across countries, providing a more detailed understanding of how job demands and resources impact nurses' well-being in different healthcare contexts.

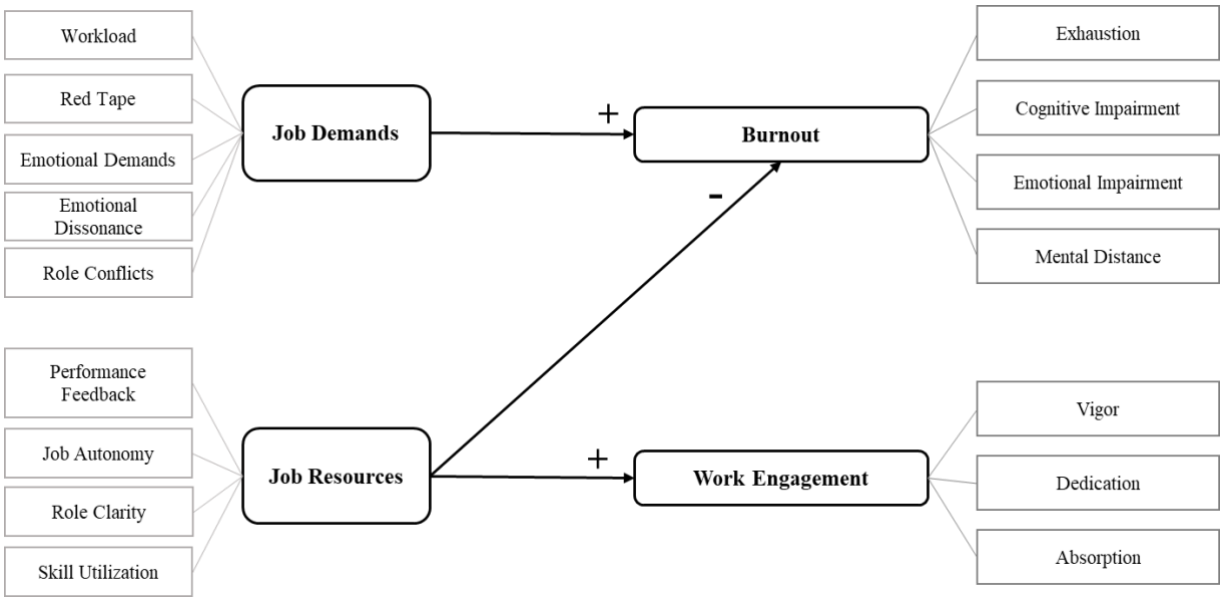

Figure 1.1: Theoretical framework based on the Job Demands-Resources model (Schaufeli & Taris, 2014).

Following the predictions of the JD-R model (Figure 1.1), we hypothesized that, regardless of the country, job resources are more strongly related to work engagement than job demands, and job demands, in turn, are more strongly related to burnout than job resources. In addition, our main goal was to examine whether the relative importance of each job demand and job resource for work engagement and burnout is similar or differs across countries.

METHODS

DATA COLLECTION

This study uses a cross-sectional dataset of 5,023 direct care nurses from 6 European countries. The data were collected between May 2022 and August 2022 in the context of the Horizon 2020-funded Magnet4Europe project (Sermeus et al., 2022). A subset of the data used in this study (the Belgian sample) has previously been analyzed in Kohnen et al. (2024) which examined the relationship between engaging leadership and nurse well-being, with job characteristics and work motivation as mediators. In contrast, the current study analyzes data from the full European sample using a different methodological approach to identify key factors of nurse well-being and to explore cross-country similarities and differences.

SETTING AND SAMPLE

A convenience sample was recruited, consisting of 64 general acute care hospitals in Belgium (13), Germany (20), Ireland (15), Norway (1), Sweden (4), and England (11). Included were hospitals, which had at least 150 beds, provided acute care for adults, and had internal medicine and/or surgery wards. Highly specialized hospitals providing only, e.g., pediatric or psychiatric care were excluded. A total of 37,758 registered nurses were invited to participate in the survey. Within each hospital, registered nurses were eligible to participate if they had direct patient contact and worked on adult inpatient units, including intensive care units (ICU) and the emergency room (ER). Of the 37,758 questionnaires sent, 7,147 were completed and returned, yielding an overall response rate of 18.9%. For the sake of homogeneity and comparability, the target population for this study included nursing professionals of the same job level, i.e., direct care nurses (De Jonge et al., 1999). Therefore, the final, overall dataset consisted of 5,023 nurses. Additionally, since there was only one Norwegian hospital, it was combined with the Swedish hospitals and presented jointly as “Scandinavia” throughout the study. The sample characteristics of each country are presented in the supplementary material (Appendix A).

MEASURES

We used previously validated scales which were available in the primary spoken languages of the participating hospitals (Dutch, English, German, Norwegian, and Swedish). A description including the internal consistency (Cronbach’s alpha) of each scale is presented below. All variables were scored on a five-point Likert scale ranging from 1 (never) to 5 (always).

Burnout. Burnout was assessed using the short version of the Burnout Assessment Tool (BAT, Schaufeli et al., 2020). The short version of the BAT (Hadzibajramovic et al., 2022) consists of 12 items that assess the presence of the four core burnout syndromes, with three items per dimension. Example items include: "At work, I feel mentally exhausted" (exhaustion), "I feel a strong aversion towards my job" (mental distance), "At work, I may overreact unintentionally" (emotional impairment), and "When I'm working, I have trouble concentrating" (cognitive impairment). The Cronbach's alpha for the total burnout scale was $\alpha = 0.91$.

Work Engagement. Work engagement was measured using the ultra-short version from the Utrecht Work Engagement Scale (UWES, Schaufeli et al., 2019). The UWES-3 assesses the three core dimensions of work engagement, with one item each. An example item is: "At my work, I feel bursting with energy" (vigor). The Cronbach's alpha for this scale was $\alpha = 0.81$.

Job Resources. Four job resources were included in this study using the Energy Compass (Schaufeli, 2017). Performance feedback was measured with three items ($\alpha = .82$). An example item was "Does your supervisor provide information about how well you perform your job?" The job autonomy scale consisted of four items ($\alpha = .84$), such as "Can you decide when you perform your work?". Role clarity was assessed with two items ($\alpha = .83$). An example item was "Do you know exactly what is expected of you at work?" Lastly, skill utilization was measured with three items ($\alpha = .75$), such as "I have sufficient opportunities at work to use my skills and abilities."

Job Demands. Similarly, the questionnaire captured a set of five job demands which, except for emotional dissonance (Zapf et al., 1999), were all derived from the Energy Compass (Schaufeli, 2017). Workload was assessed using four items ($\alpha = .82$). One example item was "Do you have too much work to do?" Role conflict covered three items ($\alpha = .67$), such as "I have to do things that should be done differently." The three remaining job demands were assessed with single items: Red tape ("Are you prevented from carrying out your work properly because of unnecessary rules, procedures and regulations?"), emotional dissonance ("How often does it occur in your job that you have to display emotions which do not correspond to your inner feelings at that moment?", Zapf et al., 1999), and emotional demands ("Does your work put you in emotionally upsetting situations?").

STATISTICAL ANALYSIS

Data analysis was performed in several stages. Before testing the general assumptions of the JD-R model and conducting the dominance analysis, we assessed whether the model could be compared across countries. First, we estimated the measurement model in the pooled sample, then, separately for each country, using structural equation modeling (SEM) with maximum likelihood estimation in Mplus (Version 8.6, Muthén & Muthén, 2017). Model fit was evaluated based on the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) (Hu & Bentler, 1999; van de Schoot et al., 2012). Values above 0.90 indicate an adequate fit, while values above 0.95 suggest an even better fit. Additionally, we considered the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR), with recommended thresholds of <0.06 (RMSEA) and <0.08 (SRMR).

In the next step, we used multiple-group confirmatory factor analysis with maximum likelihood estimation to examine configural and metric invariance. Configural invariance was assessed by specifying the same factor structure across groups while allowing factor loadings, item intercepts, and residual variances to vary freely. In the metric invariance model, we further constrained factor loadings to be equal across countries to ensure that constructs were measured similarly across groups. Latent means were estimated freely, with the first indicator in each factor fixed at zero in each group (Rudnev et al., 2018). While configural invariance is established if the model shows an acceptable fit to the data, metric invariance is supported if the model fit does not deteriorate substantially compared to the configural model. This is typically indicated by a change in CFI ($\Delta CFI \geq -0.01$) and in RMSEA ($\Delta RMSEA \leq 0.015$, Chen, 2007). Establishing metric invariance ensures that the latent constructs are comparable across countries, allowing us to proceed to test the general assumptions of the JD-R and to conduct the dominance analysis.

DOMINANCE ANALYSIS

To assess the relative importance of the predictors included in our study, we used dominance analysis, a technique that ranks predictors according to their unique contribution in explaining the variance in an outcome (Azen & Budescu, 2003). More specifically, dominance analysis works by calculating the contribution of each predictor (demand or resource) in explaining the variance or the degree of difference in the outcome (burnout and work engagement). Dominance analysis is particularly useful in overcoming the methodological difficulties

associated with traditional regression models, which focus on estimating the effect size of each predictor. For instance, regression models, including stepwise and hierarchical approaches, tend to overestimate the importance of the strongest predictors and to underestimate the significance of the less important predictors. In other words: multiple regression fails to accurately estimate the relative importance of different predictors, especially when dealing with multicollinearity (Behson, 2005; Johnson, 2000). Unlike traditional regression models, dominance analysis helps to understand which predictors contribute most to the total variance explained by the model. Therefore, it is especially useful when dealing with complex models where multiple predictors may be interacting or when trying to assess the contribution of each variable in the most informative and unbiased way possible (Azen & Budescu, 2003; Budescu & Azen, 2004).

In the current study, the dominance analysis statistic of interest was the General Dominance statistic, which estimates the relative importance of predictors by assessing their average contribution to the explained variance (R^2) across all possible models. Specifically, it represents the average difference in R^2 when a given predictor (e.g., skill utilization or workload) is included in or excluded from models of all sizes, ranging from single-predictor models to full models with all predictors. Compared to other dominance statistics (e.g., conditional or complete dominance), the main advantage of General Dominance is that it can almost always be established (Luo & Azen, 2013). Therefore, in the present study, it helps to identify which predictors (job demands and resources) contribute most consistently to explaining the outcomes (burnout and work engagement), considering all possible model combinations.

In this study, the level of analysis was at the individual level. Given the hierarchical structure of the data, where nurses are clustered within healthcare organizations across several countries, we first calculated the intra-class correlations (ICCs) for the scales. The ICC provides an estimate of the proportion of the total variance in an observed variable that is attributable to differences between organizations (Heck, 2001). In our study, the ICC coefficients of job demands had an average value of 4.4% (ranging from 1.8% for emotional dissonance to 6.2% for workload). Similarly, we found an average value of 4.3% for job resources (ranging from 2.4% for skill utilization to 8.3% for feedback). Both values can be considered indicative of a low to moderate grouping effect (Hox et al., 2010). Therefore, we employed linear mixed models for the individual-level dominance analysis, adjusting for each healthcare organization using mixed-effect regression with the wrapper "mixdom" in Stata's DOMIN module

(Luchman, 2021). This approach accounts for the nested structure of the data, recognizing that responses from nurses within the same hospital are likely to be more similar to each other than those from nurses in different hospitals.

As the primary interest was to determine the relative importance of each predictor while controlling for random effects (i.e., clustering within hospitals), we used the R^2 measure at Level 1 to assess the importance of the predictor in the hierarchical models (Luo & Azen, 2013; Snijders & Bosker, 1994). Specifically, we evaluated the contribution of job demands and job resources in explaining variance in work engagement and burnout, while accounting for the clustering of nurses within hospitals. Similar to the first part of our analysis, we measured the relative importance of predictors for burnout and work engagement in the pooled sample and, second, separately in each country. In addition to examining the impact of the organization, we controlled for gender, age, and country to account for potential confounding effects.

ETHICAL CONSIDERATIONS

This study was approved by the Research Ethics Committee UZ/KU Leuven, Belgium (S64213), and in participating countries either through a central or decentralized authority. Data collection took place using an online data collection platform. Every participant had to agree to participate in the study before they could continue and engage in the survey. Data were processed in line with the General Data Protection Regulation 2016/679 of the European Union (European Parliament & Council of the European Union, 2016). Kohnen et al. (2023) provide a more detailed description of the data collection process in general.

RESULTS

MEASUREMENT MODEL AND MEASUREMENT INVARIANCE

First, we conducted a CFA to test whether measures of the included constructs are consistent with the expected underlying structure (see Figure 1.1). The measurement model consisted of four correlated latent variables: job demands (a first-order factor represented by items assessing workload, role conflict, emotional demands, red tape, and emotional dissonance), job resources (a first-order factor represented by items assessing job autonomy, performance feedback, role clarity, and skill utilization), burnout (a second-order factor represented by its four dimensions exhaustion, mental distance, cognitive impairment, and emotional impairment; each represented by their three corresponding items), and, lastly, work engagement (a first-order

factor represented by its three items). The model demonstrated an acceptable fit in all countries (see Supplementary Material, Appendix B), except for Scandinavia (Sweden and Norway), where the TLI was slightly below the acceptable range (TLI=0.89). Therefore, we decided to exclude Scandinavia from further analysis.

In the next step, we used multiple-group confirmatory factor analysis to examine configural and metric invariance across the four remaining countries (Belgium, Germany, Ireland, England). Model 1, which included no cross-groups constraint, demonstrated a very good fit (see Supplementary Material, Appendix C). All indicators showed statistically significant factor loadings on their respective latent factors ($p < 0.001$) with λ values ranging from: 1) Belgium, from 0.434 to 0.920; 2) Germany, from 0.422 to 0.895; 3) Ireland, from 0.602 to 0.933; and 4) England, from 0.566 to 0.945. These results confirm that each construct was measured by the same items in each country, establishing configural invariance. Model 2, which tested for metric invariance, also displayed a good fit. Furthermore, the difference in CFI and RMSEA did not exceed the indicated thresholds. A reliable measurement model was therefore obtained.

DESCRIPTIVE STATISTICS, RELIABILITIES, AND CORRELATIONS

After excluding the Scandinavian countries, the final sample consisted of 4,591 registered direct care nurses from 59 hospitals. Regarding demographic characteristics, 82% of the nursing staff were female, with an average age of 38 years (SD = 11). On average, they had 15 years of overall work experience (SD = 11) and had been employed at their current hospital for 11 years (SD = 11). The sample included registered nurses from various departments: 24.1% worked in intensive care, followed by surgical (20.5%), internal medicine (15.5%), emergency (7.6%), geriatrics (6.6%), neurology (4.2%), and oncology (2.6%) units.

Table 1.1 presents the means, standard deviations, reliabilities, and correlations for all constructs in the pooled sample. Cronbach's α coefficients were above 0.70 for all the scales in all countries, except for role conflict, which showed values of $\alpha = 0.58$ in England and $\alpha = 0.63$ in Ireland. Correlations among the variables included were all statistically significant and in the expected direction (i.e., as proposed by the JD-R model). In addition, we used correlational analyses to verify the associations between the sociodemographic variables (age, gender) and the variables of our model. Age showed statistically significant correlations with all predictors except for red tape and feedback. Specifically, older employees (56+ years) reported

statistically significant higher workload and lower role clarity, while middle-aged employees (36-45) experienced higher emotional dissonance than younger groups. Gender only showed weak but statistically significant correlations with a few predictors (i.e., workload, emotional demands, performance feedback, role clarity) and work engagement. Women reported significantly higher workload and emotional demands but lower performance feedback and role clarity than men. Resembling previous research, women also reported significantly higher work engagement (Hakanen, Ropponen, Schaufeli, et al., 2019).

JOB DEMANDS-RESOURCES MODEL

Next, we proceeded to test the structural relationships proposed by the JD-R model using SEM, as described at the beginning of the results section. Specifically, we examined these relationships first in the pooled sample and then separately for each country. In the pooled sample, our results indicated a positive relationship of job demands with burnout ($\beta = 0.681$, $p < 0.001$) as well as a positive relationship of job resources with work engagement ($\beta = 0.614$, $p < 0.001$). In addition, job resources were negatively related to burnout ($\beta = -0.258$, $p < 0.001$). As for the country-specific analysis, we found a positive and statistically significant relationship of job demands with burnout in all countries, with values ranging from 0.511 (Belgium) to 0.774 (England). Similarly, job resources were statistically significantly and positively related to work engagement, with values ranging from 0.558 (Ireland) to 0.684 (Belgium). Lastly, we found a negative and statistically significant correlation between job resources and burnout across countries. Here, values ranged from -0.196 (Ireland) to -0.378 (Belgium).

Table 1.1: Means, standard deviations, reliabilities, and correlations of the study variables (N=4,591)

Concept (# of items)	Mean	SD	Cronbach's α	Min-Max	Correlations											
					1	2	3	4	5	6	7	8	9	10	11	12
1. Gender	/	/		/	1											
2. Age	38	11		18-69	-0.025	1										
3. Workload (4)	3.98	0.63	0.82	1.50-5.00	0.035*	-0.081**	1									
4. Red Tape (1)	3.05	0.98	/	1.00-5.00	-0.014	0.010	0.472**	1								
5. Emotional Demands (1)	3.4	0.85	/	1.00-5.00	0.030	-0.058**	0.469**	0.401**	1							
6. Emotional Dissonance (1)	3.04	0.99	/	1.00-5.00	0.000	-0.069**	0.419**	0.392**	0.512**	1						
7. Role Conflict (3)	2.83	0.75	0.66	1.00-5.00	-0.016	-0.088**	0.495**	0.510**	0.410**	0.453**	1					
8. Performance Feedback (3)	2.79	0.86	0.82	1.00-5.00	-0.037*	-0.002	-0.188**	-0.189**	-0.177**	-0.181**	-0.219**	1				
9. Job Autonomy (4)	3.28	0.81	0.84	1.00-5.00	-0.007	0.029	-0.256**	-0.268**	-0.234**	-0.238**	-0.281**	0.381**	1			
10. Role Clarity (2)	4.17	0.71	0.83	1.00-5.00	0.043**	0.133**	-0.121**	-0.242**	-0.188**	-0.207**	-0.289**	0.219**	0.379**	1		
11. Skill Utilization (3)	3.48	0.74	0.75	1.00-5.00	0.027	0.057**	-0.191**	-0.253**	-0.232**	-0.262**	-0.317**	0.421**	0.487**	0.363**	1	
12. Work Engagement (3)	3.26	0.77	0.81	1.00-5.00	0.034*	0.066**	-0.219**	-0.220**	-0.217**	-0.291**	-0.292**	0.348**	0.371**	0.271**	0.501**	1
13. Burnout (12)	2.41	0.67	0.91	1.00-5.00	0.020	-0.110**	0.513**	0.408**	0.487**	0.544**	0.541**	-0.275**	-0.362**	-0.346**	-0.417**	-0.519**

Note. Sample includes all countries except Norway and Sweden; SD = standard deviation; the scoring of all variables is 1-5. **$p < 0.01$, * $p < 0.05$; gender was coded as 1 = men, 2 = women. All constructs were rated on a five-point Likert scale ranging from 1= never to 5=always.

COUNTRY-SPECIFIC DOMINANCE ANALYSIS

The results of the dominance analysis are presented in Tables 1.2 and 1.3. Job resources and job demands explained between 29% (Ireland) and 38% (Germany) of the variance in work engagement, with job resources accounting for the majority (65.0%-79.1%) and job demands explaining a smaller proportion of variance (17.5%-26.5%). Skill utilization emerged as the strongest predictor in all countries (%R^2 varied from 27.4% in Ireland to 41.9% in Belgium and Germany). This was followed by job autonomy, with values ranging from 10.8% (Germany) to 20.1% (England), and performance feedback, varying from 8.6% (Ireland) to 16.2% (Germany), respectively. Role clarity also explained variation with values ranging from 3.4% in Germany to 13.5% in England. On the other hand, job demands contributed much less to the variance in work engagement, with emotional dissonance contributing the most (%R^2 ranged from 4.3% in Ireland to 10.2% in Germany), followed by role conflict (%R^2 varied from 2.1% in England to 9.6% in Belgium) and red tape (%R^2 ranged from 2.3% in Ireland to 4.4% in Belgium), respectively. While emotional demands explained between 0.7% (Belgium) and 7.4% (England) of the overall variance in work engagement, workload emerged as the least important predictor, accounting for only 1.2% (Ireland) to 3.8% (Belgium) of the explained variance.

For burnout, job demands and job resources explained between 47% (Belgium) and 59% (Ireland) of the variance across countries, with job demands explaining a much larger proportion (67.9%-78.4%) compared to job resources (18.9%-29.8%). Emotional dissonance consistently emerged as one of the strongest predictors across all countries (%R^2 varied from 17.0% in Germany to 23.8% in Belgium). While emotional dissonance explained most of the variance in burnout in Belgium and England, emotional demands were slightly more important in Germany (%R^2 = 17.3%) and Ireland (%R^2 = 20.8%). Role conflict and workload both showed more or less similar values across all countries, ranging from 12.4% (England) to 16.5% (Belgium) for role conflict, and from 12.6% (Ireland) to 16.0% (Belgium) for workload. Red tape also played a notable role, though to a lesser extent than other demands (%R^2 varied from 5.8% in Ireland to 10.2% in England). Job resources explained much less of the total variance in burnout with skill utilization contributing the largest proportion across countries (%R^2 ranged from 6.2% in Ireland to 16.1% in Belgium), followed by job autonomy, role clarity, and performance feedback, respectively.

Table 1.2: Results of the general dominance analysis for nurse work engagement (n=4,591)

Variables	Belgium (n=1,117)		Germany (n=1,907)		Ireland (n=667)		England (n=900)		Pooled Sample (n=4.591)	
	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.
Control variables	0.012	3.5%	0.007	1.9%	0.050	17.5%	0.003	0.9%	.039	11.5%
Job Demands										
• **Workload**	0.013	3.8% (8)	0.010	2.7% (9)	0.004	1.2% (9)	0.004	1.4% (9)	.007	1.9% (9)
• **Red Tape**	0.015	4.4% (7)	0.016	4.3% (6)	0.007	2.3% (8)	0.012	4.0% (7)	.012	3.5% (7)
• **Emotional Demands**	0.003	0.7% (9)	0.015	3.9% (7)	0.014	4.8% (6)	0.023	7.4% (5)	.011	3.3% (8)
• **Emotional Dissonance**	0.026	7.9% (5)	0.038	10.2% (4)	0.012	4.3% (7)	0.016	5.1% (6)	.025	7.2% (4)
• **Role Conflict**	0.032	9.6% (4)	0.018	4.7% (5)	0.014	4.8% (5)	0.007	2.1% (8)	.016	4.7% (6)
Job Resources										
• **Job Feedback**	0.036	10.9% (3)	0.061	16.2% (2)	0.025	8.6% (4)	0.028	9.1% (4)	.040	11.6% (3)
• **Job Autonomy**	0.039	11.5% (2)	0.040	10.8% (3)	0.046	16.0% (2)	0.062	20.1% (2)	.044	12.8% (2)
• **Role Clarity**	0.019	5.8% (6)	0.013	3.4% (8)	0.038	13.1% (3)	0.042	13.5% (3)	.022	6.4% (5)
• **Skill Utilization**	0.140	41.9% (1)	0.157	41.9% (1)	0.079	27.4% (1)	0.112	36.4% (1)	.128	37.1% (1)
R^2 / % R^2 rank	0.34	100%	0.38	100%	0.29	100.0%	0.31	100%	.34	100%

Note. Control variables: age, gender, organization, country; Domin. Stat. = Dominance Statistics; Stand. Domin. Stat. = Standardized Dominance Statistics.

Table 1.3: Results of the general dominance analysis for burnout among nurses (n=4,591)

Variables	Belgium (n=1,117)		Germany (n=1,907)		Ireland (n=667)		England (n=900)		Pooled Sample (n=4.591)	
	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.	Domin. Stat.	Stand. Domin. Stat.
Control variables	0.010	2.2%	0.002	0.3%	0.057	9.5%	0.006	1.0%	.085	15.2%
Job Demands										
• **Workload**	0.075	16.0% (4)	0.077	14.8% (4)	0.075	12.6% (4)	0.074	13.0% (3)	.071	12.8% (4)
• **Red Tape**	0.041	8.9% (5)	0.045	8.6% (6)	0.034	5.8% (6)	0.058	10.2% (5)	.042	7.5% (6)
• **Emotional Demands**	0.013	2.8% (9)	0.090	17.3% (1)	0.124	20.8% (1)	0.112	19.8% (2)	.072	12.9% (2)
• **Emotional Dissonance**	0.111	23.8% (1)	0.088	17.0% (2)	0.107	18.0% (2)	0.131	23.0% (1)	.097	17.5% (1)
• **Role Conflict**	0.077	16.5% (2)	0.078	15.0% (3)	0.085	14.4% (3)	0.070	12.4% (4)	.071	12.8 (3)
Job Resources										
• **Job Feedback**	0.014	3.0% (8)	0.024	4.6% (9)	0.022	3.7% (9)	0.016	2.9% (9)	.018	3.2% (9)
• **Job Autonomy**	0.030	6.4% (6)	0.026	4.9% (8)	0.029	4.9% (7)	0.025	4.5% (8)	.025	4.5% (8)
• **Role Clarity**	0.020	4.3% (7)	0.033	6.3% (7)	0.025	4.1% (8)	0.037	6.4% (7)	.028	4.9% (7)
• **Skill Utilization**	0.075	16.1% (3)	0.058	11.2% (5)	0.037	6.2% (5)	0.039	6.8% (6)	.049	8.7% (5)
R^2 / % R^2 rank	0.47	100%	0.52	100%	0.59	100%	0.57	100%	.56	100%

Note. Control variables: age, gender, organization, country; Domin. Stat. = Dominance Statistics; Stand. Domin. Stat. = Standardized Dominance Statistics.

DISCUSSION

Following the premises of the JD-R model, the current study examined the relationship of job demands and job resources with burnout and work engagement among nursing professionals in four European countries. Additionally, the aim was to contribute to the JD-R theory by examining the relative importance of specific job demands and resources in predicting nurse burnout and work engagement across four European countries. So far, the majority of JD-R studies have focused on the separate and interaction effects of job demands and resources on burnout and work engagement, thereby assuming that each demand or resource is equally important. Using dominance analysis, this study applied a novel approach to quantify the relative contributions of specific job demands and resources, offering a more nuanced understanding of drivers of nurse well-being.

Overall, our results align with previous research linking job demands and resources with burnout and work engagement among nurses, but also in other occupations (Alarcon, 2011; Lesener et al., 2020; Lesener et al., 2019). Job demands showed a positive relationship with burnout while job resources showed positive associations with work engagement and a negative relationship with burnout. These findings were consistent across all European countries and corroborate key propositions of the JD-R model.

In addition, dominance analyses highlighted the differing roles of job demands and job resources and their associations with work engagement and burnout. Job resources were the primary drivers of work engagement, explaining between 65% and 79.1% of the total variance, whereas job demands played a much smaller role (17.5%-26.5%). Among job resources, skill utilization emerged as the strongest predictor, followed by job autonomy and job feedback. Together, these predictors explained over half of the total variance in work engagement. Our findings further align with previous research demonstrating that job resources, particularly skill utilization, job feedback, and job autonomy, serve as key drivers of work engagement (Hakanen et al., 2021; Hakanen, Ropponen, De Witte, et al., 2019; Humphrey et al., 2007). These results corroborate the Job Characteristics Model (JCM) that considers skill utilization, job feedback, and job autonomy as the core job characteristics that increase work motivation and job satisfaction (Hackman & Oldham, 1975; Oldham & Hackman, 2010). According to the JCM, skill variety (or: skill utilization) contributes to meaningful work, autonomy fosters a sense of responsibility, and feedback enhances knowledge of work outcomes - factors that collectively

drive engagement. Particularly, our findings emphasize the crucial role of skill utilization in work engagement, aligning with concerns about skill mismatches in nursing. The OECD (2016) reports that many nurses are complaining that they are not employed at their full competency, which can lead to frustration and disengagement. Ensuring that nurses can fully apply their competencies could therefore enhance both engagement and care quality.

Job demands, on the contrary, were more dominant for burnout, explaining between 67.9% and 78.4% of the total variance, while job resources contributed considerably less (18.9%-29.8%). Among the different job demands, emotional factors stood out as particularly relevant across all countries. Specifically, emotional dissonance emerged as the strongest predictor, followed by emotional demands, role conflict, and workload, respectively. Emotional dissonance and emotional demands are conceptually related but distinct constructs. Emotional demands refer to the extent to which nurses are confronted with emotionally challenging situations at work, such as dealing with suffering patients or emotionally charged interactions. These demands require them to invest considerable effort in managing their emotions, which, when excessive, can lead to exhaustion and strain (van Vegchel et al., 2004). In contrast, emotional dissonance arises when employees are required to display emotions that conflict with their true feelings (Zapf et al., 1999). This discrepancy between felt and expressed emotions is particularly common in professions requiring emotional labor, such as nursing. Similar to emotional demands, emotional dissonance is also associated with psychological strain and increased risk of burnout (Hülsheger & Schewe, 2011; Kenworthy et al., 2014).

While previous research has often identified workload or role conflict as the most significant contributors to burnout (Alarcon, 2011; Lee & Ashforth, 1996), our findings suggest that the emotional component of job demands may be even more critical, particularly for nurses. Interestingly, while emotional demands ranked among the top contributors to burnout in Germany, Ireland, and England, they played a surprisingly minor role in Belgium, ranking last among all job demands and resources. At first glance, this may appear contradictory to previous research showing that emotional demands significantly contribute to burnout among health professionals in Belgium (Vandenbroeck et al., 2017; Vander Elst et al., 2016). According to Azen and Budescu (2003), a predictor's dominance is based on its incremental contribution to the explained variance, meaning that variables with lower variability tend to have a reduced ability to contribute to the model's explained variance. A more detailed examination of the data revealed that while emotional demands were frequently reported in Belgium, their variability

was significantly lower compared to other countries. This lower variability may explain why emotional demands showed a weaker correlation with burnout and appeared less important in the dominance analysis for our Belgian sample.

LIMITATIONS

The present study is not without limitations. The first one is its cross-sectional design, which means that no causal inferences can be made. Future studies could revalidate the model using longitudinal designs. Second, the reliability of the role conflict scale was low, particularly in England ($\alpha = 0.58$) and Ireland ($\alpha = 0.63$). This may be attributed to the scale's relatively few items. Despite the lower reliability, the role conflict scale was validated in previous research and aligns conceptually with the expected theoretical framework (Schaufeli, 2017). Additionally, its associations with the other variables in this study were in line with theoretical expectations, suggesting that it still captures meaningful variance in role conflict. Another limitation is the relatively low response rates in all countries, ranging from 12.6% (England) to 26.6% (Germany). Data collection took place between May 2022 and August 2022, a period still marked by the aftermath of the COVID-19 pandemic. While the pandemic and associated survey fatigue among health professionals might explain the overall low response rates (de Koning et al., 2021), previous research on nursing staff reported similar if not even lower response rates (Timmins et al., 2023). Moreover, the Scandinavian sample, consisting of four Swedish and one Norwegian hospital, was excluded due to its relatively low TLI value (0.89), indicating suboptimal model fit. A possible explanation is the smaller sample size and the limited number of clusters (i.e., hospitals) compared to the other countries. Previous research has indicated that the TLI tends to show lower values in smaller samples and in models with many observed variables (Shi et al., 2019). Overall, it can be assumed that the relationships proposed by the JD-R model also hold in Sweden and Norway, as previous studies have validated the model among health professionals in these countries (Ahlstedt et al., 2024; Kaiser et al., 2020; Thapa et al., 2022). Nevertheless, future research should aim to test the model with larger samples in Sweden and Norway to further strengthen its robustness and generalizability in these contexts. Another limitation is that our sample consisted solely of direct care nurses, which limits the generalizability of the results. However, it also minimizes contextual influences, allowing for a clear test of our hypotheses. A key strength of this study is its cross-national dataset, which includes hospitals from Germany, Belgium, Ireland, and England. By incorporating data from multiple countries, the study provides valuable insights into how job

demands and resources affect nurses' well-being in diverse settings. Lastly, the results of the dominance analysis certainly depend on the set of predictor variables included in the analysis. The results could therefore be different if other or additional factors were considered.

IMPLICATIONS FOR PRACTICE

Despite these limitations, our study has some important implications. First, in line with previous research, our results confirm that job demands are the main drivers of burnout, while job resources have the power to boost work engagement. In particular, the emotional aspects of nursing work emerged as significant contributors to burnout. While these factors are an integral, if not vital, part of the profession and cannot be entirely eliminated, targeted strategies can help nurses to better cope with the emotional aspects of their work. For example, structured debriefing sessions, individual counseling, or peer support meetings led by an external professional or a senior nurse can serve as valuable outlets for frustration and emotional stress (Cortese et al., 2010). Additionally, training in interpersonal skills can equip nurses with the tools needed to navigate challenging patient interactions more effectively (Chou et al., 2012). While reducing job demands can help lower job strain, strengthening job resources appears to be a more promising strategy due to their dual impact, i.e., enhancing work engagement and reducing burnout. Our findings highlight the pivotal role of skill utilization, job feedback, and job autonomy in fostering work engagement among nurses. Therefore, healthcare organizations should focus on implementing interventions or offering programs that enhance these aspects. For instance, nurses should be provided with opportunities to fully use and develop their skills, for example, by offering continuous professional development, job enrichment strategies, and opportunities to take on challenging tasks (Hakanen et al., 2021). Additionally, performance feedback can be improved through job crafting, where nurses actively seek constructive input from colleagues and supervisors (Gordon et al., 2018). Overall, while these interventions can be beneficial in helping nurses manage their job demands and job resources, they place too much responsibility on the individual, overlooking the need for systemic workplace improvements (Demerouti, 2024). Instead, a combined approach that integrates individual and organizational interventions is needed in order to tackle the underlying root causes of nurse well-being within the work environment. Research shows that such integrated interventions, ranging from (work schedule) reorganization and work shift evaluation to participatory action research and professional supervision, are particularly effective in reducing burnout and increasing well-being among health professionals (for an overview: Awa et al., 2010;

Demerouti, 2024). Importantly, recent research highlights that nurses themselves favor structural changes to improve working conditions and well-being (Aiken et al., 2024). A study by Aiken et al. (2024) found that the majority of nurses (79%) preferred increasing nurse staffing as an intervention to reduce burnout and improve well-being, followed by reducing clinical documentation burdens (41%) and implementing minimum safe nurse staffing ratios (38%). Accordingly, to be truly effective, these interventions must be tailored to the specific needs of hospitals and their workforce, ensuring their feasibility and long-term impact.

CONCLUSION

This study adds to existing research on JD-R theory by uncovering, across countries, the relative importance of specific job demands and resources for nurse burnout and work engagement. Our findings indicate that job demands, particularly emotional dissonance and emotional demands, are the strongest contributors to burnout, whereas job resources, especially skill utilization, play a crucial role in fostering work engagement.

CHAPTER 2

What Makes Nurses Flourish at Work? The Clinical Work Environment and Its Role in Nurse Motivation and Well-Being

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This chapter is based on Kohnen, D., De Witte, H., Schaufeli, W.B., Dello, S., Bruyneel, L., & Sermeus, W. (2024). What makes nurses flourish at work? How the perceived clinical work environment relates to nurse motivation and well-being: A cross-sectional study. *International Journal of Nursing Studies*, 104567. https://doi.org/10.1016/j.ijnurstu.2023.104567

ABSTRACT

Literature shows that the work environment is a main determinant of nurses' well-being and psychological strain; yet, the (psychological) mechanisms underlying this relationship remain understudied. This study explored the underlying (psychological) mechanisms (why) and boundary conditions (when) by which characteristics present in the clinical work environment influence nurses' well-being. We investigated the mediating role of intrinsic motivation in the relationship between job demands and job resources with burnout and work engagement. In addition, we examined if job resources strengthen the relationship of job demands with intrinsic motivation and burnout. A cross-sectional survey study was conducted in general acute care hospitals in Belgium (n = 14) with a sample of direct care nurses (n = 1,729). Data were collected by means of online questionnaires between October 2020 and July 2021. Study variables included burnout, work engagement, intrinsic motivation and a set of different job demands (workload, role conflict, emotional demands, and red tape) and job resources (performance feedback, autonomy, skill use, opportunity for growth, and value congruence). All variables were obtained using self-report measures. The central hypotheses were tested using structural equation modeling. Job resources appeared to be a crucial factor for nurses' health showing positive associations with work motivation ($\beta = 0.513$) and work engagement ($\beta = 0.462$) and negative associations with burnout ($\beta = -0.216$). Job demands remained an essential factor that harms psychological health and is associated with increased burnout ($\beta = 0.489$). Our results confirmed that intrinsic motivation mediated the relationship of job resources with work engagement ($\beta = 0.170$) and burnout ($\beta = -0.135$). In addition, job resources moderated the relationship of job demands with burnout ($\beta = -0.039$). Against our expectations, we found no associations between job demands and intrinsic motivation or a moderation effect of job resources on the respective relationship. These findings suggest that a highly demanding work environment can be a source of significant stress, which may put nurses' health at severe risk. Nurses who perceive sufficient job resources such as feedback, autonomy, and opportunities for growth and development are likely to feel intrinsically motivated at work. In addition, it will foster their work engagement and prevent them from burning out, particularly when job demands are high.

Keywords: Work motivation, Well-being, Burnout, Nurses, Work environment, Structural equation modeling

INTRODUCTION

The clinical environment, whether demanding or resourceful, acts on nurses' energy as it influences their psychological functioning, which in turn, relates to their motivation and behavior (Van den Broeck et al., 2008). The Job Demands-Resources (JD-R) model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) is the most widely used job stress model to explain occupational stress and how it relates to employee health. In essence, this model proposes two psychological processes by which excessive job demands lead – via burnout – to negative outcomes (*health impairment process*) whereas job resources – via work engagement – will foster positive outcomes (*motivational process*) and reduce burnout (Schaufeli & Taris, 2014). Job demands are those "aspects of the job that require sustained physical or mental effort and are therefore associated with certain physiological and psychological costs" (Demerouti et al., 2001, p. 501). Job resources, in turn, are defined as "those physical, psychological, social, or organizational aspects of the job that are either/or (1) functional in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, (3) stimulate personal growth, learning, and development" (Demerouti et al., 2001, p. 501).

In line with this view, the JD-R model has been tested and validated across a variety of samples from different countries and industries (Hu et al., 2011; Llorens et al., 2007), including healthcare (Jourdain & Chenevert, 2010; Keyko et al., 2016; Kutney-Lee et al., 2013; Lee & Akhtar, 2011; Stimpfel et al., 2012). Among nursing staff, in particular, job demands such as work overload and emotional demands were found to predict burnout (Montgomery et al., 2015; Sundin et al., 2011). By contrast, job resources such as job autonomy or performance feedback have been found to be positively related to work engagement (Humphrey et al., 2007; Keyko et al., 2016; Lesener et al., 2019) and to be negatively associated with burnout (Hakanen et al., 2006). Burnout – in this study – is defined as a work-related state of mental exhaustion, which is characterized by extreme tiredness, reduced ability to regulate cognitive and emotional processes, and mental distancing (Schaufeli et al., 2020). Work engagement, on the other hand, refers to a positive, fulfilling, work-related state of mind that is characterized by vigor (that is, high level of energy and mental resilience while working), dedication (referring to a sense of significance, enthusiasm, and challenge), and absorption (being focused and happily engrossed in one's work) (Schaufeli & Bakker, 2004; Schaufeli et al., 2002). By including burnout and work engagement, this study simultaneously focuses on both the negative aspect (burnout) and positive aspect (work engagement) of job-related well-being.

It has been argued that personal resources have a crucial role in the association between employees and their reaction to job demands and resources (Sonnentag & Frese, 2012). Personal resources are defined as aspects of the self that are associated with resilience and that refer to the ability to control and impact one's environment successfully (Hobfoll et al., 2003). In the present study we posit that intrinsic motivation functions as a personal resource as it is believed to influence the way in which employees allocate and balance their resources (Kanfer et al., 2017). In order to get a better understanding of why work motivation acts on nurses' functioning and the role it plays in both the motivational and health impairment processes of the JD-R model (Demerouti et al., 2001; Schaufeli & Bakker, 2004), we rely on Self-Determination Theory (SDT, Ryan & Deci, 2000a; Ryan & Deci, 2000b). While JD-R theory exemplifies what kind of job characteristics lead to certain psychological outcomes (i.e., burnout and work engagement), it does not tell us why this would be so (Schaufeli & Taris, 2014). An important feature of SDT is that it describes why people do what they do at work. To our knowledge, there has been no research empirically testing the impact of work motivation on the relationship between nurses' job characteristics and their well-being. Combining JD-R theory and SDT, the main purpose of this study is to deepen our understanding of the (underlying psychological) mechanisms (i.e., why) and boundary conditions (i.e., when) by which characteristics present in the clinical environment influence nurses' well-being.

NURSE MOTIVATION AND HOW IT RELATES TO THEIR WELL-BEING

According to SDT, the social (or work) environment can facilitate or undermine employees' motivation and functioning. It further posits that employees perform and feel better when their motivation is intrinsic, as part of autonomous motivation. Rather than working for a financial reward, intrinsically motivated employees perform a task because it is inherently interesting and challenging to them (Ryan & Deci, 2000a, 2000b). In nursing, the work is often perceived as meaningful, engaging, and rewarding, which is expected to generate positive job outcomes (Toode et al., 2015; Toode et al., 2011). Nurses who find themselves in a supportive work environment and can draw upon sufficient job resources, e.g., autonomy, performance feedback, and opportunities for growth and development, will feel intrinsically motivated. On the other hand, a demanding work environment in which nurses experience excessive stressors such as high workloads and role conflict might frustrate nurses' fundamental psychological needs (like the need for autonomy and competence), reducing their work motivation. Therefore, it is expected that job resources will boost nurses' intrinsic motivation, whereas job demands

are assumed to undermine it. In line with this reasoning, job resources such as decision authority (Tummers et al., 2002), autonomy as well as opportunities to learn (Janssen et al., 1999) were empirically found to be related to higher levels of nurses' motivation (Toode et al., 2015; Toode et al., 2011). With regard to job demands, several demotivating factors were reported such as poor supervision, lack of recognition and role stressors (i.e., role conflict) (Daneshkohan et al., 2014; Kim & Beehr, 2018). The findings of studies that investigated the links between job demands and intrinsic motivation are, however, less consistent (Fernet et al., 2012). While some studies report negative associations (Fernet et al., 2004; Fernet et al., 2012), others found no significant relationship between job demands and intrinsic motivation (Fernet et al., 2015; Van Yperen & Hagedoorn, 2003). A few studies even found high levels of workload to be related to high levels of intrinsic motivation (Beckers et al., 2004; Houkes et al., 2001; Tummers et al., 2002).

In relation to outcomes, work motivation among health professionals has been found to be closely related to work engagement, burnout, job satisfaction, intent to leave, work performance, and perceived patient safety (for an overview: Toode et al., 2011). In particular, research has shown that intrinsic motivation was negatively related to burnout and positively related to work engagement (Fernet et al., 2015; van Beek et al., 2011), indicating that motivation was associated with higher levels of vitality, absorption, concentration, effort, and persistence. Similar results were reported by a recent meta-analysis (Van den Broeck et al., 2021) that showed that intrinsic motivation was positively related to work engagement and negatively to burnout. More specifically, intrinsic motivation showed to be the strongest predictor of employee well-being (such as work engagement and burnout), compared to other types of motivation as it explained more than 50% of the variance in burnout, work engagement, job satisfaction, turnover intention, and absenteeism in comparison to other types of motivation (Van den Broeck et al., 2021).

Therefore, we argue that when nurses can draw upon sufficient resources, they are likely to experience joy and pleasure while working, hence fostering their intrinsic motivation. Presumably, as a result, they are more likely to become vigorous, dedicated, and absorbed in their work tasks (Bakker & Demerouti, 2008; Xanthopoulou et al., 2009). In contrast, when nurses face unfavorable working conditions that are simply too stressful to manage and to cope with, they are expected to become unmotivated, making them more vulnerable to become

exhausted, eventually burning out. In short, we posit that intrinsic motivation will mediate the relationship of job resources and job demands with both work engagement and burnout.

THE BUFFERING EFFECT OF JOB RESOURCES

Another focus of this study is to examine the boundary conditions by which working conditions influence nurses' well-being. In other words, we aim to specify when the relation of job demands with burnout and intrinsic motivation changes in strength or direction depending on the presence of job resources (Busse et al., 2017). Most studies highlight the negative impact of excessive job demands, whereas a few report positive associations between job stressors and, e.g., work motivation. The latter might be because they interact with other job characteristics. In line with the JD-R and Karasek's Job Demand-Control model (JDC; Karasek, 1979), a number of studies suggest that the presence of high job demands is not necessarily problematic for employees' motivation and well-being when they perceive opportunities to effectively cope with high demands (Van Yperen & Hagedoorn, 2003; Van Yperen et al., 2016; Xanthopoulou, Bakker, Dollard, et al., 2007). Accordingly, it is not high demands per se, but high demands in combination with a lack of job resources that might undermine nurses' well-being and make them more vulnerable to develop feelings of exhaustion ("strain hypothesis"). On the other hand, when high job demands occur in alliance with high job resources, nurses feel enabled to effectively cope with these demands ("activation hypothesis"). Even more, they are presumed to perceive their jobs as intrinsically motivating and stimulating (Karasek & Theorell, 1990). In a demanding work environment enhancing job resources seems therefore beneficial as it may not only decrease stress but may also increase nurses' intrinsic motivation. This, in fact, may have important implications particularly for hospitals where nurses have to cope with high workload that, combined with other work-related factors, may have severe consequences not only for their own physical and psychological health but also for their patients' safety (Aiken et al., 2009; Aiken et al., 2001; Janssen et al., 1999).

A few studies provide support for the activation hypothesis (De Jonge et al., 1999; Hu et al., 2011; Van Yperen & Hagedoorn, 2003). For instance, a study on Dutch nurses showed that high job demands combined with high job resources were positively related to work motivation, indicating that job demands can be stimulating and motivating when sufficient resources are available to cope with these stressors (De Jonge et al., 1999). Similar findings were reported by (Van Yperen & Hagedoorn, 2003). In contrast, empirical evidence of the strain hypothesis is

less consistent (de Lange et al., 2003; Häusser et al., 2010; Van der Doef & Maes, 1999). A review by De Lange et al. (2003) showed that only 8 of the 19 studies included (42%) provided support for the strain hypothesis. The authors also noted that previous research predominantly focused on job control and social support as a potential buffer against certain types of job demands (i.e., workload and time pressure). Yet, only a few included more general job characteristics (Bakker et al., 2005; Hu et al., 2011).

The majority of studies largely focused on the strain hypothesis in relation to health outcomes while the activation hypothesis received only little research attention, particularly in relation to work motivation (Parker & Sprigg, 1999; Vangrieken et al., 2022). Thus, an interesting question that remains is whether job resources may not only promote employees' intrinsic motivation (as described above) but also if they interact with job demands. The present study was designed to extend the existing research by including a broader range of job specific demands and resources and by focusing on both the strain and activation hypotheses in relation to burnout and work motivation. Specifically, we propose that high demands will be associated with higher levels of burnout, particularly when job resources are low (strain hypothesis). In addition, it is expected that high job demands will be associated with higher levels of intrinsic motivation, particularly when job resources are high (activation hypothesis).

HYPOTHESES

Drawing on the postulates of SDT, we posit that intrinsic motivation plays a mediating role in both the health impairment and motivational processes of the JD-R model (Figure 2.1). To validate and extend existing research, the present study further seeks to examine whether job resources moderate the relationship of job demands with a) intrinsic motivation and b) burnout. More specifically, we hypothesize:

H1: Intrinsic motivation mediates the relationship of job demands with 1a) burnout and 1b) work engagement.
H2: Intrinsic motivation mediates the relationship of job resources with 2a) work engagement and 2b) burnout.
H3: Job resources moderate the relationship of job demands with 3a) intrinsic motivation (activation hypothesis) in such a way that the relationship will be enhanced when job resources are high and 3b) burnout (strain hypothesis), i.e., in such a way that the relationship will be enhanced when job resources are low.

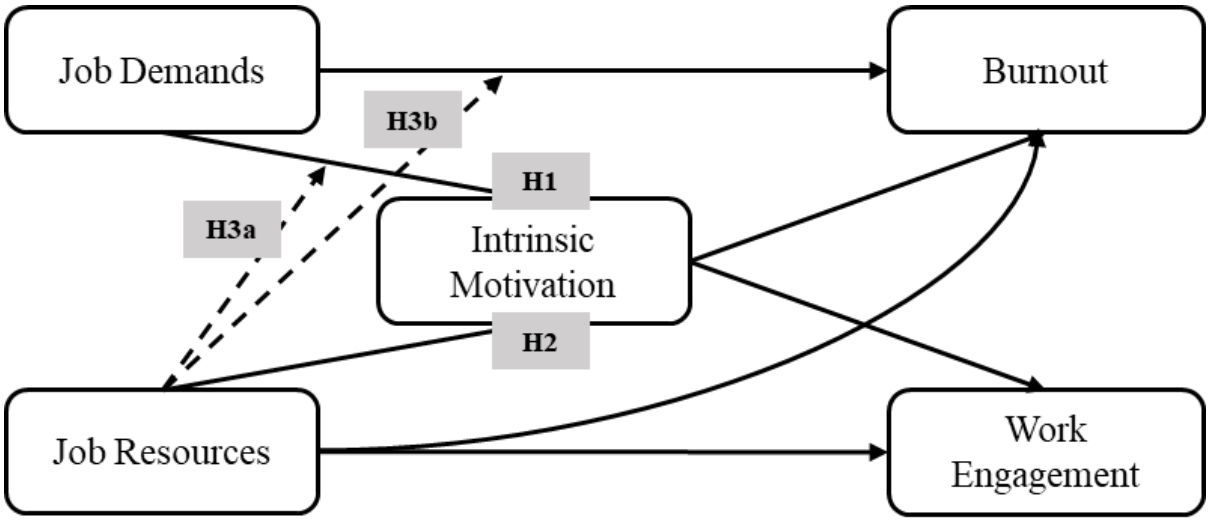

Figure 2.1: A moderated mediation of the Job Demands-Resources model.

Note. Solid lines represent direct associations between constructs. Dashed lines represent moderation effects on the respective associations.

METHOD

DATA COLLECTION AND PARTICIPANTS

This study uses a cross-sectional dataset of direct care nurses (n = 1,729) from general acute care hospitals (n = 14) in the Flemish region of Belgium. In 2019, Belgium counted a total of 103 general hospitals of which 50% (or 52 hospitals) were located in Flanders (Federal Public Service, 2019). In relation to nursing staff, 214,374 professional practitioners were licensed to practice nursing in Belgium. Of these licensed professionals, around 35% (~72,000) were practicing in the Flemish healthcare sector, of whom approximately 62% (~47,000) worked in hospitals (Federal Public Service, 2022).

Data collection took place by means of online questionnaires between October 2020 and July 2021. A total of 5,889 registered nurses were invited to participate in a survey that aimed to assess their working environment, motivation, and well-being in the context of the Horizon 2020-funded Magnet4Europe project (Sermeus et al., 2022). Eligible nursing staff was identified and recruited by the Magnet4Europe coordinator who was nominated as a liaison in each participating hospital. Registered nurses were eligible and invited to participate in the survey if 1) they had direct patient contact, 2) met the minimum qualifications as specified by the Directive 2013/55/EU amending Directive 2005/36/EC on the recognition of professional qualifications, and 3) worked on adult inpatient units including intensive care units (ICU) and

the emergency room (ER). Excluded were nurses from specialized units such as neonatology, pediatrics, obstetrics, psychiatry, operating room, pathology, microbiology, radiology, and medical imaging.

Of the 5,889 questionnaires sent, 2,060 were filled in and returned, which yielded a response rate of 35%. To keep the work situation rather constant, this study focused on nursing staff in the same job level, i.e., direct care nurses (De Jonge et al., 1999). Direct care nurses were defined as nurses primarily active on units and working in direct contact with patients. Therefore, the final dataset consisted of 1,729 observations. 83% of respondents were female, the average age was 38 years (SD = 12) and they had been working in their current workplace for 12 years on average (SD = 11). In addition, we included direct care nurses from all types of departments. The majority were working in intensive care (22.5%), followed by nurses active on surgical (19.7%), internal (17.3%), and geriatric (14.6%) units. With regard to gender and age, the sample distribution of this study was similar to the active nursing population in the Flemish region of Belgium. According to the most recent available data from 2018, provided by the Belgian Federal Public Service, the majority of nurses are female (85%) and between 25 and 54 years old. No data for the Flemish nursing population are available with respect to organizational tenure or units.

MEASURES

We used previously validated scales in this study which were available in Dutch (the primary spoken language in participating hospitals). A description of each scale is presented below.

Job demands and resources. The questionnaire included a set of items to assess different job demands and job resources, mostly derived from the Questionnaire on the Experience and Evaluation of Work (QEEW, in Dutch VBBA; Veldhoven et al., 2002) and the Nordic Questionnaire for Psychological and Social Factors (NQPS) (Dallner et al., 2000). Job Resources included autonomy (1-item), performance feedback (3 items), skill use (1-item), opportunities for growth and development (1-item), and value congruence (1-item). Example items were: “Do you have enough freedom and independence at work?” (autonomy) and “Does your supervisor provide information about how well you perform your job?” (performance feedback). Job demands included role conflict (3 items), workload (4 items), red tape (1-item), and emotional demands (1 item). Example items were: “Do you have too much work to do?”

(workload) and “I receive incompatible requests from two or more people.” (role conflict). All items were rated on a five-point Likert scale ranging from never (1) to always (5). For both job demands and job resources, composite scores were generated, i.e., scores on the five job resources as well as on the four job demands were each compiled into one mean score (see Table 2.1). A higher score indicated that nurses' experience more job demands (or resources) to be present in their work environment.

Burnout. The short version of the Burnout Assessment Tool (BAT), a novel self-report questionnaire (Schaufeli et al., 2020), was used to assess the presence of core burnout syndromes (i.e., exhaustion, mental distance, cognitive, and emotional impairment) among nursing staff. The short version (Hadzibajramovic et al., 2022) consists of 12-items that could be scored on a five-point Likert scale ranging from never (1) to always (5). A high score indicates high levels of burnout. Example items are “After a day at work, I find it hard to recover my energy” (Exhaustion) and “I struggle to find any enthusiasm for my work” (Mental distance).

Work engagement. Work engagement was assessed using three items from the Dutch version of the Utrecht Work Engagement Scale (UWES, Schaufeli et al., 2019), rated on a five-point Likert scale ranging from never (1) to always (5). A high score is indicative of high levels of engagement. An example item was “I am enthusiastic about my work” (Dedication).

Intrinsic motivation. Intrinsic motivation was measured with the Work Extrinsic and Intrinsic Motivation Scale (WEIMS, Tremblay et al., 2009). Using the WEIMS, intrinsic motivation is measured with three items, rated on a five-point Likert scale ranging from completely disagree (1) to completely agree (5). A high score indicates high levels of intrinsic motivation. An example item was “For the satisfaction I experience when I am successful at doing difficult tasks”.

DATA ANALYSIS

To test the hypothesized models, we used structural equation modeling (SEM) with maximum likelihood estimation methods using the software program Mplus 8.6 (Muthén & Muthén, 2017). We followed the two-stage approach of Anderson and Gerbing (1988) by testing the measurement model first and then the hypothesized structural model. In terms of fit statistics, the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) were considered as indices to

assess how well the hypothesized measurement model fits the data (Brown, 2015; Hu & Bentler, 1999). Values above 0.90 indicated a good model fit (van de Schoot et al., 2012). In addition, the Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) were considered; these values should ideally be below 0.08.

Next, we tested the hypothesized structural model following a two-step approach (Klein & Moosbrugger, 2000). First, we assessed the fit of the mediation model without the hypothesized interaction (H1–H2). In addition, bootstrapping with 1000 bootstrapped samples was applied to determine the point estimate and bias-corrected and accelerated 95% confidence interval (CI) of the total and specific indirect effect. Bootstrapping is recommended as the indirect effect (the product of the coefficients of the predictor and mediator variable) is not normally distributed (Stride et al., 2017). Accordingly, statistical significance of the indirect effect was tested by computing the bias-corrected confidence interval around the indirect effect obtained from the bootstrapping analysis. A bootstrapped confidence interval (lower level of confidence interval – upper level of confidence interval, LLCI – ULCI) that does not contain zero is indicated as statistically significant. Second, we tested the moderated mediational model (H3) using maximum likelihood parameter estimates that could generate estimates with standard errors robust to non-normality of observed variables (Muthén & Muthén, 2017). To establish the interaction effect of job demands and job resources, both variables were mean-centered and the interactions were probed + 1 SD above and − 1 SD below the mean of the moderator (i.e., job resources).

ETHICS APPROVAL

The study described herein is embedded in a large interventional study that is funded under the European Union's Horizon 2020 Research and Innovation program from 2020 to 2023 (Grant Agreement 848031) (Sermeus et al., 2022). The protocol of Magnet4Europe is registered in the ISRCTN registry (ISRCTN10196901). Ethical clearance to conduct the Magnet4Europe study has been obtained from the central ethics committee in participating countries. In Belgium, ethical approval has been obtained from the Ethics Committee Research UZ/KU Leuven (S64213).

Data collection took place using an online data collection platform to which invited nurses had to register prior to their participation in the survey. Prior to the survey launch, the

Magnet4Europe coordinators received the survey link as well as information and recruitment material that had to be shared with eligible nursing staff. After registration, participants followed a process of informed consent that explained the objective of the study and that all data would be kept confidential. Every participant had to agree to participate in the study before they could continue and engage in the survey. Data were processed in line with the General Data Protection Regulation 2016/679 of the European Union (European Parliament & Council, 2016). Each record of informed consent was managed and stored through the online platform. Data were pseudonymized to ensure non-attribution to an identified or identifiable person; at no point in time during the study it would have been possible to draw any conclusions about a single person's identity.

RESULTS

TEST OF MEASUREMENT MODEL

First, we conducted a confirmatory factor analysis (CFA) to test whether measures of the constructs included are consistent with the expected underlying structure. The measurement model consisted of five correlated latent variables: burnout (a second-order factor represented by its four dimensions exhaustion, mental distance, cognitive impairment, and emotional impairment; each represented by their three corresponding items), work engagement (a first-order factor represented by its three items), intrinsic motivation (a first-order factor represented by its three items), job demands (a first-order factor represented by items assessing workload, role conflict, emotional demands, and bureaucracy), and, lastly, job resources (a first-order factor represented by items assessing autonomy, performance feedback, skill use, opportunities for growth and development, and value congruence).

The results of the CFA indicated a good fit of our hypothesized measurement model, with χ^2 (310) = 1383.035, CFI = 0.95, TLI = 0.94, RMSEA = 0.05, and SRMR = 0.05. Moreover, all indicators showed significant factor loadings on their respective latent factors ($p < .001$) with λ values ranging from 0.45 to 0.89. Mean factor loadings of items assessing the different constructs were satisfactory with values of 0.63 (Job Demands), 0.63 (Job Resources), 0.76 (Burnout), 0.78 (Work Engagement), and 0.79 (Intrinsic Motivation). A reliable measurement model was therefore obtained.

Table 2.1: Means, standard deviations, internal consistencies, minimum and maximum values, and correlations of the study variables

Concept (# of items)	Mean	SD	α	Min.-Max.	Correlations					
					Age	Gender	Job Demands	Job Resources	Intrinsic Motivation	Work Engagement
1. Age	38	12		19-64						
2. Gender	/	/	/	/	-0.029					
3. Job Demands (9)	3.35	0.49	0.829	1.44-4.89	-0.054*	-0.011				
4. Job Resources (7)	3.32	0.57	0.806	1.43-5.00	-0.094**	-0.018	-0.312**			
5. Intrinsic Motivation (3)	3.90	0.60	0.824	1.00-5.00	-0.204**	-0.007	-0.162**	0.401**		
6. Work Engagement (3)	3.66	0.63	0.824	1.33-5.00	-0.001	0.023	-0.269**	0.537**	0.500**	
7. Burnout (12)	2.11	0.55	0.897	1.00-4.25	-0.015	0.105**	0.515**	-0.411**	-0.382**	-0.541**

Note. SD = standard deviation, **correlation is significant at the 0.01 level (2-tailed), gender was coded as 1=male and 2=female. All constructs were rated on a five-point Likert scale ranging from 1= never/completely disagree to 5=always/completely agree.

DESCRIPTIVE RESULTS

The means, standard deviations (SD), minimum and maximum values as well as correlations, and internal consistencies for all constructs are presented in Table 2.1. All correlations among the variables were significant and relationships in the hypothesized direction. In addition, we used correlational analyses to verify the associations between the sociodemographic variables (i.e., age and gender) and the variables of our model. Age showed significant but weak correlations with job demands, job resources, and intrinsic motivation while gender only showed a weak but significant correlation with burnout. In addition, when including these variables as controls, the hypothesized effects did not change substantially. Therefore, to aid clarity, we report the most parsimonious analysis without including age and gender as control variables (Cohen et al., 2014).

ANALYSIS OF THE MODERATED MEDIATION MODEL

In a first step, we tested the main assumptions of the JD-R model (cfr. Table 2.2). Consistent with the model, we found a positive relationship of job demands with burnout ($\beta = 0.484$, $p < .001$) as well as a positive relationship of job resources with work engagement ($\beta = 0.630$, $p < .001$). In addition, and in accordance with the JD-R model job resources were negatively related to burnout ($\beta = -0.355$, $p < .001$).

Our first hypotheses predicted that the relationship of job demands with burnout and work engagement would be mediated by intrinsic motivation. We found that the indirect effect of job demands on burnout via intrinsic motivation ($\beta = -0.002$) was not statistically significant according to the 95% bootstrap CI (− 0.022, 0.016). With regard to work engagement, the indirect effect of job demands via intrinsic motivation ($\beta = 0.002$) was also not statistically significant according to the 95% bootstrap CI (− 0.023, 0.026). These results do not support H1a and H1b.

In relation to job resources, we found an indirect effect on work engagement via intrinsic motivation ($\beta = 0.170$) which was statistically significant according to the 95% bootstrap CI (0.139, 0.205). The results further indicated an indirect effect of job resources on burnout via intrinsic motivation ($\beta = -0.135$) which was statistically significant according to the 95% bootstrap CI (− 0.178, − 0.102). In addition, the results indicated that, after including intrinsic motivation as mediator, job resources had a direct effect on both work engagement ($\beta = 0.462$,

$p < .001$) and burnout ($\beta = -0.216$, $p < .001$). In short, the results indicated a partial mediation of intrinsic motivation in the relationship of job resources with both work engagement (H2a) and burnout (H2b). Against expectations, they did not support the hypothesized mediating effect of intrinsic motivation in the relationship of job demands with burnout (H1a) and work engagement (H1b).

Our last set of hypotheses predicted that the relationship of job demands with intrinsic motivation (H3a) and burnout (H3b) would be moderated by job resources. With regard to H3a, we found a moderating effect of $\beta = -0.004$ for job resources on the relationship of job demands with intrinsic motivation. This effect was not statistically significant according to the 95% bootstrap CI (− 0.055, 0.047) indicating that there is no moderating effect for job resources on the respective relationship. Considering the relationship of job demands with burnout, our results show a moderating effect of $\beta = -0.039$ for job resources which was statistically significant according to the 95% bootstrap CI (− 0.077, − 0.001). Hence, while the results did not support H3a (activation hypothesis), we could find confirmation for H3b (strain hypothesis). Figure 2.2 shows the interaction between demands and resources on nurses' burnout.

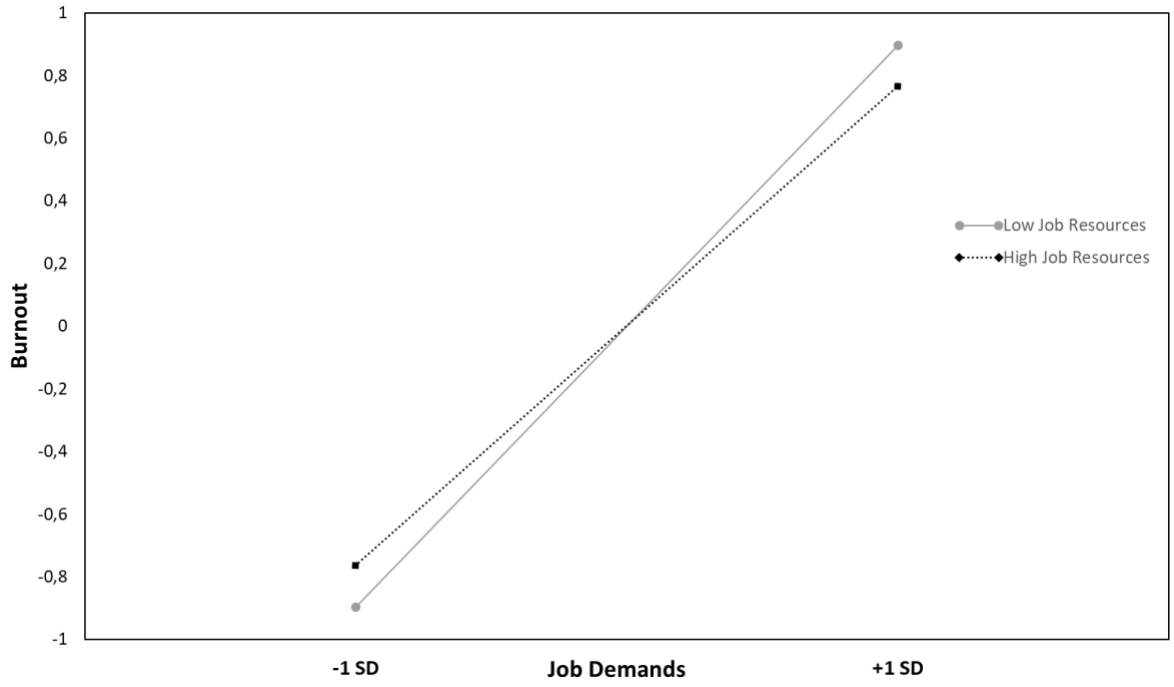

Figure 2.2: Interaction between job demands and job resources on burnout.

Table 2.2: Research model – moderated mediation results

Model	Outcome	Variable/ Effect	β	ρ	LLCI	ULCI
1	*Burnout*	Job Demands	0.484	0.000	0.411	0.548
		Job Resources	-0.355	0.000	-0.423	-0.290
	Work Engagement	Job Resources	0.630	0.000	0.574	0.682
		Job Demands	-0.079	0.020	-0.147	-0.012
2 (Mediation)	*Intrinsic Motivation*	Job Demands	0.007	0.846	-0.067	0.078
		Job Resources	0.512	0.000	0.447	0.575
	Burnout	Intrinsic Motivation	-0.264	0.000	-0.325	-0.207
		Job Demands (direct)	0.485	0.000	0.414	0.548
		(indirect via Intrinsic Motivation)	-0.002	0.847	-0.022	0.016
		Job Resources (direct)	-0.221	0.000	-0.287	-0.150
		(indirect via Intrinsic Motivation)	-0.135	0.000	-0.178	-0.102
	Work Engagement	Intrinsic Motivation	0.333	0.000	0.272	0.388
		Job Resources (direct)	0.461	0.000	0.395	0.524
		(indirect via Intrinsic Motivation)	0.170	0.000	0.139	0.205
		Job Demands (direct)	-0.080	0.012	-0.144	-0.017
		(indirect via Intrinsic Motivation)	0.002	0.847	-0.023	0.026

Model	Outcome	Variable/ Effect	β	ρ	LLCI	ULCI
3 (Moderated Mediation)	*Intrinsic Motivation*	Job Demands	0.008	0.821	-0.060	0.075
		Job Resources	0.513	0.000	0.453	0.575
		Interaction Job Demands x Job Resources	-0.004	0.870	-0.055	0.047
	Burnout	Intrinsic Motivation	-0.264	0.000	-0.320	-0.208
		Job Demands (direct)	0.489	0.000	0.414	0.548
		(indirect via Motivation)	-0.002	0.847	-0.022	0.016
		Job Resources (direct)	-0.216	0.000	-0.282	-0.150
		(indirect via Motivation)	-0.135	0.000	-0.178	-0.102
		Interaction Job Demands x Job Resources	-0.039	0.045	-0.077	-0.001
	Work Engagement	Intrinsic Motivation	0.332	0.000	0.277	0.386
		Job Resources (direct)	0.462	0.000	0.399	0.525
		(indirect via Motivation)	0.170	0.000	0.139	0.205
		Job Demands (direct)	-0.081	0.029	-0.138	-0.023
		(indirect via Intrinsic Motivation)	0.002	0.847	-0.023	0.026

Note. β = Standardized beta, LLCI=lower level of bootstrap confidence interval, ULCI=upper level of bootstrap confidence interval.

The results obtained from the moderated mediation analysis are presented in Figure 2.3.

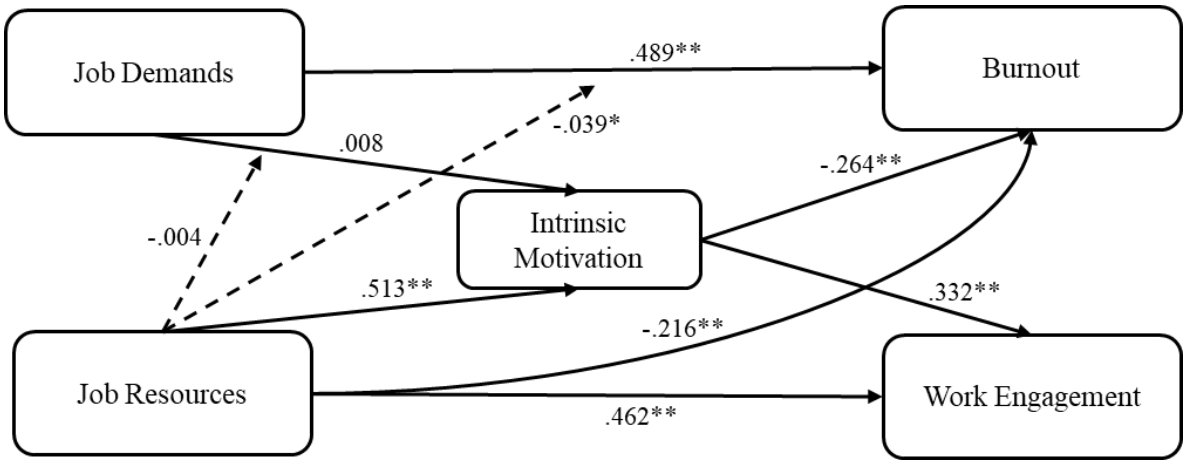

Figure 2.3: Structural model of the relationships between job characteristics, intrinsic motivation, and job well-being outcomes.

Note. Coefficients represent standardized estimates. *p<.05; **p<.001.

DISCUSSION

Drawing on the postulates of SDT, the aim of this study was to investigate the mediating role of intrinsic motivation within the JD-R model. To validate and extend the existing research, the present study further sought to examine if job resources moderate the relationships of job demands with a) intrinsic motivation and b) burnout. The results of the structural equation modeling analyses partially support our theoretical model. Overall, the findings highlight the importance of intrinsic motivation and its role in relation to job resources and nurse well-being. First and foremost, the pattern of our results is in line with what has been suggested by previous studies: job resources appear to be the most crucial factor for nurse well-being whereas job demands remain an essential factor that harms their psychological health. Consistent with the general assumptions of the JD-R model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) and in line with previous research on health professionals (e.g., Jourdain & Chenevert, 2010; Keyko et al., 2016; Kutney-Lee et al., 2013; Lee & Akhtar, 2011; Stimpfel et al., 2012), we found a positive relationship of job demands with burnout as well as a positive relationship of job resources with work engagement. In addition, job resources were negatively related to burnout.

INTRINSIC MOTIVATION AND JOB DEMANDS

The results of the mediation effect analysis only showed partial support for our assumptions. Against our expectations, the findings did not confirm a mediating effect of intrinsic motivation in the relationship of job demands with burnout and work engagement (H1a). A possible explanation for these results is that the relationships may be influenced by other motivational factors that nurses experience. According to SDT, different types of motivation can be ordered along a continuum of self-determination (ranging from more controlled to more autonomous motivation), i.e., people may choose from an array of different reasons (extrinsic or intrinsic) on how to invest their time and energy on certain behaviors and activities (Deci et al., 2017). While being intrinsically motivated means doing an activity out of inherent interest or pleasure, extrinsic motivation drives people to engage in an activity to obtain a separable outcome. Amotivation, in addition, is considered as a lack of motivation (i.e., people show no engagement in certain behaviors or activities) and has been shown to yield only negative health outcomes, such as distress, burnout, and low performance (Van den Broeck et al., 2021). In order to understand the full impact of work motivation on employee functioning at work, future research might benefit from examining the mediating effects of other motivational types such as controlled motivation as part of extrinsic motivation. In addition, researchers have recommended to include the full SDT continuum along with amotivation in order to provide a more nuanced understanding of motivation in the workplace (Van den Broeck et al., 2021).

Another possible explanation is that the relationship between demands and motivation vary with the nature of the demand. More specifically, theory and research on job characteristics suggests that some demands may also have a positive connotation and therefore, demands should be categorized into two types, namely job hindrances and job challenges (Lepine et al., 2005; Podsakoff et al., 2007; Van den Broeck et al., 2010). While both types still tend to be demanding, challenges may also have the potential to promote mastery and goal achievement as they may motivate workers to invest in their work. In contrast, hindrances may thwart learning and goal attainment and, even more, wear out workers' energy. Indeed, a number of studies confirm the opposite effect of challenge and hindrance demands on motivation (Lepine et al., 2005; van Oortmerssen et al., 2019). In this study, no distinctions were made in relation to job demands, also, no associations between demands and intrinsic motivation were observed. However, job demands were, after including intrinsic motivation, still positively associated with burnout and negatively related to work engagement. These results suggest that nursing

staff perceived job demands as hindrances rather than as challenges. Future research on job stress might benefit from exploring the distinctive effects of job hindrances and challenges on motivation and well-being.

INTRINSIC MOTIVATION AND JOB RESOURCES

Our results further showed that intrinsic motivation partially mediated the relationship of job resources with both work engagement and burnout (H2). While our findings largely support the main assumptions of the JD-R model, they also highlight the importance of work motivation as a personal resource in the motivational process between job resources and work engagement. More specifically, they indicate that nurses who perceive sufficient job resources such as feedback, autonomy, and opportunities for development, are likely to become intrinsically, i.e., autonomously motivated at work. This, in turn, will enable them to allocate and balance their resources (e.g., attention, effort, and time spent on certain activities) in a more constructive and healthy way. As a result, they will not only experience more joy and pleasure while working but also become more vigorous, dedicated, and absorbed in their work tasks. At the same time, it will prevent them from severe and enduring job-related strain and burning out. Similar findings have been reported in previous studies (Janssen et al., 1999; Toode et al., 2015; Toode et al., 2011; Trépanier et al., 2015). A question that remains is why work motivation showed significant association with job resources but not with job demands. First, our results suggest that job demands are perceived as hindrance rather than as challenge stressors. Second, a possible explanation is that the relationship between job characteristics and work motivation might be influenced by other (underlying psychological) mechanisms. A main premise of SDT is that employees are optimally motivated and likely to feel better to the extent that their three innate psychological basic needs for autonomy, competence, and relatedness are satisfied (Ryan & Deci, 2000b). While the satisfaction of these basic needs is expected to enhance employees' intrinsic motivation, frustration of any of these needs, on the other hand, is considered as damaging to work motivation (Ryan & Deci, 2020). Thus, a promising avenue would be to investigate whether basic need satisfaction and/or frustration could explain the relationship between job characteristics and work motivation.

THE BUFFERING EFFECT OF JOB RESOURCES

Lastly, we found only partial support for H3. Consistent with the JD-R and earlier stress models, low job resources strengthened the adverse effect of job demands on nurses' burnout (H3a). Alternatively stated, high job resources showed to have a buffering effect on the respective relationship, particularly when job demands were high. However, similar to previous studies which examined the interaction effect of job demands and resources on health-related outcomes, the moderation effect observed in this study was rather weak ($\beta = -0.039$) (e.g., Hu et al., 2011). Furthermore, against our expectations, we found no support for the activation hypothesis, i.e., high job resources combined with high job demands will increase nurses' intrinsic motivation. It is difficult to verify the extent to which these findings truly reflect the results of previous research as, to our knowledge, only a few studies have investigated the activation hypothesis so far. For instance, Van Yperen and Hagedoorn (2003) showed that high job control is needed to enhance intrinsic work motivation, particularly when job demands are high and social support is low. In contrast, the findings e.g., reported by Taris et al. (2003) hardly support the activation hypothesis as proposed by Karasek and Theorell (1990). A more general explanation could be that our job demands and resources did not match well. Indeed, researchers have noted that demands from a specific domain will only interact with resources from the same domain (Daniels & de Jonge, 2010). It would be interesting to see if future studies using other better-matched, job-specific demands and resources from the same domain provide support for the activation hypothesis.

LIMITATIONS

Naturally, the present research has some limitations that are worth mentioning. A first limitation is the cross-sectional nature of the study which clearly limits causal conclusions. Particularly in relation to the strain hypothesis, researchers have identified the cross-sectional design as a factor influencing the robustness of the buffering effect (Xu & Payne, 2020). From a theoretical point of view, however, it is unclear whether the strain as well as activation hypothesis occur in the short or long-term, or both. Longitudinal studies are needed to answer this question. Second, in order to reduce respondents' burden, this study used several single-item scales from existing validated instruments to measure job demands (i.e., emotional demands, bureaucracy) and job resources (i.e., autonomy, skill use, opportunities for growth and development, value congruence). Internal consistencies of both scales, however, were above the usual criterion of 0.70, with values of $\alpha = 0.829$ (job demands) and $\alpha = 0.811$ (job resources). While there is

usually a strong preference in occupational research for multiple-item measures over single-item measures, a recent study by Fisher et al. (2016) indicated the validity of several single-item measures, such as job control. Another limitation in relation to our measures is that all concepts included in this study were obtained through self-reports. As such, the strength of the effects reported here may have been biased due to common-method variance or because of the wish to answer consistently (Conway, 2008). This may be resolved in future research by including "objective" indicators of job characteristics such as shift work, average hours worked per week, staffing levels. In addition, a number of studies indicated that some groups of individuals seem particularly vulnerable (or resistant) to unfavorable working conditions. Another route for future research could be to explore the role of individual differences (self-efficacy, proactivity, coping style) in the relationship between work environment, motivation and well-being (Parker & Sprigg, 1999; Xu & Payne, 2020). Lastly, the sample return rate (35%) raises concerns around sampling bias and generalizability. In addition, the current study employed a sample of direct care nurses working in Belgian hospitals (n = 14) which puts some limits on the generalization of our findings. A comparison of our sample with data provided by the Belgian Public Federal Services however showed that our sample was representative for the Flemish nursing population with respect to age and gender. Yet, a replication of our study with, e.g., other occupational groups or within other countries would strengthen our conclusions.

IMPLICATIONS FOR PRACTICE

Despite these limitations, we believe that our study has some important implications. Overall, our results support what often has been shown in the past: work environments in which nurses experience high job demands but insufficient resources to cope with these demands bear the highest risk for burnout, reduced well-being, and illness. In particular, they indicate that hospitals should invest in interventions aimed at reducing job demands and increasing job resources. Following a JD-R based approach, Bakker et al. (2014) propose a combination of training and job redesign. For instance, to reduce job demands (such as workload and red tape), hospitals should monitor nurse staffing levels and the amount of administrative paperwork across units and shifts (Ellenbecker et al., 2006; Teoh et al., 2023). In relation to emotional demands, nurses may also benefit from training where they learn how to set boundaries and seek emotional support when dealing with emotionally demanding situations (e.g., treating patients with severe diseases) (Kinman & Leggetter, 2016). However, from a practical point of view, it is important to note that it might be difficult to eliminate all job demands present in the

work environment. Particularly in healthcare, professionals are frequently confronted with high levels of workload and emotionally demanding situations (Trépanier et al., 2015). Therefore, hospitals should focus on interventions aimed at building job resources as they show strong associations with nurses' intrinsic motivation and their well-being. For instance, job resources such as performance feedback can be optimized through job crafting, e.g., the nurse proactively asks the manager or colleague for feedback (Gordon et al., 2018). In order to increase autonomy and opportunities for growth and development, hospitals may invest in (team) workshops fostering trust, respect, and collegial relationships. In a similar vein, hospitals may encourage their staff to participate in decision-making processes, e.g., related to patient care and shift planning. Lastly, having continuous access to adequate training and other educational resources will allow nursing staff to learn and to grow (Tourangeau et al., 2017; Vander Elst et al., 2016). Taken together, by fostering a positive work environment through enhanced job resources, it seems possible to foster work motivation and engagement and to reduce perceived job strain, thereby creating a healthy work environment for direct care nurses.

CONCLUSION

A highly demanding work environment can be a source of significant stress which may put nurses' health at severe risk. Nurses who perceive sufficient job resources such as feedback, autonomy, and opportunities for growth and development, are likely to feel intrinsically motivated at work. In addition, it will foster their work engagement and prevent them from burning out, particularly when job demands are high.

CHAPTER 3

Engaging Leadership and Nurse Well-Being: The Role of the Work Environment and Work Motivation

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This chapter is based on Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., & Sermeus, W. (2024). Engaging leadership and nurse well-being: the role of the work environment and work motivation—a cross-sectional study. *Human Resources for Health*, *22*(1), 8. https://doi.org/10.1186/s12960-023-00886-6

ABSTRACT

Healthcare literature suggests that leadership behavior has a profound impact on nurse work-related well-being. Yet, more research is needed to better conceptualize, measure, and analyze the concepts of leadership and well-being, and to understand the psychological mechanisms underlying this association. Combining Self-Determination and Job Demands-Resources theory, this study aims to investigate the association between engaging leadership and burnout and work engagement among nurses by focusing on two explanatory mechanisms: perceived job characteristics (job demands and resources) and intrinsic motivation. This study is based on a cross-sectional survey of 1,117 direct care nurses (response rate = 25%) from 13 general acute care hospitals in Belgium. Validated instruments were used to measure nurses' perceptions of engaging leadership, burnout, work engagement, intrinsic motivation, and job demands and job resources. Structural equation modeling was performed to test the hypothesized model which assumed a serial mediation of job characteristics and intrinsic motivation in the relationship of engaging leadership with nurse work-related well-being. Confirmatory factor analysis indicated a good fit of the measurement model. The findings offer support for the hypothesized model, indicating that engaging leadership is linked to enhanced well-being, as reflected in increased work engagement, and reduced burnout. The results further showed that this association is mediated by nurses' perceptions of job resources and intrinsic motivation. Notably, while job demands mediated the relationship between EL and nurses' well-being, the relationship became non-significant when including intrinsic motivation as a second mediator. Engaging leaders foster a favorable work environment for nursing staff, which is not only beneficial for their work motivation but also for their work-related well-being. Engaging leadership and job resources are modifiable aspects of healthcare organizations. Interventions aimed at developing engaging leadership behaviors among nursing leaders and building job resources will help healthcare organizations to create favorable working conditions for their nurses.

Keywords: leadership, well-being, motivation, work environment

INTRODUCTION

The nursing profession is under increased pressure due to a global staff shortage and high turnover rates (Buchan & Aiken, 2008; Lu et al., 2019). Nurses have to cope with a high workload that, combined with other work-related demands, may have severe consequences not only for their own physical and psychological health but also for their patients' safety (Aiken et al., 2009; Aiken et al., 2001; Janssen et al., 1999). Empirical evidence suggests that leadership behavior has a profound impact on nurses' perceived work-related strain and psychological well-being (Inceoglu et al., 2018; Skakon et al., 2010). For instance, poor leadership and lack of autonomy may contribute to nurse burnout, whereas recognition, rewards, and acknowledgment may enhance work-related well-being (Cummings et al., 2018; Dall'Ora et al., 2020; Rahmadani & Schaufeli, 2020). A recent systematic review on nursing leadership concluded that positive leadership styles (e.g., transformational leadership) and empowerment of staff foster nurses' well-being at work (Cummings et al., 2018).

Despite the widely acknowledged importance of leadership in creating healthy workplaces, the majority of leadership studies have largely neglected its impact on health-related outcomes, such as burnout and work engagement, mostly in favor of job performance or job satisfaction (Inceoglu et al., 2018). Even more, previous research has underestimated (inadequate) leadership as a driving factor in the development of employee well-being and ill-health, partly because of poor conceptualization, measurement, or analysis of leadership and burnout (Schaufeli, 2015). For instance, earlier studies assessed burnout rather as a one-dimensional construct by solely focusing on the emotional exhaustion dimension of the Maslach Burnout Inventory (MBI) (Aronsson et al., 2017). The MBI is the most widely used instrument to assess occupational burnout; however, it has been frequently criticized because of conceptual, practical, and psychometric shortcomings (Schaufeli et al., 2020). Similarly, most burnout research considered leadership behavior as rather narrow (e.g., by providing social support) instead of a comprehensive, multidimensional concept (Kanste et al., 2007). In relation to leadership, previous leadership concepts particularly transformational leadership have been criticized, because they lack a theoretical foundation and detailed description of the underlying processes (Bormann & Rowold, 2018; van Knippenberg & Sitkin, 2013). Accordingly, there is still much debate in the literature about the underlying (motivational) processes through which leaders influence employee well-being (Cummings et al., 2018; Nielsen et al., 2008).

In the present study, the focus is on the concept of engaging leadership (EL) (Schaufeli, 2021; Schaufeli, 2015) which is measured and understood through the perceptions of nurses. Rooted in Self-Determination theory (SDT, Ryan & Deci, 2000b), our research builds on the premise that a resourceful workplace as perceived by employees is not only beneficial for their health but also for their work motivation. By inspiring, strengthening, connecting, and empowering employees, engaging leaders are supposed to balance their followers' job demands and resources in such a way that they remain healthy, motivated, productive, and satisfied (Schaufeli, 2015). This resonates with research indicating that leaders, including engaging leaders, indirectly influence their followers' well-being by shaping their perceptions of their work environment (i.e., in the form of reduced job demands and improved job resources) (Inceoglu et al., 2018; Schaufeli, 2015; Skakon et al., 2010). SDT further posits that employees perform and feel better when their motivation is autonomous in nature (i.e., intrinsic). A workplace where employees experience sufficient support, receive high-quality feedback, and have opportunities for professional development, therefore, provides the fuel required for optimal motivation and leads to optimal functioning and well-being (Deci et al., 2017; Kohnen et al., 2023).

The overall aim of this study is to address the aforementioned conceptual and theoretical shortcomings of current leadership research by (1) using a new comprehensive measure of burnout, namely, the Burnout Assessment Tool (de Beer et al., 2020; Schaufeli et al., 2020), (2) focusing on the concept of Engaging Leadership (EL) that is rooted in SDT, a well-established theory of human motivation, and (3) focusing on two explanatory mechanisms: perceived job characteristics (i.e., job resources and job demands) and intrinsic motivation in the relationship of leadership with nurse well-being. Drawing on the Job Demands–Resources (JD–R) leadership model and SDT, we propose an integrative model which links EL with nurses' perceived work-related well-being (i.e., burnout and work engagement) through two explanatory mechanisms: perceived job characteristics (job demands and resources) and intrinsic motivation.

THEORETICAL BACKGROUND AND STUDY HYPOTHESES

THE JD–R LEADERSHIP MODEL

To explain the link between leadership behavior and nurse well-being, we use the JD–R leadership model as a conceptual model, an extension of the original JD–R model (Demerouti

et al., 2001; Schaufeli, 2015; Schaufeli & Bakker, 2004). At its core, the JD–R model proposes two psychological processes by which excessive job demands and lacking job resources are associated with well-being. First, job demands foster – via burnout – negative outcomes (i.e., health impairment process). Second, job resources yield – via work engagement – positive outcomes (i.e., motivational process). Job demands describe "aspects of the job that require sustained physical or mental effort" (Demerouti et al., 2001, p. 501) and, therefore, are said to drain employees' energies. By contrast, job resources are considered as the positive aspects of the job "that are either/or (1) functional in achieving work goals, (2) reduce job demands and the associated physiological and psychological costs, (3) stimulate personal growth, learning, and development'' (Demerouti et al., 2001, p. 501). Job resources are assumed to have motivational potential as they may not only promote work engagement but also reduce burnout. In this study, the focus is on both the negative aspect (burnout) and positive aspect (work engagement) of job-related well-being as leadership behavior shows differential relationships with these constructs (Arnold, 2017; Inceoglu et al., 2018). Burnout is defined as a work-related state of mental exhaustion, which is characterized by extreme tiredness, reduced ability to regulate cognitive and emotional processes, and mental distancing (Schaufeli et al., 2020). Being repeatedly confronted with heavy levels of workload and other work-related stressors, nurses are considered at a high risk of burnout (Woo et al., 2020). In contrast, work engagement refers to a positive, fulfilling, work-related state of mind that is characterized by vigor (i.e., high level of energy and mental resilience while working), dedication (referring to a sense of significance, enthusiasm, and challenge), and absorption (being focused and happily engrossed in one's work) (Schaufeli & Bakker, 2004; Schaufeli et al., 2002). A large-scale prevalence study of work engagement in 30 European countries revealed that employees in human service jobs such as healthcare reported higher levels of work engagement than employees in other types of industries (Hakanen, Ropponen, De Witte, et al., 2019).

Following the JD–R leadership model, leadership is one of the unique antecedents and plays a decisive role in both the health impairment and motivational process (Rahmadani et al., 2020; Schaufeli, 2015). In other words, leaders who encourage and give supportive feedback, and who show recognition, may provide nurses with sufficient resources and thereby positively influence their health and well-being (i.e., the motivational process) (Engelbrecht et al., 2017; Rahmadani & Schaufeli, 2020). In contrast, leaders who fail to provide constructive feedback, who show less support, or who exert undue control and pressure on their staff may – due to reduced resources and increased demands – contribute substantially to feelings of stress,

thereby reducing individual well-being (i.e., the health impairment process) (van Dierendonck et al., 2004). Empirical research supports this assumption. For instance, Nielsen et al. (2008) found that various work characteristics (e.g., role clarity, opportunities for development) mediated the relationship between leadership and health professionals' well-being. In a similar vein, Schaufeli (2015) reported that EL is positively associated with work engagement through job resources (e.g., task variation, role clarity) and negatively associated with burnout through reduced job demands (e.g., work overload, emotional demands). These results were further supported in a study among nursing staff (Lewis & Cunningham, 2016).

INTRINSIC MOTIVATION IN THE JD–R LEADERSHIP MODEL

Another focus of the present study is to examine the mediating role of work motivation in the JD-R leadership model by drawing on the main premises of SDT. The focus is on one specific facet of motivation, namely, intrinsic motivation (as a form of autonomous motivation), which is defined as "the doing of an activity for its inherent satisfactions rather than for some separable consequence" (Ryan & Deci, 2000a, p. 56). If people are intrinsically motivated to perform a task, they do so for its own sake, because they perceive the task as interesting and pleasurable (Ryan & Deci, 2000a). Following the premises of SDT, nurses will feel intrinsically motivated and healthier when they find themselves in a work environment providing them with sufficient job resources, such as autonomy, skill use, opportunities for growth and development, and performance feedback. On the other hand, a demanding work environment in which nurses experience excessive job demands such as high workloads, emotional demands and a lot of bureaucracy might not only reduce their work motivation but also put them at a higher risk for burnout.

Engaging leaders are expected to behave in such a way that they fulfill their followers' work-related basic needs (Schaufeli, 2015) which, in turn, is expected to fuel intrinsic motivation (Xue et al., 2022). Schaufeli (2015) proposes four components of EL, namely, empowering, strengthening, inspiring, and connecting. These may shape nurses' perceptions of their work environment, thereby nurturing their work motivation. First, engaging leaders empower nurses by giving them a voice and by recognizing their ownership. As a result, they will experience more autonomy and control over their own job which is likely to foster their intrinsic motivation. Second, nurses are strengthened, because engaging leaders assign them challenging tasks stimulating their talents and skills. Through strengthening, leaders foster nurses' feeling

of mastery and competence, particularly through positive feedback, which are considered as one of the prerequisites for the development of intrinsic motivation. Third, nurses are inspired to work towards an overall goal of the team or organization driven by a commitment to a vision and encouraged by their leader. The leader further acknowledges each member's individual contribution towards the overall goal, which will increase nurses' experience that their work is meaningful, and their contribution makes a difference. As a result, they are likely to become intrinsically motivated. Finally, engaging leaders connect their followers, for example, by fostering collaboration and a strong team spirit. In doing so, they promote a work environment characterized by a sense of security and relatedness, in which nurses' intrinsic motivation is expected to flourish. Hence, by empowering, strengthening, inspiring, and connecting, engaging leaders are considered to create favorable working conditions characterized by feelings of autonomy, competence, meaning, and relatedness, which in turn will increase nurses' intrinsic motivation. This experience is likely to result in higher levels of work engagement and well-being. Previous studies have mainly focused on the concept of transformational leadership. Research on EL is, however, relatively new and has not widely been researched yet. Nevertheless, SDT-based research generally supports this assumption (Eyal & Roth, 2011; Fernet et al., 2015). For instance, a meta-analytic review shows that a work environment where leaders support their employees to work autonomously is not only beneficial for the satisfaction of employees' basic needs but also for their (intrinsic) motivation (Van den Broeck et al., 2021). While the researchers found that leader autonomy support was positively related to intrinsic motivation, it showed, on the other hand, negative associations with employees' distress (i.e., burnout and work stress). These findings find support by Slemp et al. (2018) who conducted a meta-analytic review of 72 studies on the motivational processes and consequences of leader autonomy support in the workplace - behaviors that may be also typical of EL. Furthermore, Fernet et al. (2015) showed that (transformational) leadership was significantly related to nurse well-being by contributing to favorable working conditions and intrinsic motivation.

OBJECTIVE AND HYPOTHESES

We propose that engaging leaders indirectly influence nurse well-being and intrinsic motivation by providing more job resources and by reducing job demands. Focusing on the mediating role of job characteristics and intrinsic motivation, considering that engaging leaders (a) support nurses to balance their job resources and job demands and (b) nurture their intrinsic motivation

through improved working conditions, it is expected that engaging leaders influence nurses' work-related perceived strain and well-being (i.e., reduced levels of burnout and increased work engagement). The proposed model is shown in Figure 3.1. The hypotheses are as follows:

H1: Job demands mediate the relationship of EL with 1a) burnout and 1b) work engagement.
H2: Job resources mediate the relationship of EL with 2a) work engagement and 2b) burnout.
H3: The relationship of EL with intrinsic motivation is mediated by 3a) job demands and 3b) job resources.
H4: Job demands and intrinsic motivation mediate the relationship of EL with 4a) burnout and 4b) work engagement.
H5: Job resources and intrinsic motivation mediate the relationship of EL with 5a) work engagement and 5b) burnout.

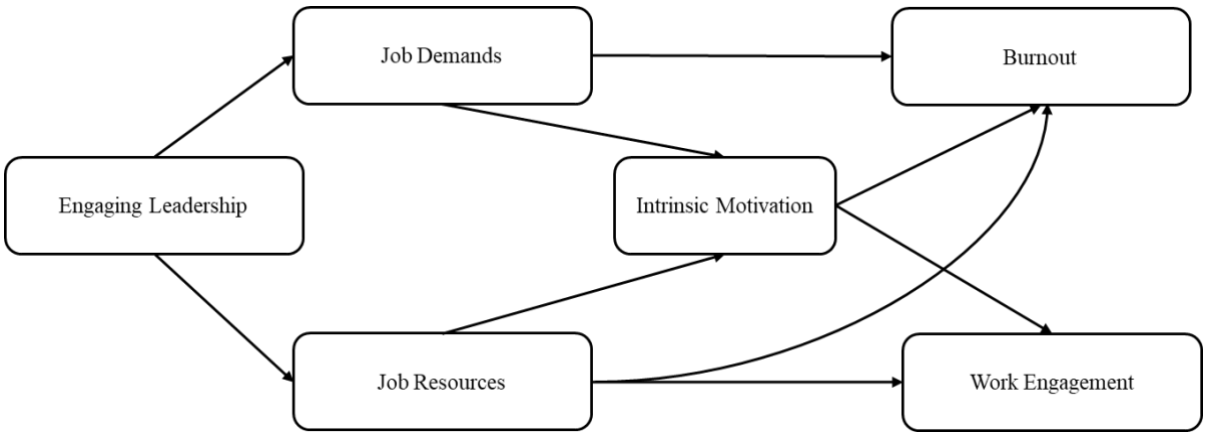

Figure 3.1: Intrinsic motivation in the JD-R leadership model based on Schaufeli (2015).

METHODS

DESIGN AND SETTING

The present study employed a cross-sectional dataset of 1117 direct care nurses from 13 general acute care hospitals in the Flemish (i.e., Dutch speaking) region of Belgium.

DATA COLLECTION

The data used for this study were collected between May 2022 and August 2022 in the context of the Horizon 2020-funded Magnet4Europe project (Sermeus et al., 2022). The project aims to investigate doctors' and nurses' perceptions towards leadership, their working environment,

motivation, and well-being. In the present study, we report only on the data collected from the nurses that participated in the survey. Data were processed in line with the General Data Protection Regulation 2016/679 of the European Union (European Parliament & Council, 2016). More information on the data collection process in general can be found in Kohnen et al. (2023).

PARTICIPANTS

A total of 5,445 registered nurses were invited to participate in the survey. Registered nurses were eligible to participate if they had direct patient contact and worked on adult inpatient units, including intensive care units (ICU) and the emergency room (ER). Of the 5,445 questionnaires sent, 1,374 were filled in and returned, which yielded a response rate of 25%. To keep the work situation rather constant and comparable, the target population for this study included nursing professionals in the same job level, i.e., direct care nurses (De Jonge et al., 1999). Accordingly, the final dataset consisted of 1,117 observations. Regarding the demographic characteristics, 82% of the nursing staff were female, the average age was 40 years (SD = 12) and they had been working in their current hospital for 15 years on average (SD = 11). Direct care nurses from all types of departments were included in the study. The majority were working in intensive care (25.3%), followed by nurses active on surgical (18.5%), internal (17.5%), and geriatric (12.5%) units.

MEASURES

A description of all measures, based on existing scales available in Dutch, and their internal consistencies (Cronbach's alpha) are described below. Unless stated otherwise, all variables were scored on a five-point Likert scale ranging from 1 (never) to 5 (always).

Engaging leadership. Employees' perception of engaging leadership was measured with the 12-item Engaging Leadership scale (Rahmadani et al., 2020; Schaufeli, 2015). The instrument assesses the four core dimensions of EL with three items per dimension, rated on a five-point Likert scale ranging from completely disagree (1) to completely agree (5). In the Dutch version of the survey instrument, the term 'leidinggevende' was used to refer to 'supervisor.' Example items were: "My supervisor delegates tasks and responsibilities to team members" (strengthening), "My supervisor encourages team members to cooperate" (connecting), "My supervisor encourages team members to voice their opinions" (empowering), and "My

supervisor is inspiring" (inspiring). The value of Cronbach's alpha for the total scale of EL was $\alpha = 0.96$.

Job demands and resources. The questionnaire captured a set of five job demands and seven job resources which were mostly derived from the Energy Compass psychometric instrument (Schaufeli, 2017). Job resources included autonomy (4 items), role clarity (2 items), performance feedback (3 items), skill use (1-item), opportunities for growth and development (1-item), task variety (1 item), and value congruence (1-item). Job demands included role conflict (3 items), workload (4 items), red tape (1-item), emotional dissonance (1-item), and emotional demands (1-item). For every respondent, composite scores of all job demands and job resource measures were generated, i.e., scores on the seven job resources as well as on the five job demands were each combined into one mean value. The value of Cronbach's alpha for both scales was $\alpha = 0.84$.

Intrinsic motivation. Intrinsic motivation was assessed with three items from the Work Extrinsic and Intrinsic Motivation Scale (WEIMS, Tremblay et al., 2009), rated on a five-point Likert scale ranging from completely disagree (1) to completely agree (5). The header for the scale was: "Please indicate to what extent each of the following items corresponds to the reasons why you are presently involved in your work." An example item was "Because I derive much pleasure from learning new things." The value of Cronbach's alpha for this scale was $\alpha = 0.83$.

Burnout. Burnout was measured using the short version of the Burnout Assessment Tool (BAT), a novel self-report questionnaire (Schaufeli et al., 2020). The short version of the BAT (Hadzibajramovic et al., 2022) consists of 12-items that assess the presence of the four core burnout syndromes, with three items per dimension: "At work, I feel mentally exhausted" (exhaustion), "I feel a strong aversion towards my job" (mental distance), "At work, I may overreact unintentionally" (emotional impairment), and "When I'm working, I have trouble concentrating" (cognitive impairment). The value of Cronbach's alpha for the total burnout scale was $\alpha = 0.90$.

Work engagement. Work engagement was measured using three items from the Dutch version of the Utrecht Work Engagement Scale (UWES, Schaufeli et al., 2019). The UWES-3 assesses the three core dimensions of work engagement, with one item each. An example item was: "At

my work, I feel bursting with energy" (vigor). The value of Cronbach's alpha for this scale was $\alpha = 0.84$.

Covariates. To rule out the possibility that the associations can be explained by relevant third variables, we controlled for the impact of the hospital, gender, and age.

DATA ANALYSIS

Data analysis was done using SPSS Version 28 (IBM, 2021) and Mplus Version 8.6 (Muthén & Muthén, 2017). To estimate our model, we performed structural equation modeling (SEM) with maximum likelihood estimation methods. In line with the two-stage approach proposed by Anderson and Gerbing (1988), we first tested the measurement model and in a second step the hypothesized structural model. The measurement model was tested using Confirmatory Factor Analysis (CFA). We considered a number of fit indices to assess how well the hypothesized measurement model fits the data (Hu & Bentler, 1999; van de Schoot et al., 2012): Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and the Standardized Root Mean Square Residual (SRMR). For the CFI and TLI, values above 0.90 indicated an adequate, and values above 0.95 an even better model fit. For the RMSEA values should ideally be below 0.06 and for SRMR below 0.08, respectively.

Next, the hypothesized structural model was evaluated. Bootstrapping was applied with a resample procedure of 1000 bootstrap samples to determine the point estimate and bias-corrected and accelerated 95% confidence interval (CI) of the total and specific indirect effect (Hayes, 2022; Hayes Andrew, 2013). Bootstrapping is recommended as the indirect effect (the product of the coefficients of the predictor and mediator variable) is not normally distributed (Stride et al., 2017). A bootstrapped confidence interval (lower level of confidence interval − upper level of confidence interval, LLCI − ULCI) that does not include the null value is considered statistically significant. As shown in Figure 3.1, we did not hypothesize direct relationships between EL and intrinsic motivation or between EL and burnout and work engagement. Rather, it was assumed that these relationships are explained through job demands and resources. Following Hayes (2022), a significant association between the predictor and the outcome is neither a necessary nor a sufficient condition of mediation. Yet, the direct paths from EL to each outcome variable were also added in the SEM. Any direct associations among

the variables included in this study are documented in the supplementary material of this study (Appendix D).

RESULTS

Table 3.1 provides information on the means, standard deviations, and correlations for all constructs. Correlations among the variables included were statistically significant and in the expected direction. In addition, we used correlational analyses to verify the associations between the sociodemographic variables (i.e., age and gender) and the variables of our model. Age significantly correlated weakly with intrinsic motivation (− 0.139, $p < 0.001$), work engagement (0.086, $p < 0.001$), and burnout (− 0.104, $p < 0.001$), while gender showed no significant correlations with any of the variables. In addition, when including these variables as controls, the hypothesized associations did not change substantially. The same was observed when including hospitals as a covariate. Therefore, to aid clarity, we report the most parsimonious analysis without including hospitals, age, and gender as control variables (Cohen et al., 2014).

CONFIRMATORY FACTOR ANALYSIS

A CFA was conducted to evaluate the measurement model which consisted of six correlated latent variables: engaging leadership (a second-order factor represented by its four dimensions, strengthening, connecting, empowering, and inspiring; each represented by their three corresponding items), job demands (a first-order factor represented by items assessing workload, role conflict, emotional demands, bureaucracy, and emotional dissonance), job resources (a first-order factor represented by items assessing autonomy, performance feedback, role clarity, task variety, skill use, opportunities for growth and development, and value congruence), intrinsic motivation (a first-order factor represented by its three items), burnout (a second-order factor represented by its four dimensions, exhaustion, mental distance, cognitive impairment, and emotional impairment; each represented by their three corresponding items), and, finally, work engagement (a first-order factor represented by its three items). The results of the CFA indicated a good fit of our hypothesized measurement model, with χ^2 (797) = 2566.703, CFI = 0.93, TLI = 0.93, RMSEA = 0.05, and SRMR = 0.06. All indicators showed significant factor loadings on their respective latent factors ($p < 0.001$) with λ values ranging from 0.38 to 0.93. A reliable measurement model was therefore obtained.

Table 3.1: Means, standard deviations, and Pearson correlations among study variables

Concept (# of items)	Mean	SD	Correlations						
			Gender	Age	Engaging Leadership	Job Demands	Job Resources	Intrinsic Motivation	Work Engagement
1. Gender	/	/	1						
2. Age	40	12	-0.059*	1					
3. Engaging Leadership (12)	3.49	0.81	0.018	0.011	1				
4. Job Demands (10)	3.30	0.48	-0.039	-0.009	-0.302**	1			
5. Job Resources (13)	3.40	0.48	0.039	0.032	0.565**	-0.405**	1		
6. Intrinsic Motivation (3)	3.80	0.62	0.047	-0.139**	0.247**	-0.213**	0.456**	1	
7. Work Engagement (3)	3.49	0.67	0.061	0.086**	0.341**	-0.348**	0.527**	0.497**	1
8. Burnout (12)	2.18	0.57	0.023	-0.104**	-0.315**	0.589**	-0.468**	-0.347**	-0.591**

Note. SD = standard deviation, **correlation is significant at the 0.01 level (2-tailed), gender was coded as 1=male and 2=female. All constructs were rated on a five-point Likert scale ranging from 1= never/completely disagree to 5=always/completely agree.

RESULTS OF THE MEDIATION ANALYSIS

First, we tested the main premises of the JD-R model (cfr. Figure 3.2). Our results indicated a positive relationship of job demands with burnout ($\beta = 0.576$, $p < 0.001$) as well as a positive relationship of job resources with work engagement ($\beta = 0.444$, $p < 0.001$). In addition, job resources were negatively related to burnout ($\beta = -0.311$, $p < 0.001$).

Table 3.2 provides information on the indirect relationships and mediating effects. Our first set of hypotheses aimed at testing the main assumptions of the JD-R leadership model, i.e., job demands and job resources are expected to mediate the relationship of EL with nurse well-being (burnout and work engagement). In relation to H1a, we observed an indirect effect of EL on burnout via job demands ($\beta = -0.218$) which was statistically significant according to the 95% bootstrap CI (− 0.272, − 0.176). With regard to H1b, our results showed an indirect effect of EL on work engagement via job demands ($\beta = 0.064$) which was statistically significant according to the 95% bootstrap CI (0.035, 0.100). These results confirm H1a and H1b.

With regard to H2a, our results showed an indirect effect of EL on work engagement via job resources ($\beta = 0.260$), which was statistically significant according to the 95% bootstrap CI (0.192, 0.342). In relation to H2b, the results further indicated an indirect effect of EL on burnout via job resources ($\beta = -0.183$). This effect was statistically significant according to the 95% bootstrap CI (− 0.262, − 0.121). Accordingly, these results support H2 and, therefore, taken together with H1a, the main assumptions of the JD-R leadership model.

Next, it was hypothesized that the relationship of EL with intrinsic motivation is mediated by job demands (H3a) and job resources (H3b). The observed indirect association between EL and intrinsic motivation via job demands ($\beta = 0.011$) was not statistically significant according to the 95% bootstrap CI (− 0.018, 0.040). Regarding H3b, our results showed an indirect effect of EL on intrinsic motivation via job resources ($\beta = 0.368$) which was statistically significant according to the 95% bootstrap CI (0.286, 0.457). In short, while the results do not support H3a, they do confirm H3b.

Our next set of hypotheses stated that job demands and intrinsic motivation mediate the relationship of EL with burnout (H4a) and work engagement (H4b). We found that the indirect effect of EL on burnout via job demands and intrinsic motivation ($\beta = -0.002$) was not

statistically significant according to the 95% bootstrap CI (− 0.007, 0.003). In relation to work engagement, we observed an indirect effect of EL on work engagement via job demands and intrinsic motivation ($\beta = 0.003$). This effect was not statistically significant according to the 95% bootstrap CI (− 0.005, 0.012). These results do not confirm H4.

Finally, it was hypothesized that job resources and intrinsic motivation mediate the relationship of EL with work engagement (H5a) and burnout (H5b). The results show that EL had an indirect effect on work engagement via job resources and intrinsic motivation ($\beta = 0.104$). This effect was statistically significant according to the 95% bootstrap CI (0.070, 0.144). In addition, we found that EL had an indirect effect on burnout via job resources and intrinsic motivation ($\beta = -0.058$), which was statistically significant according to the 95% bootstrap CI (− 0.095, − 0.032). Consequently, these results support H5.

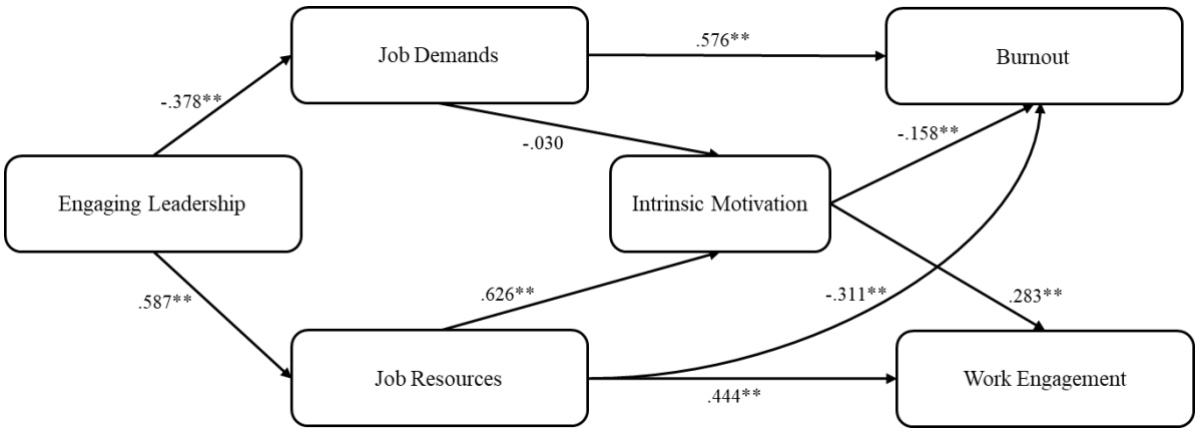

Figure 3.2: Structural model of intrinsic motivation in the JD-R Leadership model.
Note. Coefficients represent standardized estimates. **p<.001.

Table 3.2: Indirect effect of Engaging Leadership on burnout and work engagement through job demands, job resources, and intrinsic motivation

Hypothesis	Predictor	Mediator	Outcome	β	ρ	LLCI	ULCI
1a	Engaging Leadership	Job Demands	Burnout	-0.218	0.000	-0.272	-0.176
1b	Engaging Leadership	Job Demands	Work Engagement	0.064	0.000	0.035	0.100
2a	Engaging Leadership	Job Resources	Work Engagement	0.260	0.000	0.192	0.342
2b	Engaging Leadership	Job Resources	Burnout	-0.183	0.000	-0.262	-0.121
3a	Engaging Leadership	Job Demands	Intrinsic Motivation	0.011	0.457	-0.018	0.040
3b	Engaging Leadership	Job Resources	Intrinsic Motivation	0.368	0.000	0.286	0.457
4a	Engaging Leadership	Job Demands & Intrinsic Motivation	Burnout	-0.002	0.461	-0.007	0.003
4b	Engaging Leadership	Job Demands & Intrinsic Motivation	Work Engagement	0.003	0.462	-0.005	0.012
5a	Engaging Leadership	Job Resources & Intrinsic Motivation	Work Engagement	0.104	0.000	0.070	0.144
5b	Engaging Leadership	Job Resources & Intrinsic Motivation	Burnout	-0.058	0.000	-0.095	-0.032

Note. β = Standardized beta, LLCI=lower level of bootstrap confidence interval, ULCI=upper level of bootstrap confidence interval.

DISCUSSION

Based on the JD-R leadership model and SDT, we tested an integrative model which links engaging leadership with nurses' perceived work-related well-being (i.e., burnout and work engagement) through two explanatory mechanisms: perceived job characteristics (job demands and resources) and intrinsic motivation. The results from the structural equation modeling largely support this model: engaging leaders can shape nurses' perceptions of their work and create a work environment that is characterized by more resources and fewer demands. Particularly, by providing nurses with sufficient job resources such leaders not only nurture their intrinsic motivation but also foster their perceived well-being (i.e., reduced levels of burnout and increased work engagement).

Overall, our results are in line with what has been suggested by previous studies: job resources appear to be a crucial factor for nurse work engagement, whereas job demands remain an essential driver of burnout. Consistent with the JD-R leadership model, we found that job demands mediated the relationship between EL and burnout (H1a). Similarly, job demands mediated the relationship between EL and work engagement (H1b), indicating that engaging leaders can rule out the detrimental effect of job demands on nurse well-being. Job resources, on the other hand, mediated the relationship of EL with work engagement (H2a) but also with burnout (H2b). These results illustrate that engaging leaders indirectly influence nurses' well-being by shaping their perceived job resources and job demands. By empowering, inspiring, strengthening, and connecting, engaging leaders create a more favorable work environment for nurses characterized by reduced demands (less workload, emotional demands, role conflict) and increased resources (sufficient autonomy, task variety, skill use and feedback). As a result, nurses will not only experience higher levels of work engagement; they are also less likely to experience feelings of burnout. These results are in line with the findings reported in previous studies (Lewis & Cunningham, 2016; Schaufeli, 2015). For instance, by including a wide variety of job demands (i.e., emotional demands, role conflict, work overload) and job resources (i.e., job control, task variety, skill use), Schaufeli (2015) found that followers' perceptions of their work characteristics mediated the relationship between EL and employee well-being.

In addition, our findings underscore the importance of work motivation in the JD-R leadership model. Through increased job resources, engaging leaders seem to foster nurses' intrinsic motivation (H3b). Particularly, the results indicate that nurses who feel empowered, inspired,

strengthened, and connected through EL behavior are more likely to perceive sufficient autonomy and a strong connection with their team. In addition, they will believe in their ability to master their work and to contribute meaningfully to the workplace. Consequently, they will find themselves in a work environment in which their intrinsic motivation is expected to flourish. Following SDT, these results suggest that engaging leaders foster – via job resources – an internalization process in nurses, inducing a sense of enjoyment and satisfaction while performing their job (Deci & Ryan, 2000). Even more, as illustrated in the current sample, nurses are likely to feel more engaged at work (H5a), while they are less likely to develop feelings of burnout (H5b). This study adds to the accumulating evidence of the JD-R model and SDT by showing that leadership behavior has a profound impact on nurses' perceptions of their work environment, their work motivation, and work-related well-being.

Contrary to our expectations, we found no mediating effect of job demands and intrinsic motivation in the relationship of EL with nurses' burnout (H4a) and work engagement (H4b). Although job demands mediated the relationship between EL and nurses' well-being, the relationship became non-significant when including intrinsic motivation as second mediator. Overall, these findings align with a recent study by Kohnen et al. (2023). In a sample of 1729 direct care nurses in Belgium, the authors investigated the mediating role of intrinsic motivation in the relationship of job demands and job resources with nurse work-related well-being. The results showed that intrinsic motivation did not mediate the relationship of job demands with nurse well-being. In a similar vein, intrinsic motivation showed no associations with job demands in general. In relation to the current study, our findings prompt further exploration into the specific aspects of EL, as it may not be effectively predicting the associations of job demands and intrinsic motivation with nurses' work-related well-being. Yet, another possible explanation is that the relationship between job demands and nurse well-being is influenced by other types of motivation, such as external regulation, as a form of controlled motivation. SDT arranges different forms of motivation along a continuum of self-determination, ranging from more controlled to more autonomous motivation. While the most autonomous form of motivation, i.e., intrinsic motivation, is at one extreme of the continuum, the most controlled form of motivation (i.e., external regulation) is at the other end of the spectrum. External regulation occurs when employees engage in a certain behavior or activity for purely instrumental reasons, such as obtaining rewards, avoiding punishment, or simply because they are being pressured by demands. Indeed, previous research and meta-analytic evidence demonstrated that external regulation, and particularly amotivation (i.e., lack of motivation,

employees show no interest or engagement in performing a task), exerted only negative influence on employee functioning, leading to distress and burnout (Fernet et al., 2015; Van den Broeck et al., 2021). This may suggest that autonomous and controlled motivation or amotivation are inversely associated with employees' psychological functioning. However, empirical evidence on the individual effects of the different motivational types is scarce and more research is needed to fully understand employees' motivation in the workplace (Van den Broeck et al., 2021).

LIMITATIONS

Some limitations of the present study need to be mentioned. First, this study employed a cross-sectional design which precludes establishing definite conclusions about causal relationships between the variables. Future studies could revalidate the model using longitudinal designs. Second, we observed a relatively low participation rate (25%) in our sample which raises concerns around sampling bias. While the COVID-19 pandemic and the associated survey fatigue among health professionals might be an explanation for the low response rates (de Koning et al., 2021), research on nursing staff seems to report similar if not even lower response rates of 10–15% (Timmins et al., 2023). Similarly, our sample consisted of direct care nurses working in Belgian hospitals ($n = 13$), which puts a limitation on the generalization of our findings. While the homogeneous sample minimizes the influence of contextual factors, allowing for a straightforward test of our hypotheses, the results should be interpreted with caution. A replication of our study among other health professionals, such as physicians, or in other countries that are part of the Magnet4Europe study (Sermeus et al., 2022), as well as over time would strengthen the external validity of our findings. Third, several job demands and resources were measured using a few or even single-item scales from validated instruments. Internal consistencies of the scales, however, were beyond the usual criterion of 0.70, with a value of $\alpha = 0.84$ for both scales. While scholars in occupational research seem to prefer multiple-item over single-item measures, a recent study confirmed the validity of several single-item measures, such as job control (Fisher et al., 2016). Another limitation in relation to our measures is that employees' perceptions of EL have been measured instead of surveying supervisors themselves. Future research might benefit from assessing leadership behavior by surveying non-followers. Similarly, all concepts included in this study were obtained through self-reports. As such, the strength of the effects reported herein may have been biased due to common-method variance or because of the wish to answer consistently (Conway, 2008). This

may be resolved in future research by including "objective" indicators of work characteristics, such as nurse staffing levels, nurse–patient ratios, or average hours worked per week. Finally, while the quantitative nature of this study offers limited insights into the local context, future investigations could enhance understanding by incorporating qualitative research methods, such as interviews and focus groups. Notably, in the context of the Magnet4Europe study, interviews and focus groups have been performed among nursing staff which might offer valuable insights into their perceptions of the clinical work environment.

IMPLICATIONS FOR PRACTICE

Despite the aforementioned limitations, our study has a few practical implications for healthcare organizations. First, the results of this study confirm that EL indirectly influences nurses' well-being by shaping their perceptions of their working environment. In particular, when leaders provide nurses with sufficient job resources, such as autonomy, feedback, and opportunities for development, nurses are likely to become intrinsically, i.e., autonomously motivated at work which seems to be beneficial in two ways: first, it will foster their work engagement, and second, it will prevent them from burning out. The findings illustrate that engaging leaders are key agents in shaping the clinical work environment and in creating a resourceful atmosphere that is needed to improve nurses' motivation and well-being. Accordingly, healthcare organizations may benefit from investing in training programs that support nurse leaders in developing EL behavior. As a matter of fact, research on leadership training programs shows that leadership behavior promoting favorable working conditions, autonomous motivation, and well-being can be learned (Ng et al., 2012; Su & Reeve, 2010; van Tuin et al., 2020). For instance, a recent intervention study proposed a 6-day training program on EL designed in co-creation between senior leaders and team leaders (van Tuin et al., 2020). Peer consultation and personal coaching were offered between training days to support the integration of the program. The findings showed that training managers in EL behavior was associated with improved business results, lower absenteeism, and, most importantly, improved well-being (van Tuin et al., 2020). Our findings further indicate that job demands (such as heavy workloads, emotional demands, and role conflict) are an important antecedent of burnout, whereas job resources (such as autonomy, performance feedback, role clarity) are key predictors of nurse intrinsic motivation and work engagement. Healthcare organizations are, therefore, advised to invest in initiatives aimed at reducing job demands and increasing job resources. Consistent with the JD-R model, Bakker et al. (2014) suggest a combination of training and workshops, where

participants learn about possible ways to actively modify job demands and resources in their job (i.e., job crafting). Research has shown that such job crafting interventions can be very effective for employees in optimizing their perceptions of their work environment (Gordon et al., 2018). To summarize, by promoting EL, healthcare organizations may create a resourceful environment for nursing staff which is not only beneficial for their work motivation but also for their overall well-being.

CONCLUSION

Drawing on the JD-R leadership model and SDT, the present study tested an integrative model which links EL with nurse work-related well-being (i.e., burnout and work engagement) through two explanatory mechanisms: perceived job characteristics (job demands and resources) and intrinsic motivation. The findings provide support for the hypothesized model, suggesting that EL is associated with increased well-being (i.e., work engagement and reduced burnout) by contributing to favorable perceptions of job characteristics (more resources and fewer demands) and intrinsic motivation in nurses.

GENERAL DISCUSSION

GENERAL DISCUSSION

The aim of this dissertation was to advance our understanding of how the clinical work environment affects nurse well-being. In particular, this dissertation aimed to move beyond general associations between work characteristics and well-being by identifying which job demands and job resources matter most, how and under what conditions they affect well-being, and the role that leadership and motivation play in this process. Drawing on the Job Demands-Resources (JD-R) model and Self-Determination Theory (SDT), three empirical studies were conducted to address these objectives. In line with the JD-R model, all studies confirmed the dual process of health impairment and motivation: job demands were consistently associated with burnout, while job resources were positively related to work engagement and negatively associated with burnout. Beyond these expected patterns, each study added unique insights by addressing specific research gaps identified in the introduction.

Below, we discuss the main findings of each study in relation to their respective research objectives and also position them within the broader theoretical and empirical landscape. We begin by reflecting on the relative importance of specific job demands and resources in predicting burnout and work engagement (Objective 1). Next, we turn to the integration of the JD-R and SDT approaches by investigating the underlying psychological mechanisms that link job characteristics to nurse well-being, particularly the mediating role of intrinsic motivation (Objective 2a). We also examine whether job resources buffer or amplify the effects of job demands on burnout and motivation, shedding light on relevant boundary conditions (Objective 2b). We then evaluate how engaging leadership contributes to nurse well-being through its effects on job characteristics and motivation (Objective 3). Finally, we consider the implications of adopting a multidimensional measure of burnout in advancing current (burnout) research (Objective 4). A visual display of the key empirical pathways supported or not supported across the three studies is presented before turning to the limitations of the studies, future research directions, and practical implications.

MAIN FINDINGS

OBJECTIVE 1: THE RELATIVE IMPORTANCE OF JOB DEMANDS AND RESOURCES FOR NURSE WELL-BEING

The first aim of this dissertation was to identify which specific job demands and job resources are most important in predicting burnout and work engagement among direct care nurses in Europe. To address this question, we applied dominance analysis, which goes beyond traditional regression approaches by quantifying the relative importance of each predictor across all possible sub-models. The analysis was conducted on a large dataset of hospital nurses from different European countries, allowing for the identification of consistent patterns across national contexts. The findings from Chapter 1 confirm that both job demands and job resources were significantly associated with nurse well-being. However, their relative importance differed depending on the outcome, challenging the assumption that all job demands and job resources are equally relevant for nurse well-being. Or, to put it in Orwell's words from Animal Farm: all job characteristics are equal, but some job characteristics are more equal than others.

Regarding burnout, emotional dissonance and emotional demands consistently emerged as the strongest predictors across countries, underscoring the emotional strain inherent in caregiving work. Emotional demands refer to the extent to which nurses are confronted with emotionally challenging situations at work, such as dealing with suffering patients or emotionally charged interactions (de Jonge & Dormann, 2003; van Vegchel et al., 2004). Emotional dissonance, by contrast, arises when employees are required to display emotions that conflict with their true feelings (Zapf et al., 1999). This discrepancy between felt and expressed emotions is widespread in professions requiring emotional labor, such as nursing. Overall, our findings align with previous research emphasizing the emotional burden of the nursing profession, in which persistent emotional demands may deplete energy and increase stress levels, making nurses more vulnerable to burnout (Broetje et al., 2020; McVicar, 2016). Notably, they support early conceptualizations of burnout as a stress reaction resulting from emotionally demanding interpersonal interactions in human service professions such as those between nurses and their patients (Maslach, 1982). Our findings further resonate with research on emotional labor, which distinguishes between two strategies individuals can apply: surface acting (displaying emotions that do not reflect one's true feelings) and deep acting (genuinely trying to feel the required emotions) (Brotheridge & Lee, 2003; Grandey, 2003; Hochschild, 1983). While deep acting may support positive outcomes, such as job satisfaction and engagement (Yang & Chang,

2008), surface acting is often linked to emotional dissonance and may decrease employee well-being (Hülsheger & Schewe, 2011). The conceptual relationship between surface acting and emotional dissonance remains controversial though (Hülsheger & Schewe, 2011). While some scholars treat emotional dissonance as the defining feature of surface acting (Hochschild, 1983; Zapf et al., 1999), others view it as a potential consequence of using surface acting strategies (Grandey, 2000). In either case, the strong association between emotional dissonance and burnout observed in Chapter 1 aligns with previous research (Hülsheger & Schewe, 2011) highlighting the psychological costs of dysfunctional emotional regulation in nursing.

For work engagement, the most influential predictor was skill utilization, which refers to the extent to which nurses can apply their knowledge and abilities in their daily work. Together with performance feedback and job autonomy, it accounted for more than half of the total variance in work engagement. These results were consistent across countries and align with previous research indicating that these factors play a central role in fostering work engagement (Hakanen et al., 2021; Hakanen, Ropponen, De Witte, et al., 2019; Humphrey et al., 2007). For example, a Finnish study including 87 organizations from different industries found that skill utilization, together with performance feedback, was the strongest predictor of work engagement for both registered (n=1,051) and assistant nurses (n=863) (Hakanen et al., 2021). Our findings further align with the core propositions of the Job Characteristics Model (JCM) that considers skill utilization, job feedback, and job autonomy as the core job characteristics that foster work motivation and job satisfaction (Hackman & Oldham, 1975; Oldham & Hackman, 2010). This model posits that using various skills increases meaningfulness, autonomy promotes a sense of responsibility, and feedback provides employees with knowledge of the results of their work. Together, these factors create a work environment that helps nurses to grow and develop in their jobs, as well as to stay engaged and motivated. The JCM has found some significant support in research and has been applied and validated across industries, including healthcare (for an overview: Humphrey et al., 2007). The relevance of skill utilization also becomes evident in broader policy discussions about the nursing workforce. A central concern in these discussions is how nurses can be supported in applying their skills effectively in daily practice. For example, a 2016 OECD report highlights that many nurses feel unable to fully utilize their competencies and expertise, leading to frustration, disengagement, and a significant waste of human capital (OECD, 2016).

Although our measures captured individual perceptions, the consistency across organizational and national contexts indicates that these experiences likely reflect underlying structural issues. One important structural factor in this regard is the composition of the care team. Research on workforce planning highlights that the way staff with different qualifications are combined and deployed directly impacts whether professional skills are used effectively (Koopmans et al., 2018). This is often discussed using the concept of skill mix, which refers to the "mix of posts, grades or occupations in an organization" (Buchan & Dal Poz, 2002, p. 575). According to Buchan and Dal Poz (2002), it may also refer "to the combinations of activities or skills needed for each job within the organization" (p. 575). An inadequate skill mix may result in the underuse of available skills, inefficient allocation of resources, and diminished job satisfaction (Buchan et al., 2000). An adequate skill mix, on the other hand, has the potential to enable more targeted use of professional competencies, support collaboration across roles, and increase overall care efficiency (Drossel, 2025). Taken together, our findings underscore that supporting full skill utilization is essential for both nurse engagement and the sustainability of healthcare delivery.

OBJECTIVE 2: INTEGRATION OF THE JOB DEMANDS-RESOURCES MODEL AND SELF-DETERMINATION THEORY

In order to understand the associations between the work environment and nurse burnout and work engagement, we combined a well-established job stress framework (JD-R model) with a prominent theory of human motivation (SDT). While the JD-R model explains *which* job demands and job resources influence nurse well-being, SDT offers a motivational lens to understand *why* they do so. Taken together, the findings from Chapters 2 and 3 illustrate the integration of the JD-R model and SDT, indicating that job resources not only have direct associations with well-being but also foster intrinsic motivation, which in turn promotes work engagement and reduces burnout.

By combining JD-R and SDT, this dissertation responds to recent calls to integrate motivational and occupational health theories in order to better understand the dynamics of employee well-being (Schaufeli & Taris, 2014). In particular, it has been argued that existing heuristic models like JD-R can be significantly enriched by incorporating psychological need frameworks such as SDT, which help explain the underlying psychological mechanisms such as motivation for employee well-being (Deci et al., 2017; Van den Broeck et al., 2016). Similarly, Schaufeli and

Taris (2014) emphasized the importance of embedding psychological processes more explicitly within the JD-R model to capture how work characteristics translate into employee outcomes. Our theoretical integration aligns with these propositions and contributes to a more comprehensive and process-oriented understanding of nurse well-being. It allows us to examine not only whether job demands and resources are associated with well-being, but also how and under what conditions these associations occur.

Building on this theoretical integration, the following sub-objectives address in greater detail how and under what conditions job demands and resources contribute to nurse burnout and work engagement.

OBJECTIVE 2A: THE UNDERLYING PSYCHOLOGICAL MECHANISMS IN THE RELATIONSHIP OF JOB CHARACTERISTICS AND NURSE WELL-BEING

The aim of this objective was to examine the psychological mechanisms through which job characteristics influence nurse burnout and work engagement. Building on the integration of the JD-R model and SDT in Chapters 2 and 3, we proposed the mediating role of intrinsic motivation in both the health impairment and motivational pathways described by the JD-R model.

Chapter 2 showed that job resources such as autonomy, performance feedback, and opportunities for growth and development were positively associated with nurse intrinsic motivation. In turn, intrinsic motivation was positively linked to work engagement and negatively related to burnout, supporting our assumption that job resources affect nurse well-being directly and indirectly through motivational processes. Overall, our findings suggest that nurses who perceive sufficient job resources are more likely to develop autonomous forms of motivation, such as intrinsic motivation. As the most self-determined form of autonomous motivation, intrinsic motivation is driven by interest and enjoyment in the work itself (Ryan & Deci, 2000a). Feeling intrinsically motivated, in turn, may lead nurses to feel more energetic, enthusiastic, and mentally absorbed in their work, reflecting the core dimensions of work engagement. At the same time, this form of motivation may make them less vulnerable to symptoms of burnout, such as feeling exhausted and overwhelmed by their tasks, losing interest in their work, or having difficulty staying focused during the day.

Similar patterns emerged in Chapter 3, which focused on the role of leadership. First and foremost, the results of Chapter 3 corroborate the core motivational pathways identified in Chapter 2, despite being based on a different sample. Moreover, Chapter 3 showed that engaging leadership was indirectly linked to intrinsic motivation through job resources. By empowering, inspiring, strengthening, and connecting, engaging leaders may facilitate conditions in which autonomous (i.e., intrinsic) motivation can develop. These findings support the notion that relationship-oriented leadership styles foster resource-rich work environments that can enhance motivation, thereby potentially reducing burnout and increasing engagement among nurses (Fernet et al., 2015; Slemp et al., 2018; Van den Broeck et al., 2021).

In contrast, no significant relationship was found between job demands and intrinsic motivation in either chapter. Although job demands such as workload, emotional demands, role conflict, and red tape were positively associated with burnout and negatively related to work engagement, they did not appear to influence nurses' intrinsic motivation. This finding suggests that job demands may not necessarily diminish or enhance autonomous motivation, at least not in the way resources do. Previous research has suggested that certain types of demands may have motivational potential when experienced as challenges rather than hindrances (Lepine et al., 2005; Podsakoff et al., 2007; van Oortmerssen et al., 2019). However, this distinction could not be examined in the present studies, and the overall pattern indicates that – because of their positive relations with burnout and negative associations with work engagement – the demands included here were rather perceived as hindrances. It remains an open question whether more nuanced demand categories or alternative motivational constructs (e.g., controlled motivation or amotivation) might reveal different associations, particularly within the strain pathway of the JD-R model. Future research could address these aspects to clarify the underlying psychological mechanisms through which job demands impact nurse well-being.

The present dissertation fits within a broader body of work that integrates the JD-R model with SDT to explain how job characteristics shape motivation and, in turn, employee well-being. Reflecting the current findings, recent studies using diverse methodological approaches, including meta-analyses and person-centered analyses, consistently showed that supportive work environments foster more self-determined forms of motivation (Gillet et al., 2020; Van den Broeck et al., 2021). In particular, a recent review by Gagné and colleagues (2022) summarized evidence that core job characteristics – such as skill variety, task significance, job autonomy, social support, performance feedback, and perceptions of fairness – are all positively

associated with self-determined motivation at work. In turn, evidence indicates that these forms of motivation predict higher levels of engagement, satisfaction, and performance, and lower levels of burnout and psychological strain (Forest et al., 2023; Van den Broeck et al., 2021). Together, these findings underline that job resources are the primary drivers of both high-quality motivation and well-being, shaping how employees experience and respond to their work environment. Building on this, recent scholarship emphasized the value of integrating the JD-R model with SDT to better understand how the work environment relates to internal motivational processes, particularly in demanding contexts such as healthcare (Joseph & Seshadri, 2025). At the same time, scholars have called for stronger attention to strain-related outcomes such as burnout, which have received less empirical focus compared to positive states like work engagement and job performance (Joseph & Seshadri, 2025; Van den Broeck et al., 2021). The present dissertation addresses these calls by examining intrinsic motivation as a central mechanism linking job characteristics with both engagement and burnout among nurses, demonstrating that autonomous motivation not only enhances energy and involvement but also protects against psychological strain.

Beyond these motivational mechanisms, research within the JD-R framework has also highlighted the role of personal resources in explaining why employees differ in how they experience and respond to their work environment (Bakker & Demerouti, 2023). Personal resources, such as optimism, self-efficacy, and resilience, represent psychological capacities that help individuals manage stressors and sustain well-being (Hobfoll et al., 2003; Xanthopoulou, Bakker, Demerouti, et al., 2007; Xanthopoulou et al., 2009). Meta-analytical and longitudinal research has consistently confirmed their relevance for work engagement and well-being, identifying factors such as self-efficacy, resilience, optimism, and proactive personality as key predictors (Bakker et al., 2023; Halbesleben, 2010; Mazzetti et al., 2023). Building on this literature, this dissertation conceptualized intrinsic motivation as a self-regulatory personal resource. It captures the energetic and directional forces that guide how nurses allocate attention, effort, and persistence in their work (Kanfer et al., 2017; Pinder, 2008). While motivation is not traditionally classified as a personal resource, it serves a comparable psychological function by promoting energy, focus, and persistence at work, thereby sustaining engagement and protecting against psychological strain.

The findings of Chapters 2 and 3 extend previous research in several ways. First, while the JD-R model acknowledges that job characteristics influence employee well-being through

motivational and strain-related processes, it does not explicitly define *how* these mechanisms operate. By integrating SDT, the findings of both studies provide a theoretically grounded explanation of how specific job resources may contribute to nurse well-being through their association with intrinsic motivation. Second, the inclusion of both burnout and engagement as outcomes suggests that motivational processes are not only enabling but also protective. In this sense, intrinsic motivation functions as a pathway through which positive work experiences translate into vitality, involvement, and reduced psychological strain. Third, the absence of an association between job demands and intrinsic motivation adds nuance to current assumptions about how motivation is shaped in the workplace. Although job demands are commonly described as energy-depleting, our findings suggest that they do not necessarily interfere with autonomous motivation, at least not directly, nor in the same way as job resources. This challenges the implicit expectation that high job demands undermine autonomous motivation. Rather, our findings suggest that the presence of specific job resources such as autonomy, feedback, and opportunities for growth appears to play a more decisive role in fostering intrinsic motivation. Practically speaking, this means that a nurse working under time pressure, for example, may still feel intrinsically motivated if they have the autonomy to structure their work, receive constructive feedback, and have opportunities for professional growth, conditions that can be actively fostered by engaging leadership. The results of Chapter 3 confirm the core findings of Chapter 2 in an independent sample, strengthening the robustness and generalizability of the proposed motivational pathways presented in the two studies.

OBJECTIVE 2B: BOUNDARY CONDITIONS OF THE RELATIONSHIP BETWEEN JOB DEMANDS, MOTIVATION, AND BURNOUT

In Chapter 2, we moved beyond the additive effects of job demands and resources on nurse well-being by testing their interactive effects. Building on the JD-R model (Demerouti et al., 2001; Schaufeli & Bakker, 2004) and Karasek's (1979) Job Demand-Control (JDC) model, we tested two central hypotheses. First, in line with the strain hypothesis of the JDC model, we investigated whether low job resources intensified the negative impact of high job demands on burnout. This interaction between demands and resources is also central to the JD-R model, where it is also framed as the buffer hypothesis, emphasizing that high job resources can protect employees from the adverse effects of high demands. Second, following the activation hypothesis of this model, we examined whether high job demands in combination with high resources would enhance intrinsic motivation. Specifically, Karasek's activation hypothesis

posits that jobs are more stimulating and motivating when high demands are accompanied by sufficient control or opportunities to use one's skills. In such environments, resources may not only reduce the risk of burnout but also promote learning, motivation, and growth (Karasek & Theorell, 1990; Karasek, 1979).

Our findings provided only partial support for these assumptions. Consistent with the JDC model, low levels of job resources augmented the negative effect of job demands on nurse burnout. More importantly, our results also showed that high job resources buffered the adverse impact of high job demands on burnout. Although the effect size was small ($\beta = -0.039$), this finding supports the buffer hypothesis proposed in the JD-R model. Previous findings on this interaction have been inconsistent (Häusser et al., 2010; Van der Doef & Maes, 1998, 1999; Xu & Payne, 2020). While some studies found that job resources mitigate the negative effects of job demands (Putwain & von der Embse, 2019; Xu & Payne, 2020), others reported a reverse-buffering effect, where high levels of resources intensified the adverse impact of job demands (Mathieu et al., 2019; Tucker et al., 2018). Some researchers have argued that such inconsistencies may partly stem from methodological issues. In particular, most studies rely on cross-sectional data, which limits the ability to determine when and under what conditions buffering effects may occur (Häusser et al., 2010; Xu & Payne, 2020).

In contrast, we found no significant interaction between job demands and job resources in predicting intrinsic motivation. As such, no evidence was found for the activation hypothesis. A closer inspection of our data revealed several patterns that may explain this finding. First, correlations between job demands and intrinsic motivation were consistently weak, indicating limited potential for interaction effects. Additionally, certain demands, such as workload, were uniformly high in our sample. This lack of variation may have further reduced the chance of detecting a significant interaction between job demands and job resources. Conceptually, our findings might reflect an imbalance or mismatch in the types of demands and resources included. According to the matching hypothesis (Daniels & de Jonge, 2010; de Jonge & Dormann, 2003), job demands and job resources are more likely to interact when they are matched within the same domain, i.e., affectively, cognitively, or physically. For example, cognitive resources may be more effective in activating motivation in response to cognitively challenging tasks. Lastly, it is important to note that the activation hypothesis has not been widely examined empirically. In a review, Taris and Kompier (2004) identified only 18 studies that explicitly tested the hypothesis, and the results were mixed. Although two-thirds of the

tests (i.e., 63.3%) supported the hypothesis, the remainder showed no significant or even negative effects. Taken together, these points suggest that the activation hypothesis may be more context-dependent and sensitive to conceptual and methodological aspects.

Compared to previous studies, the present research contributes to the literature by incorporating a broader range of job demands and job resources. Earlier studies testing such interactions have primarily focused on a narrow set of job characteristics, particularly workload as the main job demand and job control and/or social support as key job resources (e.g., de Lange et al., 2003; Van Yperen & Hagedoorn, 2003). By contrast, our study included a more differentiated set of demands, such as workload, emotional demands, red tape, and role conflict, as well as various resources such as job autonomy, performance feedback, and opportunities for growth and development. This extended conceptualization reflects the complexity of nurses' psychosocial work environment more appropriately and allows for a more comprehensive examination of how job characteristics interact to produce burnout and motivation. Future research could build on this broader conceptualization to more precisely investigate which combinations of job demands and resources are most effective in promoting motivation and preventing burnout.

OBJECTIVE 3: ENGAGING LEADERS INFLUENCE NURSE WELL-BEING

The third objective of this dissertation was to examine whether and how engaging leadership contributes to nurse well-being. Drawing on the JD-R leadership model (Schaufeli, 2015) and SDT (Deci & Ryan, 2000; Ryan & Deci, 2000a), we proposed an integrated framework in which engaging leadership influences nurse well-being via two explanatory pathways: perceived job characteristics (i.e., job demands and job resources) and intrinsic motivation.

The findings presented in Chapter 3 provided partial support for this framework. As expected, engaging leadership was positively associated with job resources such as autonomy, feedback, and role clarity, which in turn were associated with higher intrinsic motivation. Both job resources and intrinsic motivation were positively related to work engagement and negatively related to burnout. Importantly, the direct effect of engaging leadership on burnout and engagement became nonsignificant once job resources and intrinsic motivation were included in the model, supporting the view that leadership acts through nurses' perceptions of their work environment and motivational processes. These findings resonate with previous studies in the field of relationship-focused leadership styles (including engaging leadership), indicating that

leaders exert their impact on work engagement and well-being indirectly through job resources (Schaufeli, 2015) and motivational mechanisms (Mazzetti & Schaufeli, 2022; Rahmadani et al., 2019).

On the other hand, the data did not support the proposed serial mediation of job demands and intrinsic motivation in the relationship between engaging leadership and nurse well-being. Although job demands initially acted as a mediator, the effect was no longer significant once intrinsic motivation was included in the model. This suggests that while engaging leaders may reduce perceived job demands, these reductions do not influence intrinsic motivation in a way that helps explain improvements in well-being. In other words, while engaging leaders may succeed in reducing perceived job demands, this reduction does not translate into improved well-being through enhanced intrinsic motivation. Other mechanisms, such as controlled forms of motivation (Fernet et al., 2015), may play a role in this relationship but were not included in the present study. At the same time, these results are consistent with the general proposition of the JD-R model that job demands and job resources operate through distinct psychological pathways (i.e., the motivational and strain pathway). These findings highlight the importance of identifying specific psychological mechanisms through which leadership behavior influences job demands and nurse well-being.

This interpretation aligns with a growing body of research emphasizing that leaders play a crucial role in shaping how employees experience their work. Within the JD-R framework, leadership has been identified as a key antecedent of job characteristics, as leaders can influence employee well-being through the way they structure work and allocate demands and resources (Inceoglu et al., 2018; Schaufeli, 2015; Tummers & Bakker, 2021). Empirical studies have shown that supportive leadership helps improve working conditions by easing workload pressures, clarifying roles, and providing access to resources that enable staff to perform their work effectively (Decuypere & Schaufeli, 2019; Tuckey et al., 2012). In doing so, leadership can foster engagement while reducing the risk of strain and burnout. From an SDT perspective, these effects can be understood as reflecting leaders' ability to create environments that nurture autonomous motivation and sustained well-being, for instance by fostering a sense of autonomy, competence, and connection (Van den Broeck & Slemp, 2023). Although these mechanisms were not directly assessed in this dissertation, the pattern of results is consistent with this theoretical view. Building on this evidence, the present dissertation integrates engaging leadership into this line of research, illustrating how leaders can foster nurse well-

being by enhancing job resources, reducing job demands, and strengthening intrinsic motivation.

In addition to its empirical contributions, the study presented in Chapter 3 offers a conceptual rationale for focusing on engaging leadership rather than more established styles such as transformational leadership (Bass, 1985). In recent decades, several positive leadership constructs have been proposed within the wider landscape of positive psychology, including transformational, charismatic (Conger & Kanungo, 1987), authentic (Luthans & Avolio, 2003), ethical (Brown et al., 2005), and servant leadership (Liden et al., 2014). While these approaches have produced a considerable body of empirical research, they have also been criticized for lacking theoretical clarity (Fischer & Sitkin, 2023; van Knippenberg & Sitkin, 2013). Specifically, they often consist of multiple dimensions without clearly specifying how these elements are conceptually related or through which pathways they may influence employee well-being (Bormann & Rowold, 2018). Engaging leadership was chosen for this study because it provides a theoretically grounded explanation of how leadership affects employee functioning. It is explicitly rooted in two well-established frameworks: the Job Demands-Resources model and Self-Determination Theory (Schaufeli, 2015). While engaging leadership shares some conceptual elements with transformational leadership, it remains a distinct construct. Both approaches include aspects of empowering and inspiring followers. In engaging leadership, these are reflected in the dimensions “empowering” and “inspiring”, which correspond conceptually to “intellectual stimulation” and “inspirational motivation” in transformational leadership. Despite these similarities, empirical research shows that the two constructs load on separate factors and can be distinguished psychometrically (Rahmadani & Schaufeli, 2022; Schaufeli, 2021). Engaging leadership avoids some of the conceptual ambiguities associated with transformational leadership by focusing on identifiable leader behaviors and well-defined psychological mechanisms (Schaufeli, 2021; Schaufeli, 2015).

Lastly, this study contributes to the field by responding to calls for a broader, multidimensional view of leadership in the context of employee well-being (Kanste et al., 2007). It shows that leadership is not just about providing support but about shaping the work environment in ways that foster motivation by increasing job resources, enhancing engagement, and reducing the risk of burnout among nurses.

OBJECTIVE 4: A COMPREHENSIVE VIEW ON BURNOUT

The final objective of this dissertation was to adopt a comprehensive approach to the measurement of burnout by using the Burnout Assessment Tool (BAT). In all three empirical chapters of this dissertation, burnout was assessed using the BAT-12, a novel validated short form of the Burnout Assessment Tool. This approach allowed for a consistent measurement of burnout across studies, focusing on its conceptualization as a syndrome composed of multiple interrelated symptoms. Across our studies, burnout consistently emerged as a relevant indicator of nurse well-being, with direct and indirect associations with job characteristics, a relationship with intrinsic motivation, and indirect associations with engaging leadership.

The use of the BAT in this dissertation aligns with ongoing discussions about the conceptual and methodological foundations of burnout research (Bianchi & Schonfeld, 2024; De Witte & Schaufeli, 2025; Demerouti & Bakker, 2025; Leiter & Day, 2025). While the Maslach Burnout Inventory (MBI) remains the most widely used instrument, it is increasingly criticized for its limited theoretical grounding, inconsistent cutoff scores, and the ambiguity surrounding the role of its three dimensions (Schaufeli et al., 2020). Moreover, studies using the MBI have employed a wide array of arbitrary and varying definitions as well as cutoff scores for determining overall burnout or high levels on its three dimensions (Hiver et al., 2022; Rotenstein et al., 2018; Schaufeli et al., 2023). In this sense, a recent systematic review of 182 studies on the prevalence of physician burnout noted that this lack of consensus has led to substantial inconsistencies in reported burnout prevalence ranging from 0% to 80.5% (Rotenstein et al., 2018). Most importantly, the MBI subscale scores are not intended to be combined into a composite score for assessing burnout as a single overall construct, although some studies have done so despite existing recommendations (Dall'Ora et al., 2020). These findings stand in contrast to the main understanding of burnout as a multifaceted syndrome, including a set of symptoms and signs that tend to occur together. Rather than considering these dimensions in isolation, burnout should be identified when its core symptoms are experienced simultaneously (Demerouti, 2024; Demerouti et al., 2021).

The BAT was developed in response to these concerns and offers a theoretically grounded and psychometrically validated alternative (Schaufeli et al., 2020). It conceptualizes burnout as a work-related state characterized by extreme tiredness, mental distancing, and a reduced ability to regulate emotional and cognitive processes – reflecting both the inability and the

unwillingness to invest effort in one's work. A key advantage of the BAT is that it allows burnout to be measured as a set of co-occurring symptoms that refer to the same underlying condition (de Beer et al., 2020; Schaufeli et al., 2023). The BAT has gained considerable attention in international burnout research and is being systematically validated in numerous countries (De Beer et al., 2024; Villacura-Herrera et al., 2025). Evidence from cross-national and sector-specific studies, including healthcare, supports its use as a robust measure of the burnout syndrome (Brulin et al., 2023; Hadžibajramović et al., 2022). Across all chapters, the findings presented in this dissertation support this rationale, showing that burnout was meaningfully associated with a range of job characteristics, intrinsic motivation, and (indirectly) leadership behavior.

Future research may build on these findings by applying the validated BAT cutoff scores (Schaufeli et al., 2023) to examine how different levels of burnout severity among nursing staff relate to specific job characteristics, leadership behavior, and intrinsic motivation. In addition, person-oriented approaches such as profile analysis could be used to identify subgroups with distinct burnout patterns and associated work-related factors.

SUMMARY OF FINDINGS

To conclude the discussion of the four research objectives, Figure 2 provides an integrated summary of the empirical pathways identified across the three studies. It visualizes which theoretical assumptions were supported by the data and which were not, providing an integrated overview of the observed relationships between job demands, job resources, intrinsic motivation, and nurse well-being, including the role of leadership.

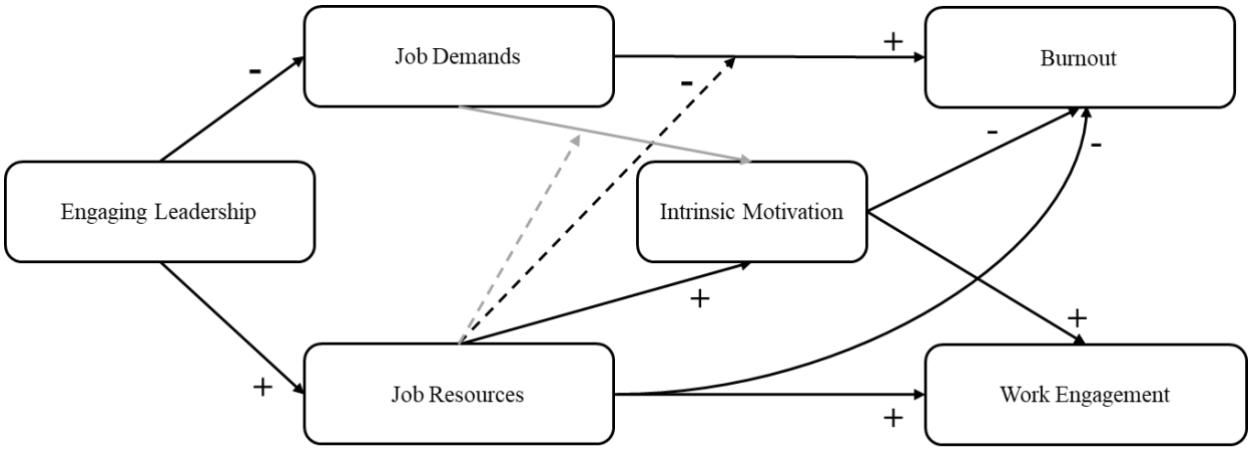

Figure 2: Integrated Summary of Empirical Pathways across Chapters 1–3.

Note. Black lines = statistically significant relationships; grey lines = non-significant relationships. + = positive relationship, − = negative relationship. Solid lines represent direct associations between constructs. Dashed lines represent moderation effects on the respective associations.

LIMITATIONS

As outlined above, this dissertation contributed to the literature by addressing four objectives that advance knowledge on the interplay between the hospital work environment and nurse well-being. However, a number of limitations need to be taken into consideration. The limitations below apply to the dissertation as a whole; specific constraints related to individual studies are discussed in the respective chapters.

REPRESENTATIVENESS AND GENERALIZABILITY

Caution is warranted when interpreting and generalizing the findings of this dissertation to other occupational groups. Below, we outline a number of considerations regarding the samples presented in each chapter and their representativeness.

Chapter 1 draws on data collected from registered nurses (n=4,591) providing direct patient care in hospitals (n=59) across Belgium (Flanders), Germany, Ireland, and England. While this cross-national approach enhances the external validity of the findings, the sample may not be fully representative of the nursing workforce in each country. For instance, hospitals participating in the Magnet4Europe study were self-selected, likely attracting institutions more committed to improving the work environment and staff well-being. While we cannot empirically assess whether this led to systematically more positive responses, this self-selection may have led to a (positive) bias, with nurses in these hospitals reporting more favorable working conditions and higher levels of well-being than the general nursing population. Additionally, differences between countries in terms of healthcare systems and working conditions may also have shaped how job characteristics and well-being are perceived and reported. To account for these contextual influences, we controlled statistically for both country and hospital in the analysis. To assess the demographic representativeness, sample characteristics of participating nurses were compared to national statistics from Belgium (with a focus on Flanders) and to WHO data for Germany, Ireland, and England (WHO, 2022a). Across all countries, the proportion of female nurses in the sample (ranging from 79% in Germany to 87.6% in Ireland) closely matched national benchmarks (ranging from 84% in Germany to 90.6% in Ireland). In terms of age, our sample (ranging from 36.6 years in the UK to 39.5 years in Belgium) was slightly younger than the general nursing population, where a significant proportion falls within the 45–55 age range. To strengthen the external validity of the findings, future research could investigate whether similar patterns can be observed in other professional groups, such as nurse managers, physicians, or advanced practice nurses.

Chapters 2 and 3 draw on data from registered nurses providing direct patient care in Belgian hospitals. The use of a single occupational group within one national context reduces contextual variability and allows for a more focused test of our hypotheses. However, it also limits the generalizability of the findings. A comparison with data from the Belgian Federal Public Service (2022) suggests that the sample was broadly representative of the Flemish nursing workforce with regard to gender, but somewhat younger in age. A replication of the study with other occupational groups or in different national contexts would help strengthen the robustness and applicability of the conclusions.

CROSS-SECTIONAL NATURE OF THE STUDIES

A second limitation concerns the cross-sectional design employed in all three studies. Although the JD-R model and SDT are well established in occupational health psychology and supported by numerous studies using various methodologies, we cannot draw conclusions about causal relationships or determine the direction of effects. Yet, across all three chapters, we found support for the core assumptions of the JD-R model. However, due to the cross-sectional nature of the data, it is unclear whether job characteristics influence nurse well-being or whether nurses' levels of burnout or engagement shape their perceptions of the work environment. It is possible that job characteristics influence nurse well-being, but reverse or reciprocal associations are also plausible (Galanakis & Tsitouri, 2022; Lesener et al., 2019). For example, nurses' levels of burnout or work engagement may shape how they perceive their work environment.

To better understand these relationships, future studies should employ longitudinal designs to explore possible reciprocal gains (or losses) and spiraling effects (i.e., where variables mutually reinforce each other over time) (Lindsley et al., 1995). Prior studies, for instance, suggest that job resources not only lead to engagement but may also be enhanced by it (Hakanen et al., 2008; Llorens et al., 2007; Salanova et al., 2010; Xanthopoulou et al., 2009). In a similar vein, burnout may negatively impact perceptions of workload, support, or control, reinforcing a cycle of strain (de Jonge et al., 2001; Ford et al., 2014; Guthier et al., 2020). These patterns align with assumptions from Conservation of Resources theory (COR; Hobfoll, 1989; Hobfoll et al., 2018), which postulates that people try to build and keep valuable resources, and that losing these resources is especially harmful, often leading to downward spirals of further loss. To advance our understanding of these mechanisms, future research should investigate the proposed pathways using longitudinal designs that allow for stronger inferences about directionality and causality.

In the present dissertation, implementing a longitudinal or two-wave design was not feasible due to external constraints. The first wave of data collection took place between October 2020 and July 2021, during the second and third peaks of the COVID-19 pandemic. Follow-up surveys were conducted mid-2022 and autumn 2023. Originally planned at shorter intervals, these follow-ups were delayed due to the ongoing disruptions caused by the COVID-19 pandemic, leading to substantial time intervals. Moreover, different surveys were used across

waves: the baseline survey was intentionally kept short to avoid survey fatigue and increase participation among health professionals. Several key constructs, such as engaging leadership and more comprehensive measures of job resources were only included from the second wave onward. In addition, the original plan envisioned individual follow-up of participants across the different waves. To enable this, the online survey system required participants to create a user profile before completing the baseline survey. This profile stored informed consent and survey responses and allowed for automated invitations to future waves. However, privacy concerns and forgotten login credentials led researchers to introduce alternative options, namely an anonymous access option via direct links. While this facilitated access and improved participation in some of the hospitals, it meant that individual responses could no longer be linked across waves. These practical constraints ultimately hindered the implementation of a longitudinal design and precluded the analysis of individual-level change.

Measurement of Perceived Work Characteristics

A related consideration concerns the measurement of job characteristics through self-report. As is common practice in occupational health psychology, job demands and job resources were assessed based on nurses' perceptions. While this subjective perspective is central to understanding individual experiences of work, it also raises questions about the extent to which the reported characteristics reflect actual job conditions rather than personal interpretations. For instance, it is possible that an engaging leader changes nurses' perceptions of their work, without necessarily altering the objective features of the job. At the same time, perceived work characteristics may accurately reflect real conditions and thus represent valid indicators of the work environment. Given the nature of self-report data, it is difficult to disentangle these two mechanisms; however, both processes may be meaningful and relevant in understanding how the work environment shapes motivation and well-being. Future research could further explore these distinctions by combining self-report data with more objective measures or observer ratings of job characteristics.

The impact of the COVID-19 pandemic

The COVID-19 pandemic represents a significant, unique contextual factor that may have influenced the findings of this dissertation. While the first wave of data collection (October 2020 to June 2021) coincided with the acute phase of the pandemic, the second occurred during its immediate aftermath (May to August 2022). During this period, healthcare systems were

still under intense pressure, and nurses continued to face challenging working conditions. Those working closely with COVID-19 patients were particularly exposed to psychological strain, including increased workload and emotional demands, which might foster symptoms of burnout, anxiety, and depression (Galanis et al., 2021; Lai et al., 2020; Luo et al., 2020; Pappa et al., 2020). A recent systematic review and meta-analysis covering 93 cross-sectional studies with over 93,000 nurses showed that at least one third experienced significant levels of stress, anxiety, depression, and sleep disturbances during the pandemic (Al Maqbali et al., 2021). This broader context might have contributed to elevated levels of job demands and strain across the sample, and it should be considered when interpreting the overall findings.

Although the COVID-19 pandemic undoubtedly shaped the broader context in which this research was conducted, the Magnet4Europe consortium deliberately chose not to include COVID-specific survey items. This decision was based on the understanding that the study addressed structural and enduring aspects of the clinical work environment that were already present prior to the pandemic. The main intention was to avoid framing the project as a pandemic-focused study, as its rationale and objectives were rooted in long-standing challenges related to clinician working conditions and professional well-being. Rather than capturing short-term crisis responses, the study aimed to explore how these structural issues can be addressed in a lasting way.

AVENUES FOR FUTURE RESEARCH

The findings presented in this dissertation open up several promising avenues for future research. Building on the insights gained across the three studies, we outline three key directions that can help to further develop theoretical frameworks, refine methodological approaches, and deepen our understanding of the nursing work context. In addition, the final section of this chapter provides a brief outlook on concrete follow-up projects based on the present dataset.

BEYOND INTRINSIC MOTIVATION: INTEGRATING THE FULL SDT CONTINUUM

This dissertation focused on intrinsic motivation. Defined as doing work because it is interesting or satisfying in itself (Deci & Ryan, 2000), this form of motivation has been consistently linked to positive health outcomes (Van den Broeck et al., 2021). However, it represents only one form of the broader motivational spectrum described by SDT. According to SDT, motivation exists along a continuum, ranging from amotivation to intrinsic motivation, with several forms of

extrinsic motivation in between that differ in how self-determined they are (Deci & Ryan, 2000). These include: (1) external regulation, i.e., the non-self-determined type of extrinsic motivation where behavior is driven by rewards or punishments, (2) introjected regulation, i.e., a partially internalized form of extrinsic motivation that is based on internal pressures such as guilt or self-esteem ("I should do"), (3) identified regulation, i.e., a more internalized and self-determined form of extrinsic motivation which reflects engaging in activities because of perceived meaningfulness and importance, and lastly (4) integrated regulation, where the reason underlying the behavior is fully aligned with one's values and identity. Intrinsic motivation represents the most autonomous form of motivation, whereas amotivation reflects a complete absence of intentionality.

Although this continuum is well established in theory (Howard et al., 2017), research on health-related outcomes still tends to focus on the broad distinction between intrinsic and controlled motivation (Van den Broeck et al., 2021). As a consequence, other types of motivation such as introjected, identified, or integrated regulation are often overlooked or are collapsed into a single extrinsic motivation factor, despite being conceptually and empirically distinct and despite showing associations with different outcomes (Gagné et al., 2015; Van den Broeck et al., 2021). For example, identified regulation has often been associated with high performance, whereas introjected regulation shows mixed associations, including links to both ill-being and well-being (Van den Broeck et al., 2021). Although intrinsic motivation remains the strongest and most consistent predictor of well-being, evidence suggests that more autonomous forms of extrinsic motivation, notably identified regulation, may also yield positive outcomes (Gagné et al., 2015; Howard et al., 2021; Van den Broeck et al., 2021).

The reviewed evidence raises an important question for future research: Is intrinsic motivation always the optimal form of motivation, or can other types of autonomous extrinsic motivation be equally "good enough" in promoting well-being and effective functioning at work? Put differently: Does work always need to be fun in order to promote well-being, or is it sufficient if employees experience their tasks as personally meaningful and aligned with their values (e.g., as in the case of identified regulation)? Addressing this question requires a more differentiated view on the quality of motivation. Rather than focusing only on intrinsic versus controlled motivation, future studies should examine how the full continuum of motivational types relate to health outcomes, including both well-being and ill-being. This would enable a more

comprehensive understanding of which forms of motivation are most effective in various work settings, particularly in demanding environments such as healthcare.

Building on this motivational perspective, empirical evidence suggests that employees often co-experience multiple forms of motivation. In this context, research on motivational profiles has shown that individuals rarely rely on a single type of motivation but instead hold combinations that relate to different (health) outcomes (Gillet et al., 2020; Howard et al., 2016). Future research could explore how different combinations of motivation types emerge and how they relate to nurses' well-being and functioning at work. These profiles may differ in how sustainable or adaptive they are. A person-centered approach such as latent profile analysis offers a suitable method for identifying these profiles and examining how they are associated with outcomes like work engagement or burnout.

IT'S A MATCH – IS IT? REVISITING THE MATCHING HYPOTHESIS

Future research could build on the findings of the present work by examining how specific job demands and job resources interact. In line with the buffer and activation hypotheses derived from the JD-R and JDC models, Chapter 2 tested whether job resources moderate the relationship between job demands and both intrinsic motivation and burnout. These hypotheses suggest that burnout is most likely to occur when job demands are high and job resources are limited, whereas motivation may increase when high levels of job resources are accompanied by high job demands. While the results supported the buffering effect of job resources on burnout, no support was found for the activation hypothesis in relation to intrinsic motivation. This raises the question of whether the interaction between job demands and resources depends on more than just their intensity or availability.

Some researchers have argued that interactions between job demands and job resources may be more likely when both belong to the same domain. This perspective is central to the Demand-Induced Strain Compensation (DISC) model (de Jonge & Dormann, 2003; de Jonge et al., 2008), which was developed specifically for human service professions. The model assumes that job demands, job resources, and outcomes can each be categorized in different domains such as cognitive, emotional, or physical. It further proposes that job resources are more likely to moderate the effects of job demands when both belong to the same domain. This assumption is reflected in the so-called double-match hypothesis, which distinguishes between two forms:

the match between demands and resources (common kind) and the match between either demands or resources and the type of strain (extended kind). Building on this logic, the model further proposes that the strongest effects are to be expected when demand, resource, and outcome all fall within the same domain. This is referred to as the triple-match principle (de Jonge & Dormann, 2003; de Jonge & Dormann, 2006).

Empirical studies in healthcare contexts have provided partial support for these hypotheses (de Jonge & Dormann, 2006; de Jonge et al., 2008; Lavoie-Tremblay et al., 2014; van den Tooren & de Jonge, 2008). In two longitudinal studies, de Jonge and Dormann (2006) found significant triple-match interactions, while non-matching combinations were less likely to produce effects. Similar results were reported by van den Tooren and de Jonge (2008), who also observed significant double-match interactions. Another study among healthcare workers further showed that emotional resources may buffer the effect of emotional demands on psychological distress (de Jonge et al., 2008). In the present dissertation, emotional demands and emotional dissonance emerged as central stressors associated with nurse burnout. Future research could examine whether emotional resources such as emotional support from colleagues are more effective in buffering emotional strain. Future studies could also examine whether matching combinations foster motivational processes, as proposed by the activation hypothesis.

NEW METHODOLOGICAL LENSES: MULTILEVEL, PERSON-CENTERED APPROACHES, AND EFFECTS OVER TIME

While the empirical studies presented in the three chapters of this thesis focused on individual-level data and analysis, future research could benefit from approaches that better reflect the complexity of the workplace. Nurses rarely work in isolation. Their tasks often require close collaboration and coordinated efforts with colleagues from other units and departments. As a result, they share common demands such as workload and emotional demands (Montgomery et al., 2015), as well as common resources such as the quality of co-worker relationships (Li et al., 2013). They may also experience shared work-related well-being such as work engagement and burnout (Bakker et al., 2006; González-Morales et al., 2012). Notably, a number of multilevel studies have demonstrated that team-level job demands and resources, as well as shared leadership perceptions, are meaningfully related to collective outcomes such as team burnout and engagement (Breevaart et al., 2014; Costa et al., 2015; Rahmadani et al., 2020; Tims et al., 2013). As Schaufeli and Taris (2014) noted, however, many studies still rely on

individual-level data and then simply aggregate these responses to reflect team- or unit-level constructs. This practice conflicts with the compatibility principle (Ajzen, 2012), which holds that all variables within a model should be operationalized at the same level of specificity. For example, team-level constructs like collective job resources or shared engagement should be assessed using items that explicitly refer to the team as a whole (e.g., "in our team" rather than "I") and analyzed in relation to other team-level outcomes. Future research building on the current findings could benefit from this approach by capturing how shared perceptions and team-level dynamics, such as shared demands and shared resources, shape nurses' collective experiences of engagement and burnout.

In addition to multilevel designs, person-centered approaches offer another valuable direction for future research (Nam et al., 2024; Portoghese et al., 2020). Rather than focusing on average effects across the full sample, these approaches allow researchers to identify subgroups of nurses who differ in how they experience and respond to their working conditions (Howard & Hoffman, 2018; Nylund-Gibson & Choi, 2018). Latent profile analysis (LPA) is one such method. In contrast to variable-centered methods that examine relationships between single constructs, LPA captures how multiple aspects of the work environment co-occur within individuals. It identifies groups based on patterns across multiple variables, revealing distinct configurations of job demands, job resources, and outcomes (Nylund-Gibson & Choi, 2018; Spurk et al., 2020). In other words, it helps uncover which combinations of work characteristics tend to occur together within certain groups of nurses, and how these combinations relate to different work-related well-being outcomes. This perspective also resonates with earlier typologies proposed in the Job Demand-Control model (Karasek & Theorell, 1990), where individuals experiencing high demands and high control are considered to belong to the "active" group, whereas those with low demands and low control fall into the "passive" group. Future research could build on the findings presented in this dissertation by using person-centered methods to explore whether distinct demand-resource patterns exist among nurses, and how these relate to nurse motivation and well-being outcomes such as burnout and engagement. This may help to better capture the diversity of nurses' experiences and inform more tailored and effective interventions.

Finally, future research would benefit from longitudinal designs to better capture the dynamic nature of nurses' work experiences and their relationship with motivational and health-related outcomes. The studies presented in this dissertation were based on cross-sectional data, which

limits the ability to draw conclusions about the directionality or temporal unfolding of effects. As such, the findings reveal important associations but cannot determine whether leadership influences job characteristics, nurse motivation, and their well-being over time, or whether these relationships operate in another or even the opposite direction. There is growing agreement among researchers that more multi-wave and follow-up studies are needed to clarify these temporal patterns and the mechanisms behind them (Bakker et al., 2023; Guthier et al., 2020; Marzocchi et al., 2024). As Sonnentag et al. (2023) emphasize, many open questions remain about how long it takes for unfavorable working conditions to impair health and well-being, and how long it takes to recover from such impairments. It is also unclear how short-term responses to adverse work experiences accumulate and evolve into more persistent patterns of strain or reduced motivation. Addressing these questions will require multi-wave longitudinal designs and repeated assessments that span different timescales. Building on the findings of this dissertation, future studies could apply such designs to examine how changing working conditions and motivational processes interact over time to influence nurses' motivation, burnout, and engagement.

WHAT COMES NEXT? BUILDING ON THIS RESEARCH

Based on the current dataset, several next steps are planned. One idea is to create different profiles based on the combination of job demands and resources that nurses experience, for example, high demands with low resources, or low demands with high resources. These profiles can then be linked to outcomes such as intrinsic motivation, burnout, and engagement. Second, using follow-up data a longitudinal model will be tested to explore how engaging leaders predict changes in job demands and resources and nurse well-being over time. Similarly, dominance analysis will again be used to examine which factors play the most important role over time.

PRACTICAL IMPLICATIONS

The findings of this dissertation offer four important implications for healthcare organizations, nursing leadership, policy makers, and those involved in workforce development.

ADDRESSING THE EMOTIONAL BURDEN OF CAREGIVING

Emotional demands and emotional dissonance are identified in Chapter 1 as the strongest predictors of burnout. This highlights that nursing involves a high level of emotional labor, which can become a serious risk factor if nurses are left to manage it alone. These emotional demands are not necessarily harmful, though; what makes them problematic is the absence of sufficient resources that can be used to effectively manage emotionally demanding experiences. Chapter 2 adds to that perspective, showing that job resources such as autonomy, feedback, and opportunities to use one's skills can buffer the burden of high (emotional) demands. Chapter 3 adds another piece to this picture by showing that engaging leadership can contribute to a healthier work environment by increasing job resources and intrinsic motivation (indirectly) and reducing job demands.

Taken together, these findings suggest that job demands related to the emotional aspect of nursing should not be taken for granted as an inevitable part of nursing work that does not warrant an organizational response. While it is true that such demands are an inherent part of caregiving, this makes it even more important that nurses are not left to carry this emotional burden alone. When emotional strain is viewed as an inevitable part of the job, it becomes less likely that nurses will seek support (Leo et al., 2021). As a result, the emotional burdens remain unspoken and unaddressed. Hospitals therefore have a responsibility not only to acknowledge emotional demands, but to proactively provide support structures to help staff cope with these demands (Kim et al., 2022; Kumar & Jin, 2022). At the individual level, this may include communication training, emotional regulation strategies, and regular moments for reflection, such as peer discussions or team supervision (Delgado et al., 2020; Feng et al., 2024). At the organizational level, this may include adequate staffing levels, ensuring manageable workloads, clarifying team roles, and allowing nurses time to recover during or after shifts without interruptions (Aiken et al., 2023; Pirrotta et al., 2025; Stutting, 2023). Importantly, findings from Chapter 3 indicate that (engaging) nurse leaders may play a crucial role here, both by supporting these practices and by encouraging open conversations about nurses' emotional challenges.

USING SKILLS, NOT WASTING THEM

Chapters 1 to 3 consistently demonstrate that job resources, particularly skill utilization, performance feedback, and autonomy, are critical for nurse well-being. Notably, Chapter 1 shows that skill utilization is the most important predictor of work engagement, suggesting that nurses are vigorous, absorbed, and dedicated in their work when they can apply their professional knowledge and actively contribute to patient care. Chapters 2 and 3 further reveal that these resources enhance intrinsic motivation and help buffer the negative effects of high job demands on burnout. In addition, Chapter 3 highlights the important role of engaging leadership in shaping these job resources and fostering a work environment that enhances motivation and protects against burnout. Yet, in many clinical settings, nurses' competencies are not fully used, as a considerable portion of their time is spent on non-nursing tasks below their professional skill level (Bruyneel et al., 2013; OECD, 2016).

To address these issues, hospitals should align nursing roles more closely with professional qualifications and expertise. This includes expanding opportunities for clinical specialization, enabling nurses to take responsibility for areas such as care coordination or clinical decision-making, and reducing or delegating low-complexity tasks that do not require professional judgment (Buchan et al., 2015; Frenk et al., 2010; Laschinger et al., 2003). At the same time, work environments should allow for greater task variety and skill development, for instance by enabling nurses to grow into specialized clinical roles that reflect their ambitions, expertise, and interests, or by offering access to advanced practice training and continuous professional development programs (Frenk et al., 2010; WHO, 2025). According to our findings, performance feedback and job autonomy also seem important for nurse well-being and work motivation. Feedback should be specific, timely, and focused on nurses' clinical performance. Rather than relying on annual evaluations or ad hoc comments, feedback should be embedded in structured formats and everyday routines (Burgess et al., 2020; Butler, 2024). In this sense, team briefings, (structured) peer feedback models, or regular check-ins with supervisors can offer timely and meaningful feedback that supports professional growth and development (Baldwin et al., 2024). To foster autonomy, nurses should be empowered to make clinical decisions within their area of expertise and be actively involved in shaping clinical routines (Goedhart et al., 2017). This includes providing access to relevant information, creating space for professional judgment, and involving nurses in decisions that affect their work. Supporting autonomy is not only a matter of individual responsibility but also of organizational design and

leadership support (Frenk et al., 2010; Laschinger et al., 2003). Following findings from Chapter 3, our results point to the crucial role of engaging leaders in fostering such environments: by fostering a culture of continuous feedback, encouraging professional autonomy, and aligning roles with nurses' competencies, they help create the conditions under which nurses can thrive.

FOSTERING ENGAGING LEADERS

The findings of Chapter 3 underline the central role of engaging leadership in shaping the clinical work environment and promoting nurse well-being. Engaging leaders foster job resources such as autonomy, feedback, and opportunities for development, which in turn enhance nurses' intrinsic motivation. This motivational pathway appears to be beneficial in two ways: it fosters work engagement among nurses and reduces the risk of them becoming exhausted and eventually burning out. These findings highlight that leaders are key agents in creating supportive, resourceful, and healthy work environments.

Because engaging leadership behaviors can be learned, healthcare organizations may benefit from leadership development initiatives that support nurse leaders in adopting this style. Research shows that training programs focusing on autonomy-supportive and resource-enhancing leadership behaviors can improve both staff well-being and organizational outcomes (Ng et al., 2012; Su & Reeve, 2010; van Tuin et al., 2020). For example, a recent intervention study introduced a six-day training program designed in co-creation with senior leaders and team leaders. The program combined structured training with peer consultation and individual coaching to support its integration into daily practice. The results indicated that leadership training was associated with improved well-being, reduced absenteeism, and better business outcomes (van Tuin et al., 2020).

Importantly, leadership development should not focus only on senior management. Frontline supervisors and nurse leaders are often the ones who translate organizational values into daily routines and practices and who support nurses during (emotionally) demanding situations (Wong et al., 2013). Providing these leaders with the necessary resources, time, and support to lead in an engaging way is essential for nurse motivation and well-being. Leadership should not be seen as an individual trait, but as a competence that can be trained, supported, and embedded in the clinical culture (Cummings et al., 2018).

TARGETING THE ORGANIZATION

Across all three empirical chapters of this dissertation, a consistent pattern emerged: nurses working in environments characterized by high job demands and insufficient resources are at increased risk of burnout, reduced well-being, and illness. However, from a practical point of view, it might be difficult to eliminate all job demands that are present in the work environment. Therefore, healthcare organizations need to focus on interventions aimed at building job resources. Research and practical experiences suggest that such interventions may target different levels: 1) individual, e.g., stress management training, 2) team, e.g., workshops that foster trust, respect, and collegial relationships, 3) leadership, e.g., leadership development programs, 4) organization, e.g., employee involvement programs, changes in policies and schedules (Caponnetto et al., 2018; Day & Nielsen, 2017; WHO, 2022b).

In practice, interventions at the individual or team level are often more visible and may appear easier to implement. However, they tend to focus on helping staff adapt to challenging conditions rather than changing the conditions themselves (Aust et al., 2024; Rugulies et al., 2023). Organizational-level interventions, by contrast, may target the root causes (Nielsen et al., 2010), aiming to improve the structural aspects of the work environment that shape the daily experiences of nurses and other staff. This makes them more complex and time-consuming to implement, but also more powerful in creating sustainable change (Montano et al., 2014). Although such interventions are not widely implemented and evaluated in the healthcare sector, some initiatives present a promising venue for hospitals to improve their work environment. One example is the Magnet4Europe intervention which is guided by the Magnet® model of organizational redesign. Overall, it aims to improve job-related (health) outcomes among clinicians in over 60 hospitals in six European countries (Sermeus et al., 2022). While the present research did not evaluate this intervention, it was conducted within the broader context of the Magnet4Europe project that aimed to strengthen organizational resources. Particularly in the U.S., implementation of the Magnet® model has been associated with increased resources, improved mental health, and reduced burnout among nursing staff (Kutney-Lee et al., 2015).

In addition, at a national level, some countries launched nationwide campaigns or introduced concrete guidelines (e.g., UK's Health and Safety Executive Management Standards) to support organizations to improve working conditions and the health of their staff. At a more global scale, WHO (2022b) recently published its "Guidelines for Mental Health" i.e., an evidence-

based public health tool providing recommendations on interventions that promote the protection and support of workers' mental health and the prevention of mental health problems. It should, however, be noted that the effectiveness of any intervention largely depends on various contextual factors. Considering the specific needs of both hospitals and healthcare workers is therefore essential for the design, content, and implementation of any intervention.

FINAL NOTE

The growing pressure on European healthcare has major implications for the well-being of nurses. This dissertation shows that preventing burnout and fostering work engagement requires more than simply reducing job demands: it calls for work environments that motivate, empower, and connect. Leaders play a crucial role in this process. By promoting skill utilization, autonomy, performance feedback, and a sense of purpose, organizations can not only protect nurses from burning out but also lay the foundation for lasting motivation and professional growth.

REFERENCES

A

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*(2), 649-661. https://doi.org/10.1016/j.ijnurstu.2014.11.004

Ahlstedt, C., Moberg, L., Brulin, E., & Nyberg, A. (2024). Social support from manager and co-workers in relation to registered nurses' work motivation in three healthcare settings: A cross-sectional study of a Swedish national sample. *Journal of Nursing Scholarship*, *56*(6), 790-801. https://doi.org/doi: 10.1111/jnu.12995

Aiken, L. H., Buchan, J., Ball, J., & Rafferty, A. M. (2008). Transformative impact of Magnet designation: England case study. *Journal of Clinical Nursing*, *17*(24), 3330-3337. https://doi.org/10.1111/j.1365-2702.2008.02640.x

Aiken, L. H., Clarke, S. P., Sloane, D. M., Lake, E. T., & Cheney, T. (2009). Effects of hospital care environment on patient mortality and nurse outcomes. *Journal of Nursing Administration*, *39*(7/8 Suppl), S45-51. https://doi.org/10.1097/NNA.0b013e3181aeb4cf

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J. A., Busse, R., Clarke, H.,…Shamian, J. (2001). Nurses' reports on hospital care in five countries. *Health Affairs*, *20*(3), 43-53. https://doi.org/10.1377/hlthaff.20.3.43

Aiken, L. H., Lasater, K. B., Sloane, D. M., Pogue, C. A., Fitzpatrick Rosenbaum, K. E., Muir, K. J.,…Consortium, U. C. W. S. (2023). Physician and Nurse Well-Being and Preferred Interventions to Address Burnout in Hospital Practice: Factors Associated With Turnover, Outcomes, and Patient Safety. *JAMA Health Forum*, *4*(7), e231809. https://doi.org/10.1001/jamahealthforum.2023.1809

Aiken, L. H., & Poghosyan, L. (2009). Evaluation of "magnet journey to nursing excellence program" in Russia and Armenia. *Journal of Nursing Scholarship*, *41*(2), 166-174. https://doi.org/10.1111/j.1547-5069.2009.01268.x

Aiken, L. H., Sermeus, W., McKee, M., Lasater, K. B., Sloane, D., Pogue, C. A.,…Consortium, M. E. (2024). Physician and nurse well-being, patient safety and recommendations for interventions: cross-sectional survey in hospitals in six European countries. *BMJ open*, *14*(2), e079931. https://doi.org/10.1136/bmjopen-2023-079931

Aiken, L. H., Sermeus, W., Van den Heede, K., Sloane, D. M., Busse, R., McKee, M.,…Kutney-Lee, A. (2012). Patient safety, satisfaction, and quality of hospital care: cross sectional surveys of nurses and patients in 12 countries in Europe and the United States. *BMJ*, *344*(7851), e1717. https://doi.org/10.1136/bmj.e1717

Ajzen, I. (2012). Values, Attitudes, and Behavior. In S. Salzborn, E. D. Davidov, & J. Reinecke (Eds.), *Methods, Theories, and Empirical Applications in the Social Sciences* (pp. 33-38). VS Verlag für Sozialwissenschaften. https://doi.org/10.1007/978-3-531-18898-0_5

Al Maqbali, M., Al Sinani, M., & Al-Lenjawi, B. (2021). Prevalence of stress, depression, anxiety and sleep disturbance among nurses during the COVID-19 pandemic: A systematic review and meta-analysis. *Journal of Psychosomatic Research*, *141*, 110343. https://doi.org/10.1016/j.jpsychores.2020.110343

Alarcon, G. M. (2011). A meta-analysis of burnout with job demands, resources, and attitudes. *Journal of Vocational Behavior*, *79*(2), 549-562. https://doi.org/10.1016/j.jvb.2011.03.007

Anderson, J. C., & Gerbing, D. W. (1988). Structural equation modeling in practice: A review and recommended two-step approach. *Psychological bulletin*, *103*(3), 411-411. https://doi.org/10.1037/0033-2909.103.3.411

Arnold, K. A. (2017). Transformational leadership and employee psychological well-being: A review and directions for future research. *Journal of Occupational Health Psychology*, *22*(3), 381-393. https://doi.org/10.1037/ocp0000062

Aronsson, G., Theorell, T., Grape, T., Hammarström, A., Hogstedt, C., Marteinsdottir, I.,…Hall, C. (2017). A systematic review including meta-analysis of work environment and burnout symptoms. *BMC Public Health*, *17*, 1-13. https://doi.org/10.1186/s12889-017-4153-7

Aust, B., Leduc, C., Cresswell-Smith, J., O'Brien, C., Rugulies, R., Leduc, M.,…Guinart, D. (2024). The effects of different types of organisational workplace mental health interventions on mental health and wellbeing in healthcare workers: a systematic review. *International Archives of Occupational and Environmental Health*, *97*(5), 485-522. https://doi.org/10.1007/s00420-024-02065-z

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention programs. *Patient Education and Counseling*, *78*(2), 184-190. https://doi.org/10.1016/j.pec.2009.04.008

Azen, R., & Budescu, D. V. (2003). The dominance analysis approach for comparing predictors in multiple regression. *Psychological Methods*, *8*(2), 129-148. https://doi.org/10.1037/1082-989x.8.2.129

B

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: state of the art. *Journal of Managerial Psychology*, *22*(3), 309-328. https://doi.org/10.1108/02683940710733115

Bakker, A. B., & Demerouti, E. (2008). Towards a model of work engagement. *Career Development International*, *13*(3), 209-223. https://doi.org/10.1108/13620430810870476

Bakker, A. B., & Demerouti, E. (2014). *Job Demands-Resources Theory* (Vol. 3). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118539415.wbwell019

Bakker, A. B., & Demerouti, E. (2017). Job demands-resources theory: Taking stock and looking forward. *Journal of Occupational Health Psychology*, *22*(3), 273-285. https://doi.org/10.1037/ocp0000056

Bakker, A. B., Demerouti, E., & Euwema, M. C. (2005). Job resources buffer the impact of job demands on burnout. *Journal of Occupational Health Psychology*, *10*(2), 170-180. https://doi.org/10.1037/1076-8998.10.2.170

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. (2023). Job Demands–Resources Theory: Ten Years Later. *Annual Review of Organizational Psychology and Organizational Behavior*, *10*(1), 25-53. https://doi.org/10.1146/annurev-orgpsych-120920-053933

Bakker, A. B., Demerouti, E., & Sanz-Vergel, A. I. (2014). Burnout and Work Engagement: The JD–R Approach. *Annual Review of Organizational Psychology and Organizational Behavior*, *1*(1), 389-411. https://doi.org/10.1146/annurev-orgpsych-031413-091235

Bakker, A. B., Emmerik, H. v., & Euwema, M. C. (2006). Crossover of burnout and engagement in work teams. *Work and Occupations*, *33*(4), 464-489. https://doi.org/10.1177/0730888406291310

Baldwin, C. A., Krumm, A. M., Sy, A., Thomas, J., Jones, A., & Ward, E. K. (2024). Nursing peer feedback: Optimizing our relationships with human resources and collective bargaining organizations. *Nursing Outlook*, *72*(5), 102238. https://doi.org/10.1016/j.outlook.2024.102238

Bargagliotti, L. A. (2012). Work engagement in nursing: a concept analysis. *Journal of Advanced Nursing*, *68*(6), 1414-1428. https://doi.org/10.1111/j.1365-2648.2011.05859.x

Bass, B. M. (1985). *Leadership and performance beyond expectations*. Free press.

Beckers, D. G., van der Linden, D., Smulders, P. G., Kompier, M. A., van Veldhoven, M. J., & van Yperen, N. W. (2004). Working Overtime Hours: Relations with Fatigue, Work Motivation, and the Quality of Work. *J Occup Environ Med*, *46*(12), 1282-1289. https://doi.org/10.1097/01.jom.0000147210.95602.50

Behson, S. J. (2005). The relative contribution of formal and informal organizational work–family support. *Journal of Vocational Behavior*, *66*(3), 487-500. https://doi.org/10.1016/j.jvb.2004.02.004

Bianchi, R., & Schonfeld, I. S. (2024). Beliefs about burnout. *Work & Stress*, 1-19. https://doi.org/10.1080/02678373.2024.2364590

Bormann, K. C., & Rowold, J. (2018). Construct proliferation in leadership style research. *Organizational Psychology Review*, *8*(2-3), 149-173. https://doi.org/10.1177/2041386618794821

Breevaart, K., Bakker, A. B., Demerouti, E., Sleebos, D. M., & Maduro, V. (2014). Uncovering the underlying relationship between transformational leaders and followers' task performance. *Journal of Personnel Psychology*. https://doi.org/10.1027/1866-5888/a000118

Broetje, S., Jenny, G. J., & Bauer, G. F. (2020). The Key Job Demands and Resources of Nursing Staff: An Integrative Review of Reviews. *Frontiers in Psychology*, *11*, 84. https://doi.org/10.3389/fpsyg.2020.00084

Brotheridge, C. M., & Lee, R. T. (2003). Development and validation of the Emotional Labour Scale. *Journal of Occupational and Organizational Psychology*, *76*(3), 365-379. https://doi.org/10.1348/096317903769647229

Brown, M. E., Treviño, L. K., & Harrison, D. A. (2005). Ethical leadership: A social learning perspective for construct development and testing. *Organizational Human Behavior and Human Decision Processes*, *97*(2), 117-134. https://doi.org/10.1016/j.obhdp.2005.03.002

Brown, T. A. (2015). *Confirmatory factor analysis for applied research* (2 ed.). Guilford publications.

Brulin, E., Lidwall, U., Seing, I., Nyberg, A., Landstad, B., Sjöström, M.,…Nilsen, P. (2023). Healthcare in distress: a survey of mental health problems and the role of gender among nurses and physicians in Sweden. *Journal of Affective Disorders*, *339*, 104-110. https://doi.org/10.1016/j.jad.2023.07.042

Bruyneel, L., Li, B., Aiken, L., Lesaffre, E., Van den Heede, K., & Sermeus, W. (2013). A multi-country perspective on nurses' tasks below their skill level: Reports from domestically trained nurses and foreign trained nurses from developing countries. *International Journal of Nursing Studies*, *50*(2), 202-209. https://doi.org/10.1016/j.ijnurstu.2012.06.013

Buchan, J., & Aiken, L. (2008). Solving nursing shortages: a common priority. *Journal of Clinical Nursing*, *17*(24), 3262-3268. https://doi.org/10.1111/j.1365-2702.2008.02636.x

Buchan, J., Ball, J., & O'May, F. (2000). *Determining skill mix in the health workforce: guidelines for managers and health professionals* [Discussion paper](Issues in health services delivery, Issue. https://iris.who.int/handle/10665/66765

Buchan, J., Catton, H., & Shaffer, F. (2022). *Sustain and retain in 2022 and beyond*. https://www.icn.ch/sites/default/files/2023-04/Sustain%20and%20Retain%20in%202022%20and%20Beyond-%20The%20global%20nursing%20workforce%20and%20the%20COVID-19%20pandemic.pdf

Buchan, J., & Dal Poz, M. R. (2002). Skill mix in the health care workforce: reviewing the evidence. *Bulletin of the World Health Organization*, *80*(7), 575-580.

Buchan, J., Duffield, C., & Jordan, A. (2015). 'Solving' nursing shortages: do we need a New Agenda? *Journal of Nursing Management*, *23*(5), 543-545. https://doi.org/10.1111/jonm.12315

Budescu, D. V. (1993). Dominance analysis: A new approach to the problem of relative importance of predictors in multiple regression. *Psychological Bulletin*, *114*(3), 542-551. https://doi.org/10.1037/0033-2909.114.3.542

Budescu, D. V., & Azen, R. (2004). Beyond global measures of relative importance: Some insights from dominance analysis. *Organizational Research Methods*, *7*(3), 341-350. https://doi.org/10.1177/1094428104267049

Burgess, A., van Diggele, C., Roberts, C., & Mellis, C. (2020). Feedback in the clinical setting. *BMC Medical Education*, *20*(Suppl 2), 1-5. https://doi.org/10.1186/s12909-020-02280-5

Busse, C., Kach, A. P., & Wagner, S. M. (2017). Boundary conditions: What they are, how to explore them, why we need them, and when to consider them. *Organizational Research Methods*, *20*(4), 574-609. https://doi.org/10.1177/1094428116641191

Butler, S. (2024). Feedback in nursing practice: exploring barriers to and strategies for effective delivery. *Nursing Management*, *31*(6). https://doi.org/10.7748/nm.2024.e2145

C

Caponnetto, P., Magro, R., Inguscio, L., & Cannella, M. C. (2018). Quality of life, work motivation, burn-out and stress perceptions benefits of a stress management program by autogenic training for emergency room staff: A pilot study. *Mental Illness*, *10*(2), 67-70. https://doi.org/10.4081/mi.2018.7913

Chen, F. F. (2007). Sensitivity of Goodness of Fit Indexes to Lack of Measurement Invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, *14*(3), 464-504. https://doi.org/10.1080/10705510701301834

Chou, H. Y., Hecker, R., & Martin, A. (2012). Predicting nurses' well-being from job demands and resources: a cross-sectional study of emotional labour. *Journal of Nursing Management*, *20*(4), 502-511. https://doi.org/10.1111/j.1365-2834.2011.01305.x

Christian, M. S., Garza, A. S., & Slaughter, J. E. (2011). Work Engagement: A Quantitative Review and Test of Its Relations with Task and Contextual Performance. *Personnel Psychology*, *64*(1), 89-136. https://doi.org/10.1111/j.1744-6570.2010.01203.x

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2014). *Applied Multiple Regression/Correlation Analysis for the Behavioral Sciences*. Psychology press. https://doi.org/10.4324/9781410606266

Conger, J. A., & Kanungo, R. N. (1987). Toward a Behavioral Theory of Charismatic Leadership in Organizational Settings. *Academy of Management Review*, *12*(4), 637-647. https://doi.org/10.5465/AMR.1987.4306715

Conway, J. M. (2008). Method Variance and Method Bias in Industrial and Organizational Psychology. *Handbook of Research Methods in Industrial and Organizational Psychology*, 344-365. https://doi.org/10.1002/9780470756669.ch17

Cortese, C. G., Colombo, L., & Ghislieri, C. (2010). Determinants of nurses' job satisfaction: the role of work–family conflict, job demand, emotional charge and social support. *Journal of Nursing Management*, *18*(1), 35-43. https://doi.org/10.1111/j.1365-2834.2009.01064.x

Costa, P. L., Passos, A. M., & Bakker, A. B. (2015). Direct and Contextual Influence of Team Conflict on Team Resources, Team Work Engagement, and Team Performance. *Negotiation and Conflict Management Research*, *8*(4), 211-227. https://doi.org/10.1111/ncmr.12061

Cummings, G. G., Tate, K., Lee, S., Wong, C. A., Paananen, T., Micaroni, S. P. M., & Chatterjee, G. E. (2018). Leadership styles and outcome patterns for the nursing workforce and work environment: A systematic review. *International Journal for Nursing Studies*, *85*, 19-60. https://doi.org/10.1016/j.ijnurstu.2018.04.016

D

Dall'Ora, C., Ball, J., Reinius, M., & Griffiths, P. (2020). Burnout in nursing: a theoretical review. *Human Resources for Health*, *18*(1), 41. https://doi.org/10.1186/s12960-020-00469-9

Dallner, A., Elo, A. L., Gambrele, F., Hottinen, V., Knardahl, S., Linstrom, K.,…Orhede, E. (2000). Validation of the General Nordic Questionnaire (QPSNordic) for psychological and social factors at work. In: Nordic Council of Ministers.

Daneshkohan, A., Zarei, E., Mansouri, T., Maajani, K., Ghasemi, M. S., & Rezaeian, M. (2014). Factors affecting job motivation among health workers: a study from Iran. *Global Journal of Health Science*, *7*(3), 153-160. https://doi.org/10.5539/gjhs.v7n3p153

Daniels, K. (2006). Rethinking job characteristics in work stress research. *Human Relations*, *59*(3), 267-290. https://doi.org/10.1177/0018726706064171

Daniels, K., & De Jonge, J. (2010). Match making and match breaking: The nature of match within and around job design. *Journal of Occupational and Organizational Psychology*, *83*(1), 1-16. https://doi.org/10.1348/096317909x485144

Day, A., & Nielsen, K. (2017). What Does Our Organization Do to Help Our Well-Being? Creating Healthy Workplaces and Workers. *An Introduction to Work and Organizational Psychology: An International Perspective*, 295-314. https://doi.org/10.1002/9781119168058.ch16

De Beer, L. T., Schaufeli, W. B., De Witte, H., Hakanen, J. J., Kaltiainen, J., Glaser, J.,…Procházka, J. (2024). Revisiting a global burnout score with the Burnout Assessment Tool (BAT) across nine country samples. *European Journal of Psychological Assessment*. https://doi.org/10.1027/1015-5759/a000839

de Beer, L. T., Schaufeli, W. B., De Witte, H., Hakanen, J. J., Shimazu, A., Glaser, J.,…Rudnev, M. (2020). Measurement Invariance of the Burnout Assessment Tool (BAT) Across Seven Cross-National Representative Samples. *International Journal of Environmental Research and Public Health*, *17*(15), 1-14. https://doi.org/10.3390/ijerph17155604

de Jonge, J., & Dormann, C. (2003). The DISC model: Demand-induced strain compensation mechanisms in job stress. In M. Dollard, H. R. Winefield, & A. H. Winefield (Eds.), *Occupational Stress in the Service Professions* (pp. 43-74). Taylor & Francis. https://doi.org/10.1201/9780203422809.ch2

de Jonge, J., & Dormann, C. (2006). Stressors, resources, and strain at work: a longitudinal test of the triple-match principle. *Journal of Applied Psychology*, *91*(6), 1359–1374. https://doi.org/10.1037/0021-9010.91.5.1359

de Jonge, J., Dormann, C., Janssen, P. P. M., Dollard, M. F., Landeweerd, J. A., & Nijhuis, F. J. N. (2001). Testing reciprocal relationships between job characteristics and psychological well-being: A cross-lagged structural equation model. *Journal of Occupational and Organizational Psychology*, *74*(1), 29-46. https://doi.org/10.1348/096317901167217

de Jonge, J., Le Blanc, P. M., Peeters, M. C., & Noordam, H. (2008). Emotional job demands and the role of matching job resources: a cross-sectional survey study among health care workers.

International Journal of Nursing Studies, *45*(10), 1460-1469. https://doi.org/10.1016/j.ijnurstu.2007.11.002

de Jonge, J., Van Breukelen, G. J. P., Landeweerd, J. A., & Nijhuis, F. J. N. (1999). Comparing group and individual level assessments of job characteristics in testing the job Demand-Control Model: A multilevel approach. *Human Relations*, *52*(1), 95-122. https://doi.org/10.1023/a:1016924517061

De Kock, J. H., Latham, H. A., Leslie, S. J., Grindle, M., Munoz, S. A., Ellis, L.,…O'Malley, C. M. (2021). A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health*, *21*, 1-18. https://doi.org/10.1186/s12889-020-10070-3

de Koning, R., Egiz, A., Kotecha, J., Ciuculete, A. C., Ooi, S. Z. Y., Bankole, N. D. A.,…Kanmounye, U. S. (2021). Survey Fatigue During the COVID-19 Pandemic: An Analysis of Neurosurgery Survey Response Rates. *Frontiers in Surgery*, *8*, 690680. https://doi.org/10.3389/fsurg.2021.690680

de Lange, A. H., Taris, T. W., Kompier, M. A., Houtman, I. L., & Bongers, P. M. (2003). "The very best of the millennium": longitudinal research and the demand-control-(support) model. *Journal of Occupational Health Psychology*, *8*(4), 282-305. https://doi.org/10.1037/1076-8998.8.4.282

De Witte, H., & Schaufeli, W. (2025). Throwing the baby out with the bathwater–while adding the bathtub too: A rejoinder to “Beliefs about burnout” of Bianchi and Schonfeld. *Work & Stress*, 1-10. https://doi.org/10.1080/02678373.2025.2468715

Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-Determination Theory in Work Organizations: The State of a Science. *Annual Review of Organizational Psychology and Organizational Behavior*, *4*(1), 19-43. https://doi.org/10.1146/annurev-orgpsych-032516-113108

Deci, E. L., & Ryan, R. M. (2000). The "What" and "Why" of Goal Pursuits: Human Needs and the Self-Determination of Behavior. *Psychological Inquiry*, *11*(4), 227-268. https://doi.org/10.1207/s15327965pli1104_01

Decuypere, A., & Schaufeli, W. (2020). Leadership and work engagement: Exploring explanatory mechanisms. *German Journal of Human Resource Management: Zeitschrift für Personalforschung, 34*(1), 69–95. https://doi.org/10.1177/2397002219892197

Delgado, C., Roche, M., Fethney, J., & Foster, K. (2020). Workplace resilience and emotional labour of Australian mental health nurses: Results of a national survey. *International Journal of Mental Health Nursing*, *29*(1), 35-46. https://doi.org/10.1111/inm.12598

Demerouti, E. (2024). Burnout: a comprehensive review. *Zeitschrift für Arbeitswissenschaft*, 1-13. https://doi.org/10.1007/s41449-024-00452-3

Demerouti, E., & Bakker, A. B. (2011). The job demands-resources model: Challenges for future research. *SA Journal of Industrial Psychology/SA Tydskrif vir Bedryfsielkunde*, *37*(2), 01-09. https://doi.org/10.4102/sajip.v37i2.974

Demerouti, E., & Bakker, A. B. (2025). Revitalising burnout research. *Work & Stress*, *39*(2), 153-161. https://doi.org/10.1080/02678373.2025.2473385

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499-512. https://doi.org/10.1037/0021-9010.86.3.499

Demerouti, E., Bakker, A. B., Peeters, M. C. W., & Breevaart, K. (2021). New directions in burnout research. *European Journal of Work and Organizational Psychology*, *30*(5), 686-691. https://doi.org/10.1080/1359432X.2021.1979962

Drossel, M. (2025). Skill and Grade Mix in Nursing. In *Transformation in Health Care* (pp. 261-271). Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-78322-7_19

E

Ellenbecker, C. H., Boylan, L. N., & Samia, L. (2006). What Home Healthcare Nurses Are Saying About Their Jobs. *Home Healthcare Nurse: The Journal for the Home Care and Hospice Professional*, *24*(5), 315-324. https://doi.org/10.1097/00004045-200605000-00010

Engelbrecht, A. S., Heine, G., & Mahembe, B. (2017). Integrity, ethical leadership, trust and work engagement. *Leadership & Organization Development Journal*, *38*(3), 368-379. https://doi.org/10.1108/lodj-11-2015-0237

EU. (2025, 2025/04/11). *Magnet4Europe – Improving mental health and wellbeing in the health care workplace*. Retrieved 11.04.2025 from https://cordis.europa.eu/project/id/848031

European Parliament and Council of the European Union. (2016). *Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)*. *Official Journal of the European Union*, L 119, 1–88. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0679

Eyal, O., & Roth, G. (2011). Principals' leadership and teachers' motivation. *Journal of Educational Administration*, *49*(3), 256-275. https://doi.org/10.1108/09578231111129055

F

Federal Public Service Health, Food Chain Safety and Environment (2019). *Key Data: General Hospitals*. Retrieved May 2025 from https://www.healthybelgium.be/en/key-data-in-healthcare/general-hospitals/download-the-full-report-in-pdf-here

Federal Public Service Health, Food Chain Safety and Environment (2022). *Key data: Healthcare Professionals*. Retrieved May 2025 from https://www.healthybelgium.be/en/key-data-in-healthcare/healthcare-professionals/download-the-full-report-in-pdf-here

Feng, H., Zhang, M., Li, X., Shen, Y., & Li, X. (2024). The Level and Outcomes of Emotional Labor in Nurses: A Scoping Review. *Journal of Nursing Management*, *2024*(1), 5317359. https://doi.org/10.1155/2024/5317359

Fernet, C., Guay, F., & Senécal, C. (2004). Adjusting to job demands: The role of work self-determination and job control in predicting burnout. *Journal of Vocational Behavior*, *65*(1), 39-56. https://doi.org/10.1016/s0001-8791(03)00098-8

Fernet, C., Guay, F., Senécal, C., & Austin, S. (2012). Predicting intraindividual changes in teacher burnout: The role of perceived school environment and motivational factors. *Teaching and Teacher Education*, *28*(4), 514-525. https://doi.org/10.1016/j.tate.2011.11.013

Fernet, C., Trépanier, S.-G., Austin, S., Gagné, M., & Forest, J. (2015). Transformational leadership and optimal functioning at work: On the mediating role of employees' perceived job characteristics and motivation. *Work & Stress*, *29*(1), 11-31. https://doi.org/10.1080/02678373.2014.1003998

Fischer, T., & Sitkin, S. B. (2023). Leadership Styles: A Comprehensive Assessment and Way Forward. *Academy of Management Annals*, *17*(1), 331-372. https://doi.org/10.5465/annals.2020.0340

Fisher, G. G., Matthews, R. A., & Gibbons, A. M. (2016). Developing and investigating the use of single-item measures in organizational research. *Journal of Occupational Health Psychology*, *21*(1), 3-23. https://doi.org/10.1037/a0039139

Ford, M. T., Matthews, R. A., Wooldridge, J. D., Mishra, V., Kakar, U. M., & Strahan, S. R. (2014). How do occupational stressor-strain effects vary with time? A review and meta-analysis of the relevance of time lags in longitudinal studies. *Work & Stress*, *28*(1), 9-30. https://doi.org/10.1080/02678373.2013.877096

Forest, Jacques, and others, 'Shaping Tomorrow's Workplace by Integrating Self-Determination Theory: A Literature Review and Recommendations', in Richard M. Ryan (ed.), *The Oxford Handbook of Self-Determination Theory* (2023; online edn, Oxford Academic, 23 Feb. 2023), https://doi.org/10.1093/oxfordhb/9780197600047.013.45, accessed 5 Nov. 2025.

Frenk, J., Chen, L., Bhutta, Z. A., Cohen, J., Crisp, N., Evans, T.,…Zurayk, H. (2010). Health professionals for a new century: transforming education to strengthen health systems in an interdependent world. *The Lancet*, *376*(9756), 1923-1958. https://doi.org/10.1016/S0140-6736(10)61854-5

G

Gagné, M., Forest, J., Vansteenkiste, M., Crevier-Braud, L., Van den Broeck, A., Aspeli, A. K.,…Güntert, S. T. (2015). The Multidimensional Work Motivation Scale: Validation evidence in seven languages and nine countries. *European Journal of Work and Organisational Psychology*, *24*(2), 178-196. https://doi.org/10.1080/1359432X.2013.877892

Gagné, M., Parker, S. K., Griffin, M. A., Dunlop, P. D., Knight, C., Klonek, F. E., & Parent-Rocheleau, X. (2022). Understanding and shaping the future of work with self-determination theory. Nature Reviews Psychology, 1(7), 378-392. https://doi.org/10.1038/s44159-022-00056-w

Galanakis, M. D., & Tsitouri, E. (2022). Positive psychology in the working environment. Job demands-resources theory, work engagement and burnout: A systematic literature review. *Frontiers in Psychology*, *13*, 1022102. https://doi.org/10.3389/fpsyg.2022.1022102

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*(8), 3286-3302. https://doi.org/10.1111/jan.14839

Galuska, L., Hahn, J., Polifroni, E. C., & Crow, G. (2018). A Narrative Analysis of Nurses' Experiences With Meaning and Joy in Nursing Practice. *Nursing Administration Quarterly*, *42*(2), 154-163. https://doi.org/10.1097/NAQ.0000000000000280

Garcia, C. L., Abreu, L. C., Ramos, J. L. S., Castro, C. F. D., Smiderle, F. R. N., Santos, J. A. D., & Bezerra, I. M. P. (2019). Influence of Burnout on Patient Safety: Systematic Review and Meta-Analysis. *Medicina (Kaunas)*, *55*(9), 553. https://doi.org/10.3390/medicina55090553

Gillet, N., Morin, A. J. S., Ndiaye, A., Colombat, P., & Fouquereau, E. (2020). A test of work motivation profile similarity across four distinct samples of employees. *Journal of Occupational and Organizational Psychology*, *93*(4), 988-1030. https://doi.org/10.1111/joop.12322

Gluschkoff, K., Hakanen, J. J., Elovainio, M., Vanska, J., & Heponiemi, T. (2022). The relative importance of work-related psychosocial factors in physician burnout. *Occupational Medicine*, *72*(1), 28-33. https://doi.org/10.1093/occmed/kqab147

Goedhart, N. S., van Oostveen, C. J., & Vermeulen, H. (2017). The effect of structural empowerment of nurses on quality outcomes in hospitals: a scoping review. *Journal of Nursing Management*, *25*(3), 194-206. https://doi.org/10.1111/jonm.12455

Gonzalez-Morales, M. G., Peiro, J. M., Rodriguez, I., & Bliese, P. D. (2012). Perceived collective burnout: a multilevel explanation of burnout. *Anxiety Stress Coping*, *25*(1), 43-61. https://doi.org/10.1080/10615806.2010.542808

Gordon, H. J., Demerouti, E., Le Blanc, P. M., Bakker, A. B., Bipp, T., & Verhagen, M. A. M. T. (2018). Individual job redesign: Job crafting interventions in healthcare. *Journal of Vocational Behavior*, *104*, 98-114. https://doi.org/10.1016/j.jvb.2017.07.002

Grandey, A. A. (2000). Emotion regulation in the workplace: a new way to conceptualize emotional labor. *Journal of Occupational Health Psychology*, *5*(1), 95-110. https://doi.org/10.1037//1076-8998.5.1.95

Grandey, A. A. (2003). When "the show must go on": Surface acting and deep acting as determinants of emotional exhaustion and peer-rated service delivery. *Academy of Management Journal*, *46*(1), 86-96. https://doi.org/10.2307/30040678

Greenberg, N., Weston, D., Hall, C., Caulfield, T., Williamson, V., & Fong, K. (2021). Mental health of staff working in intensive care during Covid-19. *Occupational Medicine*, *71*(2), 62-67. https://doi.org/10.1093/occmed/kqaa220

Guthier, C., Dormann, C., & Voelkle, M. C. (2020). Reciprocal effects between job stressors and burnout: A continuous time meta-analysis of longitudinal studies. *Psychological Bulletin*, *146*(12), 1146-1173. https://doi.org/10.1037/bul0000304

H

Hackman, J. R., & Oldham, G. R. (1975). Development of the Job Diagnostic Survey. *Journal of Applied Psychology*, *60*(2), 159-170. https://doi.org/10.1037/h0076546

Hadzibajramovic, E., Hansson, M., Akerstrom, M., Dencker, A., & Hensing, G. (2022). Burnout among midwives-the factorial structure of the burnout assessment tool and an assessment of burnout levels in a Swedish national sample. *BMC Health Services Research*, *22*(1), 1167. https://doi.org/10.1186/s12913-022-08552-8

Hadzibajramovic, E., Schaufeli, W., & De Witte, H. (2022). Shortening of the Burnout Assessment Tool (BAT)-from 23 to 12 items using content and Rasch analysis. *BMC Public Health*, *22*(1), 560. https://doi.org/10.1186/s12889-022-12946-y

Hakanen, J. J., Bakker, A. B., & Schaufeli, W. B. (2006). Burnout and work engagement among teachers. *Journal of School Psychology*, *43*(6), 495-513. https://doi.org/10.1016/j.jsp.2005.11.001

Hakanen, J. J., Bakker, A. B., & Turunen, J. (2024). The relative importance of various job resources for work engagement: A concurrent and follow-up dominance analysis. *BRQ Business Research Quarterly*, *27*(3), 227-243. https://doi.org/10.1177/23409444211012419

Hakanen, J. J., Ropponen, A., De Witte, H., & Schaufeli, W. B. (2019). Testing Demands and Resources as Determinants of Vitality among Different Employment Contract Groups. A Study in 30 European Countries. *International Journal of Environmental Research and Public Health*, *16*(24). https://doi.org/10.3390/ijerph16244951

Hakanen, J. J., Ropponen, A., Schaufeli, W. B., & De Witte, H. (2019). Who is Engaged at Work?: A Large-Scale Study in 30 European Countries. *Journal of Occupational and Environmental Medicine*, *61*(5), 373-381. https://doi.org/10.1097/JOM.0000000000001528

Hakanen, J. J., Schaufeli, W. B., & Ahola, K. (2008). The Job Demands-Resources model: A three-year cross-lagged study of burnout, depression, commitment, and work engagement. *Work & Stress*, *22*(3), 224-241. https://doi.org/10.1080/02678370802379432

Halbesleben, J. R. B. (2010). A meta-analysis of work engagement: Relationships with burnout, demands, resources, and consequences. In A. B. Bakker & M. P. Leiter (Eds.), *Work engagement: A handbook of essential theory and research* (Vol. 8, pp. 102-117). Psychology Press.

Hayes, A. F. (2022). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach (Third Edition)* (Third ed.). The Guilford Press.

Hayes Andrew, F. (2013). *Introduction to Mediation, Moderation, and Conditional Process Analysis - Model Numbers*. The Guilford Press.

Heck, R. H. (2001). Multilevel modeling with SEM. In G. A. Marcoulides & R. E. Schumacker (Eds.), *New developments and techniques in structural equation modeling* (First ed., pp. 89-127). Psychology Press.

Heinen, M. M., van Achterberg, T., Schwendimann, R., Zander, B., Matthews, A., Kozka, M.,…Schoonhoven, L. (2013). Nurses' intention to leave their profession: a cross sectional observational study in 10 European countries. *International Journal of Nursing Studies*, *50*(2), 174-184. https://doi.org/10.1016/j.ijnurstu.2012.09.019

Herzberg, F. I., Mausner, B., & Snyderman, B. (1959). *The motivation to work* (2nd ed.). John Wiley.

Hiver, C., Villa, A., Bellagamba, G., & Lehucher-Michel, M. P. (2022). Burnout prevalence among European physicians: a systematic review and meta-analysis. *International Archives of Occupational and Environmental Health*, *95*(1), 259-273. https://doi.org/10.1007/s00420-021-01782-z

Hobfoll, S. E. (1989). Conservation of resources. A new attempt at conceptualizing stress. *American Psychologist*, *44*(3), 513-524. https://doi.org/10.1037//0003-066x.44.3.513

Hobfoll, S. E., Halbesleben, J., Neveu, J.-P., & Westman, M. (2018). Conservation of Resources in the Organizational Context: The Reality of Resources and Their Consequences. *Annual Review of Organizational Psychology and Organizational Behavior*, *5*(1), 103-128. https://doi.org/10.1146/annurev-orgpsych-032117-104640

Hobfoll, S. E., Johnson, R. J., Ennis, N., & Jackson, A. P. (2003). Resource loss, resource gain, and emotional outcomes among inner city women. *Journal of Personality and Social Psychology*, *84*(3), 632-643. https://doi.org/10.1037/0022-3514.84.3.632

Hochschild, A. R. (1983). *The Managed Heart: Commercialization of Human Feeling*. University of California Press.

Holland, P., Tham, T. L., Sheehan, C., & Cooper, B. (2019). The impact of perceived workload on nurse satisfaction with work-life balance and intention to leave the occupation. *Applied Nursing Research*, *49*, 70-76. https://doi.org/10.1016/j.apnr.2019.06.001

Houkes, I., Janssen, P. P. M., de Jonge, J., & Nijhuis, F. J. N. (2001). Specific relationships between work characteristics and intrinsic work motivation, burnout and turnover intention: A multi-sample analysis. *European Journal of Work and Organizational Psychology*, *10*(1), 1-23. https://doi.org/10.1080/13594320042000007

Howard, J., Gagné, M., Morin, A. J. S., & Van den Broeck, A. (2016). Motivation profiles at work: A self-determination theory approach. *Journal of Vocational Behavior*, *95-96*, 74-89. https://doi.org/j.jvb.2016.07.004

Howard, J. L., Bureau, J., Guay, F., Chong, J. X. Y., & Ryan, R. M. (2021). Student Motivation and Associated Outcomes: A Meta-Analysis From Self-Determination Theory. *Perspectives on Psychological Science*, *16*(6), 1300-1323. https://doi.org/10.1177/1745691620966789

Howard, J. L., Gagne, M., & Bureau, J. S. (2017). Testing a continuum structure of self-determined motivation: A meta-analysis. *Psychological Bulletin*, *143*(12), 1346-1377. https://doi.org/10.1037/bul0000125

Howard, M. C., & Hoffman, M. E. (2018). Variable-centered, person-centered, and person-specific approaches: Where theory meets the method. *Organizational Research Methods*, *21*(4), 846-876. https://doi.org/10.1177/1094428117744021

Hox, J. J., Moerbeek, M., & van de Schoot, R. (2010). *Multilevel Analysis: Techniques and Applications* (Second ed.). Routledge.

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

Hu, Q., Schaufeli, W. B., & Taris, T. W. (2011). The Job Demands–Resources model: An analysis of additive and joint effects of demands and resources. *Journal of Vocational Behavior*, *79*(1), 181-190. https://doi.org/10.1016/j.jvb.2010.12.009

Hulsheger, U. R., & Schewe, A. F. (2011). On the costs and benefits of emotional labor: a meta-analysis of three decades of research. *Journal of Occupational Health Psychology*, *16*(3), 361-389. https://doi.org/10.1037/a0022876

Humphrey, S. E., Nahrgang, J. D., & Morgeson, F. P. (2007). Integrating motivational, social, and contextual work design features: a meta-analytic summary and theoretical extension of the work design literature. *Journal of Applied Psychology*, *92*(5), 1332-1356. https://doi.org/10.1037/0021-9010.92.5.1332

Häusser, J. A., Mojzisch, A., Niesel, M., & Schulz-Hardt, S. (2010). Ten years on: A review of recent research on the Job Demand–Control (-Support) model and psychological well-being. *Work & Stress*, *24*(1), 1-35. https://doi.org/10.1080/02678371003683747

I

IBM. (2021). *IBM Corp. Released 2021. IBM SPSS Statistics for Windows*. IBM Corp.

Inceoglu, I., Thomas, G., Chu, C., Plans, D., & Gerbasi, A. (2018). Leadership behavior and employee well-being: An integrated review and a future research agenda. *The Leadership Quarterly*, *29*(1), 179-202. https://doi.org/10.1016/j.leaqua.2017.12.006

J

Janssen, P. P., de Jonge, J., & Bakker, A. B. (1999). Specific determinants of intrinsic work motivation, burnout and turnover intentions: a study among nurses. *Journal of Advanced Nursing*, *29*(6), 1360-1369. https://doi.org/10.1046/j.1365-2648.1999.01022.x

Johnson, J. W. (2000). A Heuristic Method for Estimating the Relative Weight of Predictor Variables in Multiple Regression. *Multivariate Behavioral Research*, *35*(1), 1-19. https://doi.org/10.1207/S15327906MBR3501_1

Joseph, E. R., & Seshadri, V. (2025). Twenty-Five Years of Self-Determination Theory Research: A Bibliometric Perspective. *International Journal of Psychology*, *60*(6), e70122. https://doi.org/10.1002/ijop.70122

Jourdain, G., & Chenevert, D. (2010). Job demands-resources, burnout and intention to leave the nursing profession: a questionnaire survey. *International Journal of Nursing Studies*, *47*(6), 709-722. https://doi.org/10.1016/j.ijnurstu.2009.11.007

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

K

Kaiser, S., Patras, J., Adolfsen, F., Richardsen, A. M., & Martinussen, M. (2020). Using the Job Demands–Resources Model to Evaluate Work-Related Outcomes Among Norwegian Health Care Workers. *Sage Open*, *10*(3), 2158244020947436. https://doi.org/10.1177/2158244020947436

Kallio, H., Kangasniemi, M., & Hult, M. (2022). Registered nurses' perceptions of having a calling to nursing: A mixed-method study. *Journal of Advanced Nursing*, *78*(5), 1473-1482. https://doi.org/10.1111/jan.15157

Kanfer, R., Frese, M., & Johnson, R. E. (2017). Motivation related to work: A century of progress. *Journal of Applied Psychology*, *102*(3), 338-355. https://doi.org/10.1037/apl0000133

Kanste, O., Kyngas, H., & Nikkila, J. (2007). The relationship between multidimensional leadership and burnout among nursing staff. *Journal of Nursing Management*, *15*(7), 731-739. https://doi.org/10.1111/j.1365-2934.2006.00741.x

Karasek, R., & Theorell, T. (1990). *Healthy work: Stress, productivity and the reconstruction of working life*. Basic Books.

Karasek, R. A. (1979). Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. *Administrative Science Quarterly*, *24*(2), 285-308. https://doi.org/10.2307/2392498

Kenworthy, J., Fay, C., Frame, M., & Petree, R. (2014). A meta-analytic review of the relationship between emotional dissonance and emotional exhaustion. *Journal of Applied Social Psychology*, *44*(2), 94-105. https://doi.org/10.1111/jasp.12211

Keyko, K., Cummings, G. G., Yonge, O., & Wong, C. A. (2016). Work engagement in professional nursing practice: A systematic review. *International Journal of Nursing Studies*, *61*, 142-164. https://doi.org/10.1016/j.ijnurstu.2016.06.003

Kim, M., & Beehr, T. A. (2018). Challenge and hindrance demands lead to employees' health and behaviours through intrinsic motivation. *Stress Health*, *34*(3), 367-378. https://doi.org/10.1002/smi.2796

Kim, M. N., Yoo, Y. S., Cho, O. H., & Hwang, K. H. (2022). Emotional Labor and Burnout of Public Health Nurses during the COVID-19 Pandemic: Mediating Effects of Perceived Health Status and Perceived Organizational Support. *International Journal of Environmental Research and Public Health*, *19*(1), 549. https://doi.org/10.3390/ijerph19010549

Kinman, G., & Leggetter, S. (2016). Emotional Labour and Wellbeing: What Protects Nurses? *Healthcare*, *4*(4), 89. https://doi.org/10.3390/healthcare4040089

Klein, A., & Moosbrugger, H. (2000). Maximum likelihood estimation of latent interaction effects with the LMS method. *Psychometrika*, *65*(4), 457-474. https://doi.org/10.1007/bf02296338

Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., & Sermeus, W. (2023). What makes nurses flourish at work? How the perceived clinical work environment relates to nurse motivation and well-being: A cross-sectional study. *International Journal of Nursing Studies*, *148*, 104567. https://doi.org/10.1016/j.ijnurstu.2023.104567

Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., & Sermeus, W. (2024). Engaging leadership and nurse well-being: the role of the work environment and work motivation-a cross-sectional study. *Human Resources for Health*, *22*(1), 8. https://doi.org/10.1186/s12960-023-00886-6

Koopmans, L., Damen, N., & Wagner, C. (2018). Does diverse staff and skill mix of teams impact quality of care in long-term elderly health care? An exploratory case study. *BMC Health Services Research*, *18*(1), 988. https://doi.org/10.1186/s12913-018-3812-4

Kumar, N., & Jin, Y. (2022). Impact of nurses' emotional labour on job stress and emotional exhaustion amid COVID-19: The role of instrumental support and coaching leadership as moderators. *Journal of Nursing Management*, *30*(7), 2620-2632. https://doi.org/10.1111/jonm.13818

Kutney-Lee, A., Stimpfel, A. W., Sloane, D. M., Cimiotti, J. P., Quinn, L. W., & Aiken, L. H. (2015). Changes in patient and nurse outcomes associated with magnet hospital recognition. *Medical Care*, *53*(6), 550-557. https://doi.org/10.1097/MLR.0000000000000355

Kutney-Lee, A., Wu, E. S., Sloane, D. M., & Aiken, L. H. (2013). Changes in hospital nurse work environments and nurse job outcomes: an analysis of panel data. *International Journal of Nursing Studies*, *50*(2), 195-201. https://doi.org/10.1016/j.ijnurstu.2012.07.014

L

Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N.,…Hu, S. (2020). Factors Associated With Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Network Open*, *3*(3), e203976. https://doi.org/10.1001/jamanetworkopen.2020.3976

Laschinger, H. K., Almost, J., & Tuer-Hodes, D. (2003). Workplace empowerment and magnet hospital characteristics: making the link. *JONA: The Journal of Nursing Administration*, *33*(7-8), 410-422. https://doi.org/10.1097/00005110-200307000-00011

Lavoie-Tremblay, M., Trepanier, S. G., Fernet, C., & Bonneville-Roussy, A. (2014). Testing and extending the triple match principle in the nursing profession: a generational perspective on job demands, job resources and strain at work. *Journal of Advanced Nursing*, *70*(2), 310-322. https://doi.org/10.1111/jan.12188

Lee, J. S. Y., & Akhtar, S. (2011). Effects of the workplace social context and job content on nurse burnout. *Human Resource Management*, *50*(2), 227-245. https://doi.org/10.1002/hrm.20421

Lee, R. T., & Ashforth, B. E. (1996). A meta-analytic examination of the correlates of the three dimensions of job burnout. *Journal of Applied Psychology*, *81*(2), 123-133. https://doi.org/10.1037/0021-9010.81.2.123

Leiter, M. P., & Day, A. (2025). Cherry picking and red herrings creating much ado about nothing: A critique of Bianchi and Schonfeld's beliefs about burnout. *Work & Stress*, *39*(12), 1-8. https://doi.org/10.1080/02678373.2025.2473152

Leo, C. G., Sabina, S., Tumolo, M. R., Bodini, A., Ponzini, G., Sabato, E., & Mincarone, P. (2021). Burnout Among Healthcare Workers in the COVID 19 Era: A Review of the Existing Literature. *Frontiers in Public Health*, *9*, 750529. https://doi.org/10.3389/fpubh.2021.750529

Lepine, J. A., Podsakoff, N. P., & Lepine, M. A. (2005). A Meta-Analytic Test of the Challenge Stressor–Hindrance Stressor Framework: An Explanation for Inconsistent Relationships Among Stressors and Performance. *Academy of Management Journal*, *48*(5), 764-775. https://doi.org/10.5465/amj.2005.18803921

Lesener, T., Gusy, B., Jochmann, A., & Wolter, C. (2020). The drivers of work engagement: A meta-analytic review of longitudinal evidence. *Work & Stress*, *34*(3), 259-278. https://doi.org/10.1080/02678373.2019.1686440

Lesener, T., Gusy, B., & Wolter, C. (2019). The job demands-resources model: A meta-analytic review of longitudinal studies. *Work & Stress*, *33*(1), 76-103. https://doi.org/10.1080/02678373.2018.1529065

Lewis, H. S., & Cunningham, C. J. (2016). Linking Nurse Leadership and Work Characteristics to Nurse Burnout and Engagement. *Nursing Research*, *65*(1), 13-23. https://doi.org/10.1097/NNR.0000000000000130

Li, B., Bruyneel, L., Sermeus, W., Van den Heede, K., Matawie, K., Aiken, L., & Lesaffre, E. (2013). Group-level impact of work environment dimensions on burnout experiences among nurses: a multivariate multilevel probit model. *International Journal of Nursing Studies*, *50*(2), 281-291. https://doi.org/10.1016/j.ijnurstu.2012.07.001

Liden, R. C., Wayne, S. J., Liao, C., & Meuser, J. D. (2014). Servant leadership and serving culture: Influence on individual and unit performance. *Academy of Management Journal*, *57*(5), 1434-1452. https://doi.org/10.5465/amj.2013.0034

Lindsley, D. H., Brass, D. J., & Thomas, J. B. (1995). Efficacy-Performance Spirals: A Multilevel Perspective. *The Academy of Management Review*, *20*(3), 645-678. https://doi.org/10.2307/258790

Llorens, S., Schaufeli, W., Bakker, A., & Salanova, M. (2007). Does a positive gain spiral of resources, efficacy beliefs and engagement exist? *Computers in Human Behavior*, *23*(1), 825-841. https://doi.org/10.1016/j.chb.2004.11.012

Lu, H., Zhao, Y., & While, A. (2019). Job satisfaction among hospital nurses: A literature review. *International Journal of Nursing Studies*, *94*(8), 21-31. https://doi.org/10.1016/j.ijnurstu.2019.01.011

Luchman, J. N. (2021). Determining relative importance in Stata using dominance analysis: domin and domme. *The Stata Journal*, *21*(2), 510-538. https://doi.org/10.1177/1536867X211025837

Luo, M., Guo, L., Yu, M., Jiang, W., & Wang, H. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - A systematic review and meta-analysis. *Psychiatry Research*, *291*, 113190. https://doi.org/10.1016/j.psychres.2020.113190

Luo, W., & Azen, R. (2013). Determining predictor importance in hierarchical linear models using dominance analysis. *Journal of Educational and Behavioral Statistics*, *38*(1), 3-31. https://doi.org/10.3102/1076998612458319

Luthans, F., & Avolio, B. J. (2003). Authentic Leadership: A Positive Developmental Approach. In K. S. Cameron, J. E. Dutton, & R. E. Quinn (Eds.), *Positive Organizational Scholarship* (pp. 241-261). Barrett-Koehler.

M

Marzocchi, I., Nielsen, K., Di Tecco, C., Vignoli, M., Ghelli, M., Ronchetti, M., & Iavicoli, S. (2024). Job demands and resources and their association with employee well-being in the European healthcare sector: a systematic review and meta-analysis of prospective research. *Work & Stress*, 1-28. https://doi.org/10.1080/02678373.2024.2308812

Maslach, C. (1982). *Burnout: The cost of caring*. Prentice-Hall.

Mathieu, M., Eschleman, K. J., & Cheng, D. (2019). Meta-analytic and multiwave comparison of emotional support and instrumental support in the workplace. *Journal of Occupational Health Psychology*, *24*(3), 387-409. https://doi.org/10.1037/ocp0000135

Mauno, S., Kinnunen, U., Mäkikangas, A., & Feldt, T. (2010). Job Demands and Resources as Antecedents of Work Engagement: A Qualitative Review and Directions for Future Research. In S. L. Albrecht (Ed.), *New horizons in management. Handbook of employee engagement: Perspectives, issues, research and practice* (pp. 111-128). Edward Elgar. https://doi.org/10.4337/9781849806374.00016

Mazzetti, G., & Schaufeli, W. B. (2022). The impact of engaging leadership on employee engagement and team effectiveness: A longitudinal, multi-level study on the mediating role of personal- and team resources. *PLoS One*, *17*(6), e0269433. https://doi.org/10.1371/journal.pone.0269433

Mazzetti, G., Robledo, E., Vignoli, M., Topa, G., Guglielmi, D., & Schaufeli, W. B. (2023). Work engagement: A meta-analysis using the job demands-resources model. *Psychological reports*, *126*(3), 1069-1107. https://doi.org/10.1177/00332941211051988

McClure, M. L., Poulin, M. A., Sovie, M. D., & Wandelt, M. A. (1983). *Magnet Hospitals: Attraction and Retention of Professional Nurses*. American Academy of Nurses.

McVicar, A. (2016). Scoping the common antecedents of job stress and job satisfaction for nurses (2000-2013) using the job demands-resources model of stress. *Journal of Nursing Management*, *24*(2), E112-136. https://doi.org/10.1111/jonm.12326

Montano, D., Hoven, H., & Siegrist, J. (2014). Effects of organisational-level interventions at work on employees' health: a systematic review. *BMC Public Health*, *14*, 135. https://doi.org/10.1186/1471-2458-14-135

Montgomery, A., Spanu, F., Baban, A., & Panagopoulou, E. (2015). Job demands, burnout, and engagement among nurses: A multi-level analysis of ORCAB data investigating the moderating effect of teamwork. *Burnout Research*, *2*(2-3), 71-79. https://doi.org/10.1016/j.burn.2015.06.001

Moreno-Jimenez, J. E., Blanco-Donoso, L. M., Chico-Fernandez, M., Belda Hofheinz, S., Moreno-Jimenez, B., & Garrosa, E. (2021). The Job Demands and Resources Related to COVID-19 in Predicting Emotional Exhaustion and Secondary Traumatic Stress Among Health Professionals in Spain. *Frontiers in Psychology*, *12*, 564036. https://doi.org/10.3389/fpsyg.2021.564036

Muthén, L. K., & Muthén, B. (2017). *Mplus user's guide: Statistical analysis with latent variables, user's guide*. Muthén & Muthén.

N

Nahrgang, J. D., Morgeson, F. P., & Hofmann, D. A. (2011). Safety at work: a meta-analytic investigation of the link between job demands, job resources, burnout, engagement, and safety outcomes. *Journal of Applied Psychology*, *96*(1), 71-94. https://doi.org/10.1037/a0021484

Nam, S. Y., Lee, H., Ryu, E., Hong, H. C., Kang, M., & Min, A. (2025). Job Characteristic Profiles and Presenteeism Among Shift Nurses: A Latent Profile Analysis Based on the Job Demands-Resources Model. *Journal of Advanced Nursing*, *81*(7), 3715-3728. https://doi.org/10.1111/jan.16486

Ng, J. Y., Ntoumanis, N., Thogersen-Ntoumani, C., Deci, E. L., Ryan, R. M., Duda, J. L., & Williams, G. C. (2012). Self-Determination Theory Applied to Health Contexts: A Meta-Analysis. *Perspectives on Psychological Science*, *7*(4), 325-340. https://doi.org/10.1177/1745691612447309

Nielsen, K., Randall, R., Yarker, J., & Brenner, S.-O. (2008). The effects of transformational leadership on followers' perceived work characteristics and psychological well-being: A longitudinal study. *Work & Stress*, *22*(1), 16-32. https://doi.org/10.1080/02678370801979430

Nielsen, K., Taris, T. W., & Cox, T. (2010). The future of organizational interventions: Addressing the challenges of today's organizations. *Work & stress*, *24*(3), 219-233. https://doi.org/10.1080/02678373.2010.519176

Nixon, A. E., Mazzola, J. J., Bauer, J., Krueger, J. R., & Spector, P. E. (2011). Can Work Make You Sick? A Meta-Analysis of the Relationships Between Job Stressors and Physical Symptoms. *Work & Stress*, *25*(1), 1-22. https://doi.org/10.1080/02678373.2011.569175

Nylund-Gibson, K., & Choi, A. Y. (2018). Ten frequently asked questions about latent class analysis. *Translational Issues in Psychological Science*, *4*(4), 440-461. https://doi.org/10.1037/tps0000176

O

OECD. (2016). Health Workforce Policies in OECD Countries: Right Jobs, Right Skills, Right Places. In *OECD Health Policy Studies*. Paris: OECD Publishing.

Oldham, G. R., & Hackman, J. R. (2010). Not what it was and not what it will be: The future of job design research. *Journal of Organizational Behavior*, *31*(2-3), 463-479. https://doi.org/10.1002/job.678

Oppel, E. M., & Mohr, D. C. (2021). Multilevel analysis exploring the relative importance of workplace resources in explaining nurses' workload perceptions: Are we setting the right focus? *Health Care Management Review*, *46*(2), E8-E17. https://doi.org/10.1097/HMR.0000000000000285

P

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity*, *88*, 901-907. https://doi.org/10.1016/j.bbi.2020.05.026

Parent-Thirion, A., Biletta, I., Cabrita, J., Vargas, O., Vermeylen, G., Wilczynska, A., & Wilkens, M. (2016). *Sixth European Working Conditions survey: overview report* (9789289715676). https://www.eurofound.europa.eu/publications/report/2016/working-conditions/sixth-european-working-conditions-survey-overview-report

Parker, S. K., & Sprigg, C. A. (1999). Minimizing strain and maximizing learning: the role of job demands, job control, and proactive personality. *Journal of Applied Psychology*, *84*(6), 925-939. https://doi.org/10.1037/0021-9010.84.6.925

Pinder, C. C. (2008). *Work Motivation in Organizational Behavior* (Second ed.). Psychology Press.

Pirrotta, L., Cantarelli, P., & Belle, N. (2025). Exploring the role of staffing needs in JD-R theory: evidence from public healthcare organizations. *Management Decision*, *63*(13), 282-301. https://doi.org/10.1108/MD-07-2024-1718

Pisljar, T., van der Lippe, T., & den Dulk, L. (2011). Health among hospital employees in Europe: a cross-national study of the impact of work stress and work control. *Social Science & Medicine*, *72*(6), 899-906. https://doi.org/10.1016/j.socscimed.2010.12.017

Podsakoff, N. P., LePine, J. A., & LePine, M. A. (2007). Differential challenge stressor-hindrance stressor relationships with job attitudes, turnover intentions, turnover, and withdrawal behavior: a meta-analysis. *Journal of Applied Psychology*, *92*(2), 438-454. https://doi.org/10.1037/0021-9010.92.2.438

Portoghese, I., Galletta, M., Leiter, M. P., Finco, G., d'Aloja, E., & Campagna, M. (2020). Job Demand-Control-Support Latent Profiles and Their Relationships with Interpersonal Stressors, Job Burnout, and Intrinsic Work Motivation. *International Journal of Environmental Research and Public Health*, *17*(24), 9430. https://doi.org/10.3390/ijerph17249430

Putwain, D. W., & von der Embse, N. P. (2019). Teacher self-efficacy moderates the relations between imposed pressure from imposed curriculum changes and teacher stress. *Educational Psychology*, *39*(1), 51-64. https://doi.org/10.1080/01443410.2018.1500681

R

Rahmadani, V. G., & Schaufeli, W. B. (2020). Engaging Leaders Foster Employees' Well-Being at Work. Proceedings of the International Conference on Public Health,

Rahmadani, V. G., & Schaufeli, W. B. (2022). Engaging leadership and work engagement as moderated by "diuwongke": an Indonesian study. *The International Journal of Human Resource Management*, *33*(7), 1267-1295. https://doi.org/10.1080/09585192.2020.1799234

Rahmadani, V. G., Schaufeli, W. B., Ivanova, T. Y., & Osin, E. N. (2019). Basic psychological need satisfaction mediates the relationship between engaging leadership and work engagement: A cross-national study. *Human Resource Development Quarterly*, *30*(4), 453-471. https://doi.org/10.1002/hrdq.21366

Rahmadani, V. G., Schaufeli, W. B., Stouten, J., Zhang, Z., & Zulkarnain, Z. (2020). Engaging Leadership and Its Implication for Work Engagement and Job Outcomes at the Individual and Team Level: A Multi-Level Longitudinal Study. *International Journal of Environmental Research and Public Health*, *17*(3), 776-776. https://doi.org/10.3390/ijerph17030776

Rotenstein, L. S., Torre, M., Ramos, M. A., Rosales, R. C., Guille, C., Sen, S., & Mata, D. A. (2018). Prevalence of Burnout Among Physicians: A Systematic Review. *JAMA*, *320*(11), 1131-1150. https://doi.org/10.1001/jama.2018.12777

Rudnev, M., Lytkina, E., Davidov, E., Schmidt, P., & Zick, A. (2018). Testing Measurement Invariance for a Second-Order Factor. A Cross-National Test of the Alienation Scale. *Methods, data, analyses: A journal for quantitative methods and survey methodology*, *12*(1), 47-76. https://doi.org/10.12758/mda.2017.11

Rugulies, R., Aust, B., Greiner, B. A., Arensman, E., Kawakami, N., LaMontagne, A. D., & Madsen, I. E. H. (2023). Work-related causes of mental health conditions and interventions for their improvement in workplaces. *The Lancet*, *402*(10410), 1368-1381. https://doi.org/10.1016/S0140-6736(23)00869-3

Ryan, R. M., & Deci, E. L. (2000a). Intrinsic and Extrinsic Motivations: Classic Definitions and New Directions. *Contemporary Educational Psychology*, *25*(1), 54-67. https://doi.org/10.1006/ceps.1999.1020

Ryan, R. M., & Deci, E. L. (2000b). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68-78. https://doi.org/10.1037//0003-066x.55.1.68

Ryan, R. M., & Deci, E. L. (2020). Intrinsic and extrinsic motivation from a self-determination theory perspective: Definitions, theory, practices, and future directions. *Contemporary Educational Psychology*, *61*, 101860. https://doi.org/j.cedpsych.2020.101860

Ryan, R. M., Duineveld, J. J., Di Domenico, S. I., Ryan, W. S., Steward, B. A., & Bradshaw, E. L. (2022). We know this much is (meta-analytically) true: A meta-review of meta-analytic findings evaluating self-determination theory. *Psychological Bulletin*, *148*(11-12), 813. https://doi.org/10.1037/bul0000385

S

Salanova, M., Schaufeli, W. B., Xanthopoulou, D., & Bakker, A. B. (2010). The gain spiral of resources and work engagement: Sustaining a positive worklife. In A. B. Bakker & M. P. Leiter (Eds.), *Work Engagement: A Handbook of Essential Theory and Research* (First ed., pp. 118-131). Psychology Press.

Schaufeli, W. (2021). Engaging Leadership: How to Promote Work Engagement? *Frontiers in Psychology*, *12*(October), 754556. https://doi.org/10.3389/fpsyg.2021.754556

Schaufeli, W. B. (2015). Engaging leadership in the job demands-resources model. *Career Development International*, *20*(5), 446-463. https://doi.org/10.1108/cdi-02-2015-0025

Schaufeli, W. B. (2017). Applying the Job Demands-Resources model. *Organizational Dynamics*, *46*(2), 120-132. https://doi.org/10.1016/j.orgdyn.2017.04.008

Schaufeli, W. B., & Bakker, A. B. (2004). Job demands, job resources, and their relationship with burnout and engagement: a multi-sample study. *Journal of Organizational Behavior*, *25*(3), 293-315. https://doi.org/10.1002/job.248

Schaufeli, W. B., De Witte, H., Hakanen, J. J., Kaltiainen, J., & Kok, R. (2023). How to assess severe burnout? Cutoff points for the Burnout Assessment Tool (BAT) based on three European samples. *Scandinavian Journal of Work, Environment & Health*, *49*(4), 293-302. https://doi.org/10.5271/sjweh.4093

Schaufeli, W. B., Desart, S., & De Witte, H. (2020). Burnout Assessment Tool (BAT)-Development, Validity, and Reliability. *International Journal of Environmental Research and Public Health*, *17*(24), 1-21. https://doi.org/10.3390/ijerph17249495

Schaufeli, W. B., Salanova, M., González-romá, V., & Bakker, A. B. (2002). The Measurement of Engagement and Burnout: A Two Sample Confirmatory Factor Analytic Approach. *Journal of Happiness Studies*, *3*(1), 71-92. https://doi.org/10.1023/a:1015630930326

Schaufeli, W. B., Shimazu, A., Hakanen, J., Salanova, M., & De Witte, H. (2019). An Ultra-Short Measure for Work Engagement. *European Journal of Psychological Assessment*, *35*(4), 577-591. https://doi.org/10.1027/1015-5759/a000430

Schaufeli, W. B., & Taris, T. W. (2014). A Critical Review of the Job Demands-Resources Model: Implications for Improving Work and Health. In G. F. Bauer & O. Hämmig (Eds.), *Bridging Occupational, Organizational and Public Health. A Transdisciplinary Approach.* (First ed., pp. 43-68). Springer. https://doi.org/10.1007/978-94-007-5640-3_4

Schlak, A. E., Aiken, L. H., Chittams, 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*(2), 1-15. https://doi.org/10.3390/ijerph18020610

Sermeus, W., Aiken, L. H., Ball, J., Bridges, J., Bruyneel, L., Busse, R., ... & Smith, H. (2022). A workplace organisational intervention to improve hospital nurses' and physicians' mental health: study protocol for the Magnet4Europe wait list cluster randomised controlled trial. BMJ open, 12(7), e059159. https://doi.org/10.1136/bmjopen-2021-059159

Shi, D., Lee, T., & Maydeu-Olivares, A. (2019). Understanding the Model Size Effect on SEM Fit Indices. *Educational and Psychological Measurement*, *79*(2), 310-334. https://doi.org/10.1177/0013164418783530

Shuck, B., & Herd, A. M. (2012). Employee Engagement and Leadership. *Human Resource Development Review*, *11*(2), 156-181. https://doi.org/10.1177/1534484312438211

Siegrist, J. (1996). Adverse health effects of high-effort/low-reward conditions. *Journal of Occupational Health Psychology*, *1*(1), 27-41. https://doi.org/10.1037//1076-8998.1.1.27

Sinclair, R. R., Sliter, M., Mohr, C. D., Sears, L. E., Deese, M. N., Wright, R. R.,…Jacobs, L. (2015). Bad Versus Good, What Matters More on the Treatment Floor? Relationships of Positive and Negative Events With Nurses' Burnout and Engagement. *Research in Nursing and Health*, *38*(6), 475-491. https://doi.org/10.1002/nur.21696

Skakon, J., Nielsen, K., Borg, V., & Guzman, J. (2010). Are leaders' well-being, behaviours and style associated with the affective well-being of their employees? A systematic review of three decades of research. *Work & Stress*, *24*(2), 107-139. https://doi.org/10.1080/02678373.2010.495262

Slemp, G. R., Kern, M. L., Patrick, K. J., & Ryan, R. M. (2018). Leader autonomy support in the workplace: A meta-analytic review. *Motivation and Emotion*, *42*(5), 706-724. https://doi.org/10.1007/s11031-018-9698-y

Snijders, T. A. B., & Bosker, R. J. (1994). Modeled variance in two-level models. *Sociological Methods & Research*, *22*(3), 342-363. https://doi.org/10.1177/0049124194022003004

Sonnentag, S. (2017). A task-level perspective on work engagement: A new approach that helps to differentiate the concepts of engagement and burnout. *Burnout Research*, *5*, 12-20. https://doi.org/10.1016/j.burn.2017.04.001

Sonnentag, S., & Frese, M. (2012). Stress in Organizations. In N. W. Schmitt, S. Highhouse, & I. B. Weiner (Eds.), *Handbook of Psychology: Industrial and Organizational Psychology* (Second ed., Vol. 12, pp. 560-592). John Wiley & Sons, Inc.

Sonnentag, S., Tay, L., & Nesher Shoshan, H. (2023). A review on health and well-being at work: More than stressors and strains. *Personnel Psychology*, *76*(2), 473-510. https://doi.org/10.1111/peps.12572

Spurk, D., Hirschi, A., Wang, M., Valero, D., & Kauffeld, S. (2020). Latent profile analysis: A review and "how to" guide of its application within vocational behavior research. *Journal of Vocational Behavior*, *120*, 103445. https://doi.org/10.1016/j.jvb.2020.103445

Stimpfel, A. W., Sloane, D. M., & Aiken, L. H. (2012). The longer the shifts for hospital nurses, the higher the levels of burnout and patient dissatisfaction. *Health Affairs*, *31*(11), 2501-2509. https://doi.org/10.1377/hlthaff.2011.1377

Stride, C. B., Gardner, S. E., Catley, N., & Thomas, F. (2017). Mplus Code for Mediation , Moderation and Moderated Mediation Models. In.

Stutting, H. L. (2023). The Relationship Between Rest Breaks and Professional Burnout Among Nurses. *Critical Care Nurse*, *43*(6), 48-56. https://doi.org/10.4037/ccn2023177

Su, Y.-L., & Reeve, J. (2010). A Meta-analysis of the Effectiveness of Intervention Programs Designed to Support Autonomy. *Educational Psychology Review*, *23*(1), 159-188. https://doi.org/10.1007/s10648-010-9142-7

Sundin, L., Hochwalder, J., & Lisspers, J. (2011). A longitudinal examination of generic and occupational specific job demands, and work-related social support associated with burnout among nurses in Sweden. *Work*, *38*(4), 389-400. https://doi.org/10.3233/WOR-2011-1142

Svensson, I., Bridges, J., Ellis, J., Brady, N., Dello, S., Hooft, J.,…Magnet4Europe, C. (2024). Laying the foundations for implementing Magnet principles in hospitals in Europe: A qualitative analysis. *International Journal of Nursing Studies*, *154*, 104754. https://doi.org/10.1016/j.ijnurstu.2024.104754

T

Taris, T. W., & Kompier, M. A. J. (2004). Job characteristics and learning behavior: Review and psychological mechanisms. In P. L. Perrewé & D. C. Ganster (Eds.), *Exploring interpersonal dynamics* (pp. 127-166). Amsterdam, NL: Elsevier Science/JAI Press.

Taris, T. W., Kompier, M. A. J., De Lange, A. H., Schaufeli, W. B., & Schreurs, P. J. G. (2003). Learning new behaviour patterns: A longitudinal test of Karasek's active learning hypothesis among Dutch teachers. *Work & Stress*, *17*(1), 1-20. https://doi.org/10.1080/0267837031000108149

Teoh, K., Dhensa-Kahlon, R., Christensen, M., Frost, F., Hatton, E., & Nielsen, K. (2023). *Organisational wellbeing interventions: case studies from the NHS. Technical Report.*

Thapa, D. R., Stengard, J., Ekstrom-Bergstrom, A., Areskoug Josefsson, K., Krettek, A., & Nyberg, A. (2022). Job demands, job resources, and health outcomes among nursing professionals in private and public healthcare sectors in Sweden - a prospective study. *BMC Nursing*, *21*(1), 140. https://doi.org/10.1186/s12912-022-00924-z

Timmins, F., Ottonello, G., Napolitano, F., Musio, M. E., Calzolari, M., Gammone, M.,…Bagnasco, A. (2023). The state of the science-the impact of declining response rates by nurses in nursing research projects. *Journal of Clinical Nursing*, *32*(7-8), e9-e11. https://doi.org/10.1111/jocn.16597

Tims, M., Bakker, A. B., Derks, D., & Van Rhenen, W. (2013). Job crafting at the team and individual level: Implications for work engagement and performance. *Group & Organization Management*, *38*(4), 427-454. https://doi.org/10.1177/1059601113492421

Toode, K., Routasalo, P., Helminen, M., & Suominen, T. (2015). Hospital nurses' working conditions in relation to motivation and patient safety. *Nursing Management*, *21*(10), 31-41. https://doi.org/10.7748/nm.21.10.31.e1293

Toode, K., Routasalo, P., & Suominen, T. (2011). Work motivation of nurses: a literature review. *Internatioal Journal of Nursing Studies*, *48*(2), 246-257. https://doi.org/10.1016/j.ijnurstu.2010.09.013

Tourangeau, A. E., Patterson, E., Saari, M., Thomson, H., & Cranley, L. (2017). Work-related factors influencing home care nurse intent to remain employed. *Health Care Management Review*, *42*(1), 87-97. https://doi.org/10.1097/HMR.0000000000000093

Tremblay, M. A., Blanchard, C. M., Taylor, S., Pelletier, L. G., & Villeneuve, M. (2009). Work Extrinsic and Intrinsic Motivation Scale: Its value for organizational psychology research. *Canadian Journal of Behavioural Science / Revue canadienne des sciences du comportement*, *41*(4), 213-226. https://doi.org/10.1037/a0015167

Trépanier, S.-G., Forest, J., Fernet, C., & Austin, S. (2015). On the psychological and motivational processes linking job characteristics to employee functioning: Insights from self-determination theory. *Work & Stress*, *29*(3), 286-305. https://doi.org/10.1080/02678373.2015.1074957

Tucker, M. K., Jimmieson, N. L., & Bordia, P. (2018). Supervisor support as a double-edged sword: Supervisor emotion management accounts for the buffering and reverse-buffering effects of supervisor support. *International Journal of Stress Management*, *25*(1), 14. https://doi.org/10.1037/str0000046

Tuckey, M. R., Bakker, A. B., & Dollard, M. F. (2012). Empowering leaders optimize working conditions for engagement: a multilevel study. *Journal of Occupational Health Psychology, 17*(1), 15. https://doi.org/10.1037/a0025942

Tummers, G. E. R., Landeweerd, J. A., & van Merode, G. G. (2002). Work organization, work characteristics, and their psychological effects on nurses in The Netherlands. *International Journal of Stress Management*, *9*(3), 183-206. https://doi.org/10.1023/a:1015519815319

Tummers, L. G., & Bakker, A. B. (2021). Leadership and job demands-resources theory: A systematic review. *Frontiers in Psychology, 12,* Article 722080. https://doi.org/10.3389/fpsyg.2021.722080

V

van Beek, I., Hu, Q., Schaufeli, W. B., Taris, T. W., & Schreurs, B. H. J. (2011). For Fun, Love, or Money: What Drives Workaholic, Engaged, and Burned-Out Employees at Work? *Applied Psychology*, *61*(1), 30-55. https://doi.org/10.1111/j.1464-0597.2011.00454.x

van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European Journal of Developmental Psychology*, *9*(4), 486-492. https://doi.org/10.1080/17405629.2012.686740

Van den Broeck, Anja, and Gavin R. Slemp, 'Leadership: A Self-Determination Theory Perspective', in Richard M. Ryan (ed.), *The Oxford Handbook of Self-Determination Theory* (2023; online edn, Oxford Academic, 23 Feb. 2023), https://doi.org/10.1093/oxfordhb/9780197600047.013.47, accessed 5 Nov. 2025.

Van den Broeck, A., De Cuyper, N., De Witte, H., & Vansteenkiste, M. (2010). Not all job demands are equal: Differentiating job hindrances and job challenges in the Job Demands–Resources model. *European Journal of Work and Organizational Psychology*, *19*(6), 735-759. https://doi.org/10.1080/13594320903223839

Van den Broeck, A., Ferris, D. L., Chang, C.-H., & Rosen, C. C. (2016). A Review of Self-Determination Theory's Basic Psychological Needs at Work. *Journal of Management*, *42*(5), 1195-1229. https://doi.org/10.1177/0149206316632058

Van den Broeck, A., Howard, J. L., Van Vaerenbergh, Y., Leroy, H., & Gagné, M. (2021). Beyond intrinsic and extrinsic motivation: A meta-analysis on self-determination theory's multidimensional conceptualization of work motivation. *Organizational Psychology Review*, *11*(3), 240-273. https://doi.org/10.1177/20413866211006173

Van den Broeck, A., Maarten, V., Hans, D. W., & and Lens, W. (2008). Explaining the relationships between job characteristics, burnout, and engagement: The role of basic psychological need satisfaction. *Work & Stress*, *22*(3), 277-294. https://doi.org/10.1080/02678370802393672

van den Tooren, M., & de Jonge, J. (2008). Managing job stress in nursing: what kind of resources do we need? *Journal of Advanced Nursing*, *63*(1), 75-84. https://doi.org/10.1111/j.1365-2648.2008.04657.x

Van der Doef, M., & Maes, S. (1998). The job demand-control (-support) model and physical health outcomes: A review of the strain and buffer hypotheses. *Psychology & Health*, *13*(5), 909-936. https://doi.org/10.1080/08870449808407440

Van der Doef, M., & Maes, S. (1999). The Job Demand-Control (-Support) Model and psychological well-being: A review of 20 years of empirical research. *Work & Stress*, *13*(2), 87-114. https://doi.org/10.1080/026783799296084

van Dierendonck, D., Haynes, C., Borrill, C., & Stride, C. (2004). Leadership behavior and subordinate well-being. *Journal of Occupational Health Psychology*, *9*(2), 165-175. https://doi.org/10.1037/1076-8998.9.2.165

van Knippenberg, D., & Sitkin, S. B. (2013). A Critical Assessment of Charismatic—Transformational Leadership Research: Back to the Drawing Board? *The Academy of Management Annals*, *7*(1), 1-60. https://doi.org/10.5465/19416520.2013.759433

van Oortmerssen, L. A., Caniëls, M. C. J., & van Assen, M. F. (2019). Coping with Work Stressors and Paving the Way for Flow: Challenge and Hindrance Demands, Humor, and Cynicism. *Journal of Happiness Studies*, *21*(6), 2257-2277. https://doi.org/10.1007/s10902-019-00177-9

van Tuin, L., Schaufeli, W. B., van Rhenen, W., & Kuiper, R. M. (2020). Business Results and Well-Being: An Engaging Leadership Intervention Study. *International Journal of Environmental Research and Public Health*, *17*(12), 1-18. https://doi.org/10.3390/ijerph17124515

van Vegchel, N., de Jonge, J., Söderfeldt, M., Dormann, C., & Schaufeli, W. (2004). Quantitative versus emotional demands among Swedish human service employees: moderating effects of job control and social support. *International Journal of Stress Management*, *11*(1), 21-40. https://doi.org/10.1037/1072-5245.11.1.21

Van Yperen, N. W., & Hagedoorn, M. (2003). Do High Job Demands Increase Intrinsic Motivation or Fatigue or Both? The Role of Job Control and Job Social Support. *Academy of Management Journal*, *46*(3), 339-348. https://doi.org/10.2307/30040627

Van Yperen, N. W., Wörtler, B., & De Jonge, K. M. M. (2016). Workers' intrinsic work motivation when job demands are high: The role of need for autonomy and perceived opportunity for blended working. *Computers in Human Behavior*, *60*, 179-184. https://doi.org/10.1016/j.chb.2016.02.068

Vandenbroeck, S., Van Gerven, E., De Witte, H., Vanhaecht, K., & Godderis, L. (2017). Burnout in Belgian physicians and nurses. *Occupational Medicine*, *67*(7), 546-554. https://doi.org/10.1093/occmed/kqx126

Vander Elst, T., Cavents, C., Daneels, K., Johannik, K., Baillien, E., Van den Broeck, A., & Godderis, L. (2016). Job demands-resources predicting burnout and work engagement among Belgian home health care nurses: A cross-sectional study. *Nursing Outlook*, *64*(6), 542-556. https://doi.org/10.1016/j.outlook.2016.06.004

Vangrieken, K., De Cuyper, N., & De Witte, H. (2022). Karasek's activation hypothesis: A longitudinal test of within-person relationships. *Journal of Organizational Behavior*. https://doi.org/10.1002/job.2669

Vargas-Benitez, M. A., Izquierdo-Espin, F. J., Castro-Martinez, N., Gomez-Urquiza, J. L., Albendin-Garcia, L., Velando-Soriano, A., & Canadas-De la Fuente, G. A. (2023). Burnout syndrome and work engagement in nursing staff: a systematic review and meta-analysis. *Frontiers in Medicine*, *10*, 1125133. https://doi.org/10.3389/fmed.2023.1125133

Veldhoven, M. v., Jonge, J. d., Broersen, S., Kompier, M., & Meijman, T. (2002). Specific relationships between psychosocial job conditions and job-related stress: A three-level analytic approach. *Work & Stress*, *16*(3), 207-228. https://doi.org/10.1080/02678370210166399

Villacura-Herrera, C., Acosta-Antognoni, H., Maldonado, J., Arriaza, F., Cancino-Letelier, N., Nvo-Fernández, M., & Schaufeli, W. B. (2025). Burnout Assessment Tool: a reliability generalisation meta-analysis. *Work & Stress*, *39*(2), 1-28. https://doi.org/10.1080/02678373.2025.2484758

W

WHO. (2020). *State of the world's nursing 2020: investing in education, jobs and leadership* (9789240003286). https://apps.who.int/iris/handle/10665/331677

WHO. (2022a). *Health and care workforce in Europe: time to act*. https://iris.who.int/handle/10665/362379

WHO. (2022b). *WHO guidelines on mental health at work*. https://iris.who.int/bitstream/handle/10665/363177/9789240053052-eng.pdf?sequence=1

WHO. (2025). *State of the world's nursing 2025: investing in education, jobs, leadership and service delivery*. https://iris.who.int/bitstream/handle/10665/381329/9789240110236-eng.pdf?sequence=1

Wong, C. A., Cummings, G. G., & Ducharme, L. (2013). The relationship between nursing leadership and patient outcomes: a systematic review update. *Journal of Nursing Management*, *21*(5), 709-724. https://doi.org/10.1111/jonm.12116

Woo, T., Ho, R., Tang, A., & Tam, W. (2020). 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

X

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2007). The role of personal resources in the job demands-resources model. *International Journal of Stress Management*, *14*(2), 121-141. https://doi.org/10.1037/1072-5245.14.2.121

Xanthopoulou, D., Bakker, A. B., Demerouti, E., & Schaufeli, W. B. (2009). Reciprocal relationships between job resources, personal resources, and work engagement. *Journal of Vocational Behavior*, *74*(3), 235-244. https://doi.org/10.1016/j.jvb.2008.11.003

Xanthopoulou, D., Bakker, A. B., Dollard, M. F., Demerouti, E., Schaufeli, W. B., Taris, T. W., & Schreurs, P. J. G. (2007). When do job demands particularly predict burnout? *Journal of Managerial Psychology*, *22*(8), 766-786. https://doi.org/10.1108/02683940710837714

Xu, X., & Payne, S. C. (2020). When do job resources buffer the effect of job demands? *International Journal of Stress Management*, *27*(3), 226-240. https://doi.org/10.1037/str0000146

Xue, H., Luo, Y., Luan, Y., & Wang, N. (2022). A meta-analysis of leadership and intrinsic motivation: Examining relative importance and moderators. *Frontiers in Psychology*, *13*(August), 941161. https://doi.org/10.3389/fpsyg.2022.941161

Y

Yang, F. H., & Chang, C. C. (2008). Emotional labour, job satisfaction and organizational commitment amongst clinical nurses: a questionnaire survey. *International Journal of Nursing Studies*, *45*(6), 879-887. https://doi.org/10.1016/j.ijnurstu.2007.02.001

Z

Zapf, D., Vogt, C., Seifert, C., Mertini, H., & Isic, A. (1999). Emotion work as a source of stress: The concept and development of an instrument. *European Journal of work and organizational psychology*, *8*(3), 371-400. https://doi.org/10.1080/135943299398230

Ziedelis, A. (2019). Perceived Calling and Work Engagement Among Nurses. *Western Journal of Nursing Research*, *41*(6), 816-833. https://doi.org/10.1177/0193945918767631

APPENDICES

Appendix A

Sample Characteristics (Chapter 1)

Country	Response Rate (%)	Number of Hospitals (n)	Responses	Female (%)	Age (sd)
Belgium	25.2	13	1117	82.1	39.5 (11.8)
Germany	26.6	20	1907	79.0	39.1 (11.9)
Ireland	14.7	15	667	87.6	36.8 (10.1)
Scandinavia	19.0	5	432	85.2	36.5 (11.4)
▪ **Sweden**	▪ 17.0	▪ 4	▪ 359	▪ 85.5	37.0 (11.1)
▪ **Norway**	▪ 38.1	▪ 1	▪ 73	▪ 83.6	34.5 (11.0)
England	12.6	11	900	83.7	36.6 (10.3)

Appendix B

Model fit country specific analysis (Chapter 1)

Country	χ^2	df	CFI	TLI	RMSEA	SRMR
Belgium	1001.798	242	0.93	0.92	0.057	0.053
Germany	1443.145	242	0.94	0.93	0.055	0.050
Ireland	793.946	242	0.93	0.92	0.066	0.053
Scandinavia (Sweden / Norway)	659.276	242	0.90	0.89	0.067	0.065
England	1034.050	242	0.92	0.91	0.068	0.061

Note. χ^2 = chi-square; df = degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Appendix C

Test of Measurement Invariance - Multi-Group CFAs (Chapter 1)

Model	**χ^2**	**df**	**CFI**	**TLI**	**RMSEA**	**SRMR**	**CM**	**ΔCFI**	**ΔRMSEA**
M1: Configural Invariance	4272.938	968	0.930	0.920	0.060	0.053	-		
M2: Metric Invariance (λ)	4646.804	1028	0.923	0.918	0.061	0.066	1	-.007	+.001

Note. χ^2 = chi-square; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CM = comparison model; ΔCFI = change in CFI; ΔRMSEA = change in RMSEA; λ = factor loadings.

Appendix D

Direct effects (Chapter 3)

Predictor	Outcome	β	ρ	LLCI	ULCI
Job Resources	Burnout	-0.311	0.000	-0.424	-0.201
Job Demands	Burnout	0.576	0.000	0.499	0.654
Intrinsic Motivation	Burnout	-0.158	0.000	-0.236	-0.082
Engaging Leadership	Burnout	0.051	0.225	-0.028	0.134
Job Resources	Intrinsic Motivation	0.626	0.000	0.532	0.734
Job Demands	Intrinsic Motivation	-0.030	0.454	-0.106	0.051
Engaging Leadership	Intrinsic Motivation	-0.104	0.048	-0.213	-0.003
Engaging Leadership	Job Demands	-0.378	0.000	-0.439	-0.314
Engaging Leadership	Job Resources	0.587	0.000	0.522	0.652
Job Resources	Work Engagement	0.444	0.000	0.330	0.557
Job Demands	Work Engagement	-0.170	0.000	-0.259	-0.098
Intrinsic Motivation	Work Engagement	0.283	0.000	0.190	0.368
Engaging Leadership	Work Engagement	-0.004	0.930	-0.095	0.086

Note. β = standardized beta, LLCI= lower level of bootstrap confidence interval, ULCI= upper level of bootstrap confidence interval.

Appendix E

Publication List

PUBLICATIONS IN INTERNATIONAL PEER-REVIEWED JOURNALS

1. **Kohnen, D.,** De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., Aiken, L. H., & Sermeus, W. (2026). Key drivers of nurse burnout and work engagement in Europe: A cross-sectional dominance analysis. *International Journal of Nursing Studies*, 105251.
2. Stavdal, M. N., Hermansen, Å., Sjetne, I. S., Larsen, M. H., Wahl, A. K., **Kohnen, D.**, ... & Borge, C. R. (2025). Associations Between Work-Related Factors, Mental Well-Being, and Health Literacy Sensitivity: A Cross-Sectional Study Among Healthcare Personnel. *Journal of Healthcare Leadership*, 383-394.
3. Bruyneel, A., Dello, S., Dauvergne, JE., **Kohnen, D.**, Sermeus, W. (2025). Comparison of Prevalence and Risk Factors for Burnout, Missed Nursing Care, and Intention-to-Leave the Job Among Intensive Care Unit and General Ward Nurses: A Cross-Sectional Study Across Six European Countries in the Covid-19 Era. Intensive & Critical Care Nursing.
4. Svensson, I., Bridges, J., Ellis, J., Brady, N., Dello, S., Hooft, J., Kleine, J., **Kohnen, D.**, ... & Magnet4Europe Consortium. (2024). Laying the foundations for implementing Magnet principles in hospitals in Europe: A qualitative analysis. International Journal of Nursing Studies, 154, 104754.
5. Dello, S., Bruyneel, L., **Kohnen, D.**, De Witte, H., Schaufeli, W. B., Mchugh, M. D., ... & Sermeus, W. (2024). Prevalence, predictors and outcomes of physician care left undone in acute care hospitals across six European countries during COVID-19: A cross-sectional study. European Journal of Internal Medicine, 121, 95-102.
6. Aiken, L. H., Sermeus, W., McKee, M., Lasater, K. B., Sloane, D., Pogue, C. A., **Kohnen, D.**, … & McHugh, M. D. (2024). Physician and nurse well-being, patient safety and recommendations for interventions: cross-sectional survey in hospitals in six European countries. BMJ open, 14(2), e079931.
7. **Kohnen, D.**, De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., & Sermeus, W. (2024). Engaging leadership and nurse well-being: the role of the work environment and work motivation—a cross-sectional study. Human Resources for Health, 22(1), 8.
8. **Kohnen, D.**, De Witte, H., Schaufeli, W.B., Dello, S., Bruyneel, L., & Sermeus, W. (2024). What makes nurses flourish at work? How the perceived clinical work environment relates to nurse motivation and well-being: A cross-sectional study. International Journal of Nursing Studies, 104567.

9. Hasebrook, J. P., Michalak, L., Kohnen, D., Metelmann, B., Metelmann, C., Brinkrolf, P., ... & Hahnenkamp, K. (2023). Digital transition in rural emergency medicine: Impact of job satisfaction and workload on communication and technology acceptance. Plos one, 18(1), e0280956.
10. Sermeus, W., Aiken, L. H., Ball, J., Bridges, J., Bruyneel, L., Busse, R., De Witte, H., Dello, S., Drennan, J., Eriksson, L. E., Griffiths, P., **Kohnen, D.**, ... & Magnet4Europe Consortium. (2022). A workplace organisational intervention to improve hospital nurses' and physicians' mental health: study protocol for the Magnet4Europe wait list cluster randomised controlled trial. BMJ open, 12(7), e059159.
11. Fleßa, S., Suess, R., Kuntosch, J., Krohn, M., Metelmann, B., Hasebrook, J. P., Brinkrolf, P., Hahnenkamp, K., **Kohnen, D.** & Metelmann, C. (2021). Telemedical emergency services: central or decentral coordination?. Health economics review, 11, 1-12.
12. Metelmann, C., Metelmann, B., **Kohnen, D.**, Brinkrolf, P., Andelius, L., Böttiger, B. W., ... & Thies, K. C. (2021). Smartphone-based dispatch of community first responders to out-of-hospital cardiac arrest-statements from an international consensus conference. Scandinavian journal of trauma, resuscitation and emergency medicine, 29, 1-9.
13. Metelmann, C., Metelmann, B., **Kohnen, D.**, Prasser, C., Süss, R., Kuntosch, J., ... & Brinkrolf, P. (2020). Evaluation of a rural emergency medical service project in Germany: protocol for a multimethod and multiperspective longitudinal analysis. JMIR research protocols, 9(2), e14358.

PRESENTATIONS AT SCIENTIFIC CONFERENCES

Kohnen, D., De Witte, H., Schaufeli, W. B., Bruyneel, L., Aiken, L. H. & Sermeus, W. Key Drivers of Nurse Burnout and Work Engagement in Europe: A Cross-sectional Dominance Analysis. Abstract presentation at the 22nd EAWOP Congress, Prague (Czech Republic).

Kohnen, D., De Witte, H., Schaufeli, W. B., Bruyneel, L. & Sermeus, W. (2023). What makes nurses flourish at work? Intrinsic motivation in the Job Demands-Resources model. Abstract presentation at the 21st Congress of the European Association of Work and Organizational Psychology (EAWOP), Katowice (Poland).

Kohnen, D., Dello, S., De Witte, H., Schaufeli, W. B., Aiken, L. H. & Sermeus, W. (2022). Building a Strong and Healthy Workplace in Europe: Psychological perspectives and insights

from the H2020-funded sister projects. Symposium presentation at the 17th European Congress of Psychology (ECP), Ljubljana (Slovenia)

Kohnen, D., De Witte, H., Schaufeli, W. B., Dello, S., Bruyneel, L., McHugh, M. D., Aiken, L. H. & Sermeus, W. (2020). Magnet4Europe - The impact of an organizational redesign intervention on mental health outcomes of nurses and physicians in Europe. Abstract presentation at the European Health Management Association (EHMA) conference (online).