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The prevalence of stress-related outcomes and occupational well-being among emergency nurses in the Netherlands and the role of job factors: A regression tree analysis

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Abstract

Aims: This study aims to assess the prevalence of stress-related outcomes (burnout, sleep problems and post-traumatic stress) and occupational well-being (work engagement, job satisfaction and turnover intention) of Dutch emergency room nurses and to identify job factors related to key outcomes.

Background: While emergency nurses are prone to stress-related outcomes, no large-scale studies have been conducted in the Netherlands. Furthermore, few studies considered combined effects of job factors on emergency nurses' well-being.

Methods: In 2017, an occupation-specific survey was filled out by 701 (response: 74%) emergency nurses from 19 Dutch hospitals. Decision tree methods were used to identify the most important (combination of) job factors related to key outcomes.

Results: High prevalence of stress-related outcomes and turnover intention were found, while the majority experienced work engagement and were satisfied with their job. Emotional exhaustion was mainly associated with worktime demands and aggression/conflict situations. Work engagement was mainly associated with developmental opportunities.

Conclusions: Dutch emergency room nurses are at risk of stress-related outcomes and have high turnover intention, while feeling engaged and satisfied with their job.

Implications for Nursing Management: To retain and attract emergency room nurses, it is recommended to focus efforts on increasing developmental opportunities, while reducing worktime demands and aggression incidents.

KEYWORDS
burnout, psychological, nurses, occupational stress, personnel turnover, work engagement

1 | INTRODUCTION

Emergency room (ER) nurses are exposed to a number of occupational risks including high worktime demands and potentially traumatic events such as violence and aggression, suffering in patients, severe injuries and even death (Adriaenssens et al., 2011, 2012; Richardson et al., 2018). As a result, stress-related symptoms such as burnout, post-traumatic stress and sleep problems are common in this occupational group (Adriaenssens et al., 2012; Gomez-Urquiza et al., 2017; Li et al., 2018), which can have serious consequences for patients' well-being and safety (Hall et al., 2016). In addition, high stress levels in nurses are related to both more absenteeism and presenteeism (Brborovic et al., 2017), reduced job satisfaction and higher turnover intention (Bruyneel et al., 2017; Roberts & Grubb, 2014). The latter is of particular concern as health care demands are predicted to increase in the future due to an aging population, resulting in an estimated worldwide shortage of 5.9 million nurses by 2035 (World Health Organization, 2020). Focusing on the situation in the Netherlands, ER visits of patients 65 and older are rising, while the amount of vacancies that are difficult to fill have increased from 4.3% of the total full-time equivalent (FTE) for ER nurses in 2016 to 9.1% in 2018 (Capaciteitsorgaan, 2018).

Overall, it is essential to understand how the working environment of ER nurses can be improved to reduce stress-related outcomes and increase well-being, and as such attract as well as retain qualified nurses. While large-scale studies on the well-being of ER nurses were performed in Belgium (Adriaenssens et al., 2011; Bruyneel et al., 2017), Canada (Sawatzky & Enns, 2012) and the United States (Hunsaker et al., 2015), no such screening has been conducted in the Netherlands. To fill this gap, the present study focuses on the prevalence of stress-related outcomes and occupational well-being of Dutch ER nurses and aims to identify job factors related to these outcomes.

1.1 | Background

According to the Job Demands-Resources model (JD-R model), job factors influence employee well-being through two processes (Bakker & Demerouti, 2017). The health-impairment process suggests that enduring exposure to high job demands (e.g., worktime demands) can exhaust physical and mental resources and lead to stress-related outcomes, such as burnout. On the other hand, the motivational process postulates that job resources (e.g., autonomy and social support) can have a motivational role and lead to increased occupational well-being (e.g., work engagement, job satisfaction and less turnover intention). In addition, adequate job resources can buffer the health-impairment process (Bakker & Demerouti, 2017).

Previous research has identified a number of job factors related to stress-related outcomes in ER nurses. Identified job demands include high worktime demands (Adriaenssens et al., 2011, 2015a, 2015b; Bruyneel et al., 2017; O'Mahony, 2011; Sorour & El-Maksoud, 2012), emotional demands (Adriaenssens et al., 2015b) and exposure to morally distressing (Fernandez-Parsons et al., 2013) or

even traumatic events (Adriaenssens et al., 2012). In addition, identified job resources protecting ER nurses from stress-related outcomes include adequate staffing levels (Adriaenssens et al., 2015b; Bruyneel et al., 2017; Sawatzky & Enns, 2012) and social factors such as social support from the supervisor and/or colleagues (Adriaenssens et al., 2015a, 2015b; Bruyneel et al., 2017; Hunsaker et al., 2015), good collaboration between nurses and physicians (Adriaenssens et al., 2015b; Bruyneel et al., 2017; O'Mahony, 2011) and teamwork (Adriaenssens et al., 2015b; O'Mahony, 2011).

Far less research has been done on the motivational process of the JD-R model (i.e., predicting occupational well-being) in ER nurses. A quick literature search revealed four studies that (in line with the JD-R model) found a prominent role for job resources such as job control (Adriaenssens et al., 2011, 2015a; Bruyneel et al., 2017), social support from the supervisor and/or colleagues (Adriaenssens et al., 2011, 2015a; Bruyneel et al., 2017; Sawatzky & Enns, 2012), good collaboration with physicians (Sawatzky & Enns, 2012), adequate (financial) rewards (Adriaenssens et al., 2011, 2015a), adequate staffing levels (Sawatzky & Enns, 2012) and developmental opportunities (Sawatzky & Enns, 2012).

Still, many of the aforementioned studies examined only a limited range of job demands and resources. As a result, important predictors of outcomes related to well-being in ER nurses might have gone unnoticed. Furthermore, most studies performed in the ER explore the main effects of job demands and resources on outcomes, providing little insight in their additive or interactive effects (Schneider & Weigl, 2018). Yet, there is growing recognition that stressors occur and act in combination, especially in poorly designed working environments (Jimmieson et al., 2017).

1.2 | Current study

The aim of the study is twofold: First, we will assess the situation regarding stress-related outcomes (burnout, sleep problems and post-traumatic stress) and occupational well-being (work engagement, job satisfaction and turnover intention) of ER nurses in the Netherlands. Second, we aim to identify (specific combinations of) demands and resources that best predict (i.e., are most strongly associated with) reduced as well as enhanced employee well-being using regression tree analyses. Emotional exhaustion, the key dimension of burnout, was chosen as an indicator of reduced well-being as this variable typically correlates with other mental and physical stress-related symptoms (Maslach & Leiter, 2016). Work engagement, defined as a positive work-related state of mind characterized by vigour, dedication and absorption (Schaufeli & Bakker, 2003), was chosen as an indicator of enhanced well-being. Regression tree analyses can deal with a large number of predictors, as well as possible non-linearities and interactions, while also allowing for direct identification of subgroups with markedly higher or lower values of the outcome (Strobl et al., 2009). Identifying the main predictors for ER nurses' well-being will provide clear targets for improving the working environment, reducing the burden on current staff and attracting qualified nurses.

2 | METHODS

2.1 | Study design

The current study has a cross-sectional design.

2.2 | Procedure

All ERs in the Netherlands were invited to participate in the study. The human resources department of each participating hospital provided work e-mail addresses and demographic variables (age, gender, occupational role [registered nurse or in training], having a supervisory role [yes/no] and number of years of working experience in the ER) of currently enlisted ER nurses. A project manager (often the ER manager) was appointed to function as a point of contact for the researchers and to increase response rates on the questionnaires. In January/February 2017, all nurses received an e-mail including information on the study, an informed consent and a link to the online survey (about 30 minutes completion time). The survey remained open for 5–6 weeks, and regular reminders were automatically sent to employees who had not yet responded. The collected data were anonymized and stored under a personal code. Participation in the study was voluntary. The current study was approved by the ethical review board of Leiden University (approved on the 2nd of January 2017, CEP17-0102/3).

2.3 | Sample characteristics

Overall, ERs from 19 Dutch hospitals (representing 27% of all ERs and 34% of all ER nurses in the Netherlands) took part in the study, including 4 academic hospitals (representing 50% of all academic hospitals in the Netherlands) and 4 trauma centres (representing 36% of all trauma centres in the Netherlands). From the 949 ER nurses enlisted, 701 (74%) filled out the survey and were included in the current study. Most nurses were female (76%) with an average age of 42.4 ($SD = 11.4$), and 12.0 ($SD = 10.4$) years of working experience. On average, they worked 29.1 hours a week ($SD = 7.3$) in the ER. The majority of the sample were registered nurses (90.6%), the others were nurses in training (9.4%) and 4.4% had a supervisory role. Most nurses were married or living together with a partner (76.5%). About a quarter had young (≤6 years) children (23.3%), and about half (48.2%) had children between 6 and 12 years of age living at home. About one in five (22.6%) performed informal caregiving tasks, such as taking care of an elderly or disabled family member. Compared with non-respondents, respondents worked significantly more hours a week ($M = 29.1$, $SD = 7.3$, vs. $M = 27.2$, $SD = 10.1$, $p < .01$); no other differences on sociodemographic variables were found.

2.4 | Measurements

An overview of all measures is presented in Table 1.

2.4.1 | Stress-related outcomes

Two key symptoms of burnout, *emotional exhaustion* and *depersonalization*, were measured with the Dutch version of the Maslach Burnout Inventory-Human Services Survey (MBI-HSS), which has excellent internal consistency and test–retest reliability (Schaufeli & Bakker, 2003). *Sleep problems* were based on the Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV) criteria for sleep disorders (American Psychiatric Association, 2000). High reliability for this tool has been found (Adriaenssens et al., 2012). *Post-traumatic stress symptoms* were measured with the Dutch version of the Impact of Events Scale, which has found to be a reliable and valid instrument (van der Ploeg et al., 2004).

2.4.2 | Occupational well-being

Work engagement was measured using the Dutch version of the nine-item Utrecht Work Engagement Scale, which has excellent internal consistency and test–retest reliability (Schaufeli & Bakker, 2003). *Job satisfaction* and *turnover intention* were measured with the Leiden Quality of Work Questionnaire for Nurses (LQWQ-n) (Gelsema et al., 2005; Maes et al., 1999), an occupation-specific screening instrument including two factors related to occupational well-being. Satisfactory to good reliability for the subscales has been found (Gelsema et al., 2005).

2.4.3 | Job factors

The LQWQ-n (Gelsema et al., 2005; Maes et al., 1999) was also used to measure job demands and resources (see Table 1). In addition to the LQWQ-n, we assessed the *frequency of verbal and physical aggression* and the *frequency of emotionally demanding situations* based on an inventory of stressful situations previously used in a study on staff working in organisations providing care for mentally and physically disabled individuals (Bolhuis et al., 2004). Furthermore, *within work-time recovery* was assessed using a self-developed questionnaire including four statements: 'If I want to, I can leave my workplace for a short while', 'I can have a chat during my work', 'During my shift, I regularly have to skip breaks' (reversed) and 'During my breaks, I must remain available for urgent cases' (reversed).

2.5 | Statistical analyses

Differences between respondents and non-respondents were assessed by t-tests and χ^2 tests. Prevalence of stress-related outcomes and work engagement were based on cut-offs indicated in the manuals of the questionnaires: For the prevalence of sleep problems, a score of 4 or higher on at least two statements was used (Adriaenssens et al., 2012). For turnover intention and job satisfaction measured with the LQWQ-n, a percentage of the sample that

TABLE 1 Description of measures used in the current study

Dimensions	Questionnaire	Number of items	Scale	Cronbach's alpha	Example item
Job demands					
Freq. of emotional demands	Inventory of stressful situations	4	Never (1) to daily (7)	.78	In my work I am confronted with patients in a hopeless situation.
Freq. of aggression/ conflict situations	Inventory of stressful situations	7	Never (1) to daily (7)	.86	In my work I am confronted with patients and/or accompanies who are physically aggressive.
Work time demands	LQWQ-n	5	Totally disagree (1) to totally agree (4)	.72	During my shift, I am responsible for the care of too many patients.
Social harassment	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.88	In my department, some employees are belittled and/or ridiculed.
Role ambiguity	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.70	As an emergency room nurse, I know exactly what others expect from me at work (reversed).
Job resources					
Autonomy	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.62	I can decide for myself when to carry out patient-related tasks and when to carry out non-patient-related tasks.
Social support from the supervisor	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.90	I feel appreciated by my supervisor.
Social support from colleagues	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.84	My colleagues give me emotional support when I'm having difficulties.
Collaboration with physicians	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.55	In my department, nurses and doctors work well together.
Work procedures	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.75	In my department, procedures and rules are often unclear (reversed).
Internal communication	LQWQ-n	5	Totally disagree (1) to totally agree (4)	.65	In this organisation, one must ask a question repeatedly before getting an answer.
Staffing levels	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.73	In my department, there are enough nurses to provide good patient care.
Materials/equipment	LQWQ-n	3	Totally disagree (1) to totally agree (4)	.72	Materials, equipment and/or instruments are not always available when necessary (reversed).
(Financial) rewards	LQWQ-n	6	Totally disagree (1) to totally agree (4)	.71	Nurses working in the emergency room are not sufficiently valued within this hospital (reversed).
Developmental opportunities	LQWQ-n	4	Totally disagree (1) to totally agree (4)	.84	In my work I have the opportunity to further develop my capacities.
Within worktime recovery	Self-developed	4	Totally disagree (1) to totally agree (4)	.59	During my shift, I regularly have to skip breaks (reversed).
Stress-related outcomes					
Emotional exhaustion	MBI-HSS	8	Never (0) to daily (6)	.89	I feel tired when I get up in the morning and have to face another day on the job.
Depersonalization	MBI-HSS	5	Never (0) to daily (6)	.73	I feel that I treat some patients too impersonally.
Sleep problems	Based on DSM IV	3	Not at all (0) to very much (4)	.71	Items related to the initiation, duration and maintenance of sleep (e.g., 'I have a restless or disturbed sleep').

(Continues)

TABLE 1 (Continued)

Dimensions	Questionnaire	Number of items	Scale	Cronbach's alpha	Example item
Post-traumatic stress	IES-15	15	*Not at all* (0), *rarely* (1), *sometimes* (3), *often* (5)	.92	Items measuring avoidance (avoidance of feelings and thoughts about the impactful event) and intrusion (intrusive thoughts, intrusive feelings, nightmares).
Occupational well-being					
Work engagement	UWES-9	9	*Never* (0) to *daily* (6)	.90	Items measuring absorption (e.g., 'I am completely absorbed in my work'), vitality (e.g., 'At work I am bursting with energy') and dedication (e.g., 'My work inspires me').
Job satisfaction	LQWQ-n	3	*Totally disagree* (1) to *totally agree* (4)	.78	I am satisfied with my job.
Turnover intention	LQWQ-n	3	*Totally disagree* (1) to *totally agree* (4)	.81	I plan to look for a job outside this hospital within the next 3 years.

Abbreviations: DSM IV, Diagnostic and Statistical Manual of Mental Disorders IV; IES, Impact of Events Scale; LQWQ-n, Leiden Quality of Work Questionnaire for Nurses; MBI-HSS, Maslach Burnout Inventory-Human Services Survey; UWES, Utrecht Work Engagement Scale.

answered (totally) agree on a representative item (see Table 1) was calculated.

Generalized linear mixed-model (GLMM) trees, a multilevel decision tree method (Fokkema et al., 2018, 2021), was applied to identify predictors of (i.e., variables associated with) work engagement and exhaustion. In order to account for hospital-level effects, a random intercept term with respect to hospital was estimated. We used the intraclass correlation to assess the extent of hospital-level effects (Bernaldo-De-Quiros et al., 2015). Both trees were controlled for the variables age, number of hours working a week and job title (registered vs. in training) (engagement: bivariate $r = -.11$, $r = .08$, $r = .09$; emotional exhaustion: $r = .08$, $r = -.01$, $r = -.04$). To obtain effect sizes of subgroup differences on work engagement and emotional exhaustion, we also computed standardized subgroup means, based on z-scores of the response variables. Due to missing values, the analyses include 695–701 cases.

3 | RESULTS

3.1 | Prevalence of stress-related outcomes and occupational well-being

Table 2 gives an overview of (sub)clinical levels of stress-related outcomes and the levels of occupational well-being. More than one third of the sample (39.6%) scores above the (sub)clinical level for emotional exhaustion and almost half (48%) above the (sub)clinical level for depersonalization. Furthermore, one out of seven ER nurses (14.4%) report sleep problems on a clinical level and almost one out of six nurses (15.7%) report post-traumatic stress symptoms on a (sub)clinical level. Overall, ER nurses score significantly higher on stress-related outcomes (emotional exhaustion, depersonalization, and symptoms of

post-traumatic stress) than the normative sample (working population in general). Regarding occupational well-being, ER nurses report significantly higher levels of work engagement than the normative sample, with more than half of the ER nurses (61.4%) being (very) highly engaged. Furthermore, the majority of the ER nurses (84.9%) (totally) agree with the statement 'I am satisfied with my job', while about one third (32.7%) (totally) agree with the item 'I plan to look for a job outside the hospital within the next three years'. Finally, work engagement and emotional exhaustion have a bivariate correlation of $-.40$.

3.2 | Predictors for emotional exhaustion and work engagement

Figure 1 shows the GLMM tree model for emotional exhaustion. Note that variables that do not appear in the tree show weaker associations with the outcome than the variables that are selected at every split and are therefore not selected for splitting. The primary variable that distinguishes higher and lower levels of emotional exhaustion is worktime demands, which appears in inner nodes (splits) 1 and 2. A second important variable concerns the frequency of aggression/conflict situations, which appears in the nodes 5, 8 and 13. The GLMM tree algorithm recursively separated the observations into eight subgroups with different levels of emotional exhaustion. Three subgroups stand out due to high deviations from the mean: Subgroups 6 ($N = 163$; mean $z = -0.87$) and 9 ($N = 36$; mean $z = -0.87$) show low levels of emotional exhaustion and are both characterized by lower levels of worktime demands and aggression/conflict situations. Subgroup 6 in addition reports higher staffing levels. Subgroup 15 ($N = 32$; mean $z = 1.08$) shows high levels of emotional exhaustion and is characterized by high reported levels of worktime demands and aggression/conflict situations.

TABLE 2 Levels of stress-related outcomes and occupational well-being in emergency room nurses (N = 695) compared with a normative sample (working population in general)

Stress-related outcomes	Mean	SD	Min	Max	p-value	Cut-off	Subclinical level N (%)	Cut-off	Clinical level N (%)
Emotional exhaustion (MBI-HSS)									
ER nurses	2.06	1.22	0.00	5.38	p < .001	2.38–3.62	178 (25.6%)	≥3.63	97 (14%)
Normative sample	1.78	0.99	-	-					
Depersonalization (MBI-HSS)									
ER nurses	1.69	1.15	0.00	5.60	-	-	178 (25.6%)	-	156 (22.4%)
	F: 1.64	1.13	-	-	p < .001	F: 1.60–2.59			
	M: 1.86	1.20	-	-	p < .001	M: 1.80–2.79			
Normative sample	F: 1.12	0.77	-	-					
	M: 1.27	0.85	-	-					
Sleep problems									
ER nurses	2.19	0.92	1.00	5.00	-	-	-	≥2 × score ≥ 4	100 (14.4%)
Post-traumatic stress (IES)									
ER nurses	9.16	11.45	0.00	61.00	p = .015	20–25	39 (5.6%)	≥26	70 (10.1%)
Normative sample	8.10	12.30	-	-					
Occupational well-being						**Cut-off**	**High N (%)**	**Cut-off**	**Very high N (%)**
Work engagement (UWES)									
ER nurses	4.65	1.00	0.78	6.00	p < .001	4.67–5.50	278 (40%)	≥5.51	149 (21.4%)
Normative sample	3.74	1.17	-	-					
Job satisfaction (LQWQ-n)	2.91	0.50	1.00	4.00			84.9%[a]		
Turnover intention (LQWQ-n)	2.19	0.62	1.00	4.00			32.7%[b]		

Note: Cut-offs for MBI-HSS (Schaufeli & Van Dierendonck, 2000), sleep problems (Adriaenssens et al., 2012), IES (Briere & Elliott, 1998) and UWES (Schaufeli & Bakker, 2003).

Abbreviations: ER, emergency room; F, female; IES, Impact of Events Scale; LQWQ-n, Leiden Quality of Work Life Questionnaire for Nurses; M, male; MBI-HSS, Maslach Burnout Inventory-Human Services Survey; UWES, Utrecht Work Engagement Scale.

[a]Percentage (totally) agree with the item 'I am satisfied with my job'.

[b]Percentage (totally) agree with the item 'I plan to look for a job outside this hospital within the next 3 years'.

The intracluster correlation is .04, indicating 4% of variance is accounted for by hospital-level differences. The total R^2 for the GLMM tree model is .32, indicating that (32% − 4% =) 28% of variance is accounted for by the splitting variables occurring in the tree. Because computing R^2 on the data used for fitting the model gives inflated estimates of accuracy (de Rooij & Weeda, 2020), we also computed R^2 based on 10-fold cross-validation, yielding an R^2 of .20.

Figure 2 shows the GLMM tree model for work engagement. Developmental opportunities is the primary variable distinguishing lower and higher levels of work engagement, which appears in inner nodes 1, 2 and 9. Subgroups 3 (N = 18, mean z = −1.90) and 4 (N = 126, mean z = −0.64) show the strongest deviation from the overall mean reflecting lower levels of work engagement, associated with lower levels of developmental opportunities. Subgroups 6, 8 and

10 show only small deviations from the mean (mean z ranging from −0.19 to 0.17), suggesting that variables such as staffing and social support from the supervisor significantly contributed to small changes in work engagement, but to a (much) lesser extent than developmental opportunities. Finally, Group 11 (N = 119; mean z = 0.48) shows considerable deviation from the mean, a profile with high work engagement and characterized by high scores on all aforementioned job resources (social support supervisor, staffing and developmental opportunities).

The intracluster correlation is .04, indicating only minor residual hospital-level differences. The R^2 for the GLMM tree model is .28, again indicating that the majority of variance is accounted for by the splitting variables occurring in the tree. The R^2 based on 10-fold cross-validation is .17.
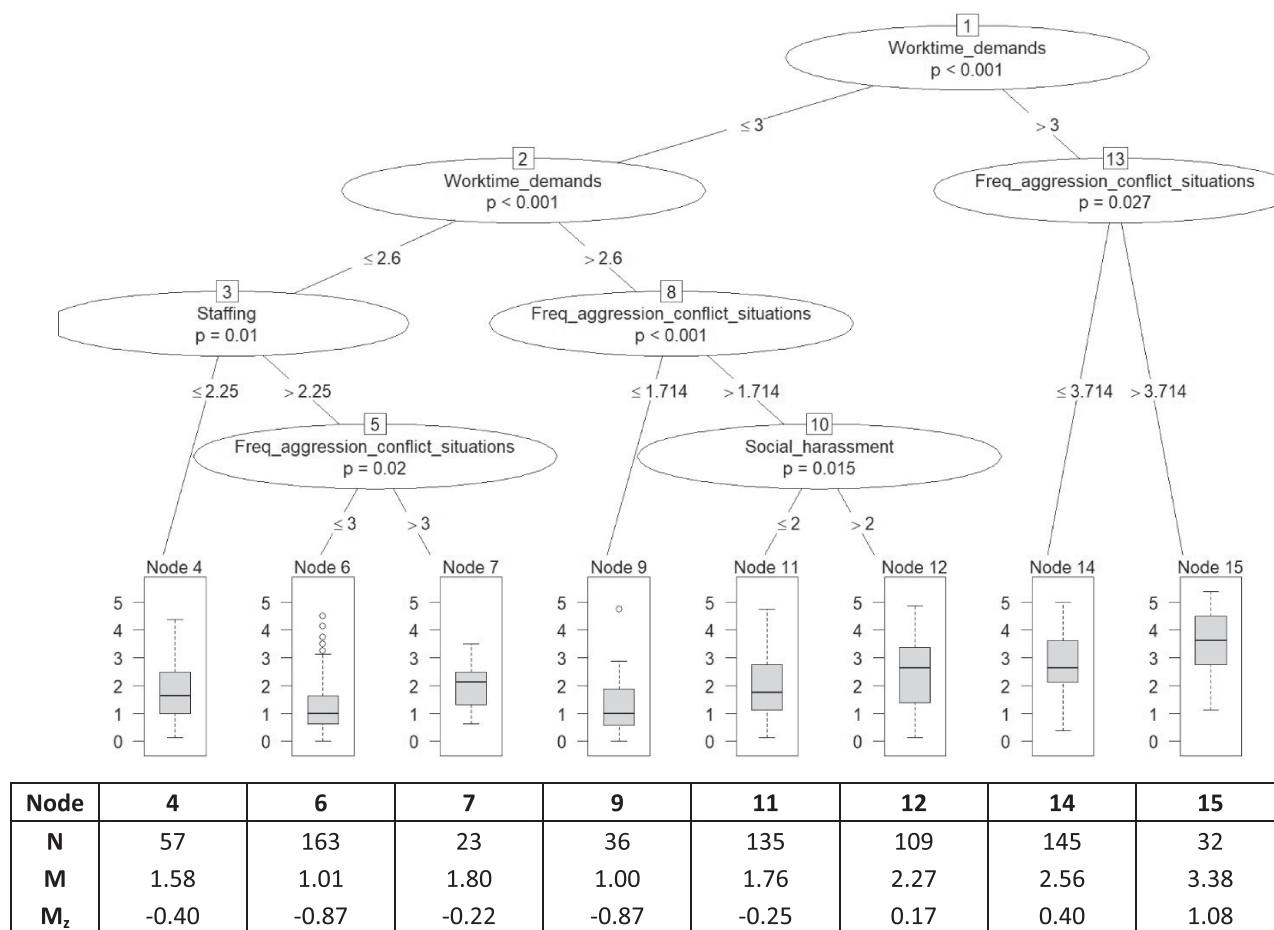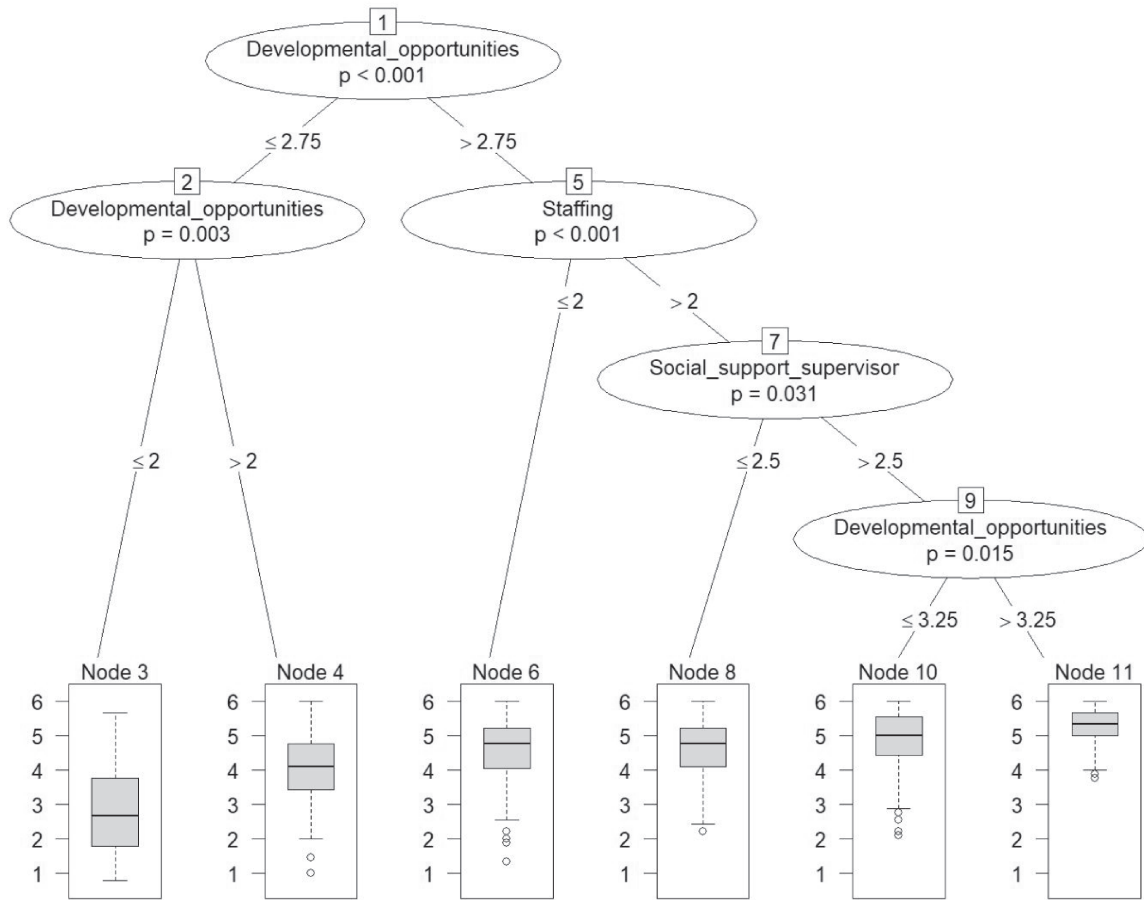
FIGURE 1 Tree for predicting emotional exhaustion. Each inner node depicts the variable used for splitting, with splitting values depicted below the nodes. The *p*-values quantify the strength of the association between the predictor variable and the outcome, with lower values indicating a stronger association. The terminal nodes provide boxplots, representing the distribution of emotional exhaustion values in each of the subgroups (terminal nodes). Below each terminal node, the table provides the corresponding group size (N); estimated group means on emotional exhaustion, corrected for covariates and hospital (M); and the same group means, standardized as a *z*-score (M_z). Predictors *not* selected by the model: emotional demands, role ambiguity, autonomy, social support supervisor, social support colleagues, collaboration with physicians, work procedures, internal communication, materials/equipment, (financial) rewards, developmental opportunities and within worktime recovery

4 | DISCUSSION

The current study conducted in 19 hospitals in the Netherlands shows a high prevalence of stress-related outcomes (emotional exhaustion, depersonalization, symptoms of post-traumatic stress and sleep problems) and substantial turnover intention among ER nurses. On a positive note, ER nurses experience high levels of work engagement and job satisfaction. The GLMM tree models (for two representative outcomes) show that emotional exhaustion is mainly related to higher worktime demands and higher prevalence of aggression/conflict situations and, to a lesser extent, lower staffing levels and more social harassment. Work engagement is mainly related to developmental opportunities and, to a lesser extent, adequate staffing levels and social support from the supervisor.

The high prevalence of stress-related outcomes and turnover intention in the current study are in line with international findings

regarding this occupational group (Adriaenssens et al., 2011, 2012; Bruyneel et al., 2017; Gomez-Urquiza et al., 2017; Li et al., 2018). At the same time, more than half of the ER nurses were (highly) engaged and the vast majority reported to be satisfied with their job. The coexistence of stress-related outcomes and outcomes of positive well-being might be explained by the content of the work: The variety in patients, pathology and medical urgency renders the ER a burdening as well as an exciting and challenging place to work (Glynn & Silva, 2013). Another explanation is provided by recent research suggesting that high levels of engagement might result in overcommitment (Leiter, 2019), including exaggerating efforts beyond what is formally required and having difficulties to withdraw from work (Leiter, 2019). Especially in a situation with high job demands, overcommitment might strengthen the energy depletion process and lead to symptoms of burnout (Leiter, 2019). Finally, due to the heavy mental burden (as reflected by the level of stress-related outcomes), many

FIGURE 2 Tree for predicting work engagement. Each inner node depicts the variable used for splitting, with splitting values depicted below the nodes. The *p*-values quantify the strength of the association between the predictor variable and the outcome, with lower values indicating a stronger association. The terminal nodes provide boxplots, representing the distribution of emotional exhaustion values in each of the subgroups (terminal nodes). Below each terminal node, the table provides the corresponding group size (N); estimated group means on work engagement, corrected for covariates and hospital (M); and the same group means, standardized as a *z*-score (M_z). Predictors *not* selected by the model: worktime demands, aggression/conflict situations, emotional demands, social harassment, role ambiguity, autonomy, social support colleagues, collaboration with physicians, work procedures, internal communication, materials/equipment, (financial) rewards and within worktime recovery

Node	3	4	6	8	10	11
N	18	126	156	41	240	119
M	2.76	4.01	4.46	4.46	4.83	5.13
M_z	-1.90	-0.64	-0.19	-0.19	0.17	0.48

work-engaged and satisfied nurses might still consider changing to a less demanding profession explaining the high turnover intention in this population.

In comparison to previous research, the use of decision tree methods allowed us to study a broad range of job factors and also assess possible combined effects of these. In line with previous research (Adriaenssens et al., 2015b; Bruyneel et al., 2017; O'Mahony, 2011) and the JD-R model, we found that emotional exhaustion was mainly related to job demands, with a primary role for worktime demands. Yet, especially the combination of worktime demands and aggressive-conflict situations seemed detrimental. This is in line with the limited research on additive effects of job demands and suggests that improving some job demands can already reduce negative stress-related outcomes (Jimmieson et al., 2017). This finding has important practical implications as certain job demands (e.g., worktime demands and social harassment) are more easily to modify than others (e.g., aggression or emotional demands) in this setting (Jimmieson et al., 2017).

In contrast to previous studies, the current study did not find a large role for social factors in the occurrence of emotional exhaustion

with the exception of social harassment. This can be explained by the high levels of social support (with limited variance) found in our sample, which reduces the power to find a statistically predictive effect of this resource. On the other hand, the absence of job resources in the GLMM model of emotional exhaustion, with the exception of a small reducing effect of higher staffing levels, suggests that the buffering effect of job resources on stress-related outcomes in this setting overall is limited and efforts should focus on reducing job demands.

In line with the JD-R model, work engagement was mainly related to job resources, with a primary role for developmental opportunities and some small additive effects for staffing levels and social support from the supervisor. A comparison with the limited available literature on engagement in ER nurses shows that the identified job factors are in line with the study of Sawatzky and Enns (2012), and partly in line with studies by Adriaenssens et al. (2011, 2015a), who identified the importance of social support from the supervisor but did not include developmental opportunities in the model. Overall, this suggests that efforts should focus on creating possibilities for professional development to keep the ER nursing workforce engaged.

4.1 | Strengths

The current study has a number of strengths. First of all, this is the first study to determine the prevalence of stress-related outcomes and occupational well-being of ER nurses in the Netherlands. Second, it answers to a call for studies on combined effects of job demands and resources and thereby gives a more complete view on job factors related to well-being in the ER (Schneider & Weigl, 2018). The use of an occupation-specific questionnaire also ensured the identification of demands and resources relevant for ER nurses. Furthermore, it is the first study to explore job demands and resources in this setting by the use of regression tree analyses. This resulted in identifying important variables (e.g., aggression/conflict situations and developmental opportunities) often not considered in studies that aim to understand how job factors influence ER nurses' well-being and highlights the combined effects of job factors. Finally, the large number and diversity of the participating ERs in the study and the high response rate increase the generalizability of the findings.

4.2 | Limitations and future directions

The sole use of questionnaire data increases the probability of common method bias. This has been addressed by the including valid questionnaires and guaranteeing anonymity in the current study (Conway & Lance, 2010). Additionally, given that well-being is subjective, it is best measured using self-reported methods. A second limitation concerns the use of a cross-sectional design, which does not allow for causal attributions. Still, although stress levels might also influence how employees experience their working environment, limited evidence exists for the reverse-effects hypothesis (Guthier et al., 2020). Third, the high levels of work engagement and limited

explanatory value of job factors (apart from developmental opportunities) on this outcome suggest that other factors are of influence. Future studies might consider including factors related to the job content (e.g., positive patient contact and meaningfulness of work) to enhance our understanding regarding predictors of work engagement in ER nurses. Finally, the concept of moral distress, a reaction to knowing the right thing to do but being constraint from taking this action due to environmental circumstances (e.g., lack of time, supervisory reluctance and institutional policy) (Corley et al., 2001), is receiving increased research attention in studies on health care professionals (Epstein et al., 2019). Due to high worktime pressure and overcrowding, it is possible that especially ER nurses are confronted with morally distressing events (e.g., sending patients home who under normal circumstances would be hospitalized or performing procedures for which they are not qualified), which can have a lasting negative impact on their well-being (Wolf et al., 2016). As such, future research on predictors of stress-related outcomes in this population should consider including morally distressing events next to other job demands.

5 | CONCLUSIONS

The current study shows a high prevalence of stress-related outcomes among ER nurses in the Netherlands and substantial turnover intention. At the same time, ER nurses are highly work engaged and the majority is satisfied with their job. The results of the current study suggest that stress-related outcomes in ER nurses can be reduced by creating manageable job demands, with special attention to the reduction of worktime demands and aggression/conflict situations, while opportunities for professional development are essential to keep ER nurses engaged at work.

6 | IMPLICATIONS FOR *NURSING MANAGEMENT*

The high prevalence of stress-related outcomes and turnover intention of ER nurses found in this study should be a concern for hospital management. Poor (occupational) well-being has important organisational consequences including increased absenteeism and presenteeism, of which the latter is related to reduced productivity, increases in medical errors and reduced quality of patient care (Letvak et al., 2012). In addition, with growing nursing shortages, it is important to optimize the working environment to retain and attract qualified staff. The results of the current study suggest that a reduction in job demands, mainly worktime demands and the prevalence of aggression/conflict situations, will have the most beneficial effect on stress-related outcomes. Promising effects have been found for programmes including the involvement of senior doctors on the ER, specific care pathways for geriatric emergency care, and extending the role of paramedics (e.g., paramedic practitioner), on reducing worktime demands in this setting (Manson et al., 2014). Aggression training, accurate

reporting of violent incidents, a positive context in which management and employees are committed to reduce violence and comfortable waiting rooms to reduce stress in patients can lead to less aggressive incidents at the ER (D'Ettorre et al., 2018). Furthermore, although the high levels and limited variance of social support in the current study suggest that Dutch ERs have good social structures (briefings, debriefing and chaplaincy support) in place, the importance of social support in the ER has been reported in other studies (Adriaenssens et al., 2015a, 2015b; Bruyneel et al., 2017; Hunsaker et al., 2015) and thus could be an issue in other countries. Finally, to keep employees engaged and retain and attract qualified staff, hospital management might explore possibilities for professional development including rotation with the ambulance or intensive care or opportunities to specialize (e.g., physician assistant). However, it must be noted that very high levels of engagement in a demanding environment might lead to energy depletion and stress-related outcomes. As such, ER managers should find a balance between stimulating engagement while controlling the level of job demands.

CONFLICT OF INTEREST

Nothing to declare.

ETHICAL APPROVAL

The current study was approved by the ethical review board of Leiden University (approved on the 2nd of January 2017, CEP17-0102/3).

AUTHOR CONTRIBUTIONS

A.N. de Wijn and M. P. van der Doef both contributed to the conception and design, acquisition of data, analysis and interpretation of data and drafting the article. M. Fokkema contributed to the analysis and interpretation of data and drafting the article.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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REFERENCES

Adriaenssens, J., de Gucht, V., & Maes, S. (2012). The impact of traumatic events on emergency room nurses: Findings from a questionnaire survey. *International Journal of Nursing Studies*, *49*(11), 1411–1422. https://doi.org/10.1016/j.ijnurstu.2012.07.003

Adriaenssens, J., De Gucht, V., & Maes, S. (2015a). Causes and consequences of occupational stress in emergency nurses, a longitudinal study. *Journal of Nursing Management*, *23*(3), 346–358. https://doi.org/10.1111/jonm.12138

Adriaenssens, J., De Gucht, V., & Maes, S. (2015b). 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

Adriaenssens, J., De Gucht, V., Van Der Doef, M., & Maes, S. (2011). Exploring the burden of emergency care: Predictors of stress-health outcomes in emergency nurses. *Journal of Advanced Nursing*, *67*(6), 1317–1328. https://doi.org/10.1111/j.1365-2648.2010.05599.x

American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (Revised 4th ed.)*. American Psychiatric Association.

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

Bernaldo-De-Quiros, M., Piccini, A. T., Gomez, M. M., & Cerdeira, J. C. (2015). Psychological consequences of aggression in pre-hospital emergency care: Cross sectional survey. *International Journal of Nursing Studies*, *52*(1), 260–270. https://doi.org/10.1016/j.ijnurstu.2014.05.011

Bolhuis, P., Mandos, E., & Hollander, M. (2004). Kwaliteit van Arbeid in de Gehandicaptenzorg: Medewerkersraadpleging 2004.

Brborovic, H., Daka, Q., Dakaj, K., & Brborovic, O. (2017). Antecedents and associations of sickness presenteeism and sickness absenteeism in nurses: A systematic review. *International Journal of Nursing Practice*, *23*(6). https://doi.org/10.1111/ijn.12598

Briere, J., & Elliott, D. M.(1998). Clinical utility of the impact of event scale: psychometrics in the general population. *Assessment*, *5*(2), 171–180. https://doi.org/10.1177/107319119800500207

Bruyneel, L., Thoelen, T., Adriaenssens, J., & Sermeus, W. (2017). Emergency room nurses' pathway to turnover intention: A moderated serial mediation analysis. *Journal of Advanced Nursing*, *73*(4), 930–942. https://doi.org/10.1111/jan.13188

Capaciteitsorgaan (2018). Capaciteitsplan 2018–2021 Fonds Ziekenhuis Opleidingen (FZO-) beroepen en ambulanceverpleegkundigen [Capacity plan 2018–2021 FZO professions and ambulance nurses]. https://capaciteitsorgaan.nl/publicaties/capaciteitsplan-2018-2021-fzo-beroepen-ambulanceverpleegkundigen/

Conway, J. M., & Lance, C. E. (2010). What reviewers should expect from authors regarding common method bias in organizational research. *Journal of Business and Psychology*, *25*(3), 325–334. https://doi.org/10.1007/s10869-010-9181-6

Corley, M. C., Elswick, R. K., Gorman, M., & Clor, T. (2001). Development and evaluation of a moral distress scale. *Journal of Advanced Nursing*, *33*(2), 250–256. https://doi.org/10.1046/j.1365-2648.2001.01658.x

de Rooij, M., & Weeda, W. (2020). Cross-validation: A method every psychologist should know. *Advances in Methods and Practices in Psychological Science*, *3*(2), 248–263. https://doi.org/10.1177/2515245919898466

D'Ettorre, G., Pellicani, V., Mazzotta, M., & Vullo, A. (2018). Preventing and managing workplace violence against healthcare workers in Emergency Departments. *Acta Biomed*, *89*(4-S), 28–36. https://doi.org/10.23750/abm.v89i4-S.7113

Epstein, E. G., Whitehead, P. B., Prompahakul, C., Thacker, L. R., & Hamric, A. B. (2019). Enhancing understanding of moral distress: The measure of moral distress for health care professionals. *AJOB Empirical Bioethics*, *10*(2), 113–124. https://doi.org/10.1080/23294515.2019.1586008

Fernandez-Parsons, R., Rodriguez, L., & Goyal, D. (2013). Moral distress in emergency nurses. *Journal of Emergency Nursing*, *39*(6), 547–552. https://doi.org/10.1016/j.jen.2012.12.009

Fokkema, M., Edbrooke-Childs, J., & Wolpert, M. (2021). Generalized linear mixed-model (GLMM) trees: A flexible decision-tree method for multilevel and longitudinal data. *Psychotherapy Research*, 31(3), 329–341. https://doi.org/10.1080/10503307.2020.1785037

Fokkema, M., Smits, N., Zeileis, A., Hothorn, T., & Kelderman, H. (2018). Detecting treatment-subgroup interactions in clustered data with generalized linear mixed-effects model trees. *Behavior Research Methods*, 50(5), 2016–2034. https://doi.org/10.3758/s13428-017-0971-x

Gelsema, T. I., van der Doef, M., Maes, S., Akerboom, S., & Verhoeven, C. (2005). Job stress in the nursing profession: The influence of organizational and environmental conditions and job characteristics. *International Journal of Stress Management*, 12(3), 222–240. https://doi.org/10.1037/1072-5245.12.3.222

Glynn, P., & Silva, S. (2013). Meeting the needs of new graduates in the emergency department: A qualitative study evaluating a new graduate internship program. *Journal of Emergency Nursing*, 39(2), 173–178. https://doi.org/10.1016/j.jen.2011.10.007

Gomez-Urquiza, J. L., De la Fuente-Solana, E. I., Albendin-Garcia, L., Vargas-Pecino, C., Ortega-Campos, E. M., & Canadas-De la Fuente, G. A. (2017). Prevalence of burnout syndrome in emergency nurses: A meta-analysis. *Critical Care Nurse*, 37(5), e1–e9. https://doi.org/10.4037/ccn2017508

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

Hall, L. H., Johnson, J., Watt, I., Tsipa, A., & O'Connor, D. B. (2016). Healthcare staff wellbeing, burnout, and patient safety: A systematic review. *PLoS ONE*, 11(7), e0159015. https://doi.org/10.1371/journal.pone.0159015

Hunsaker, S., Chen, H. C., Maughan, D., & Heaston, S. (2015). Factors that influence the development of compassion fatigue, burnout, and compassion satisfaction in emergency department nurses. *Journal of Nursing Scholarship*, 47(2), 186–194. https://doi.org/10.1111/jnu.12122

Jimmieson, N. L., Tucker, M. K., & Walsh, A. J. (2017). Interaction effects among multiple job demands: An examination of healthcare workers across different contexts. *Anxiety, Stress, and Coping*, 30(3), 317–332. https://doi.org/10.1080/10615806.2016.1229471

Leiter, M. (2019). *The psychology of work engagement*. Oxford Research Encyclopedia of Psychology. https://doi.org/10.1093/acrefore/9780190236557.013.36

Letvak, S. A., Ruhm, C. J., & Gupta, S. N. (2012). Nurses' presenteeism and its effects on self-reported quality of care and costs. *The American Journal of Nursing*, 112(2), 30–38. https://doi.org/10.1097/01.NAJ.0000411176.15696.f9

Li, H., Cheng, B., & Zhu, X. P. (2018). Quantification of burnout in emergency nurses: A systematic review and meta-analysis. *International Emergency Nursing*, 39, 46–54. https://doi.org/10.1016/j.ienj.2017.12.005

Maes, S., Akerboom, S., van der Doef, M. & Verhoeven, C. (1999). De Leidse Arbeids Kwaliteits Schaal voor Verpleegkundigen (LAKS-V) [The Leiden Quality of Work Life Questionnaire for Nurses (LQWLQ-nurses)]. Health Psychology, Leiden University.

Manson, S., Mountain, G., Turner, J., Arain, M., Revue, E., & Weber, E. J. (2014). Innovations to reduce demand and crowding in emergency care; a review study. *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine*, 22(55), 1–7. http://www.sjtrem.com/content/22/1/55

Maslach, C., & Leiter, M. P. (2016). Understanding the burnout experience: Recent research and its implications for psychiatry. *World Psychiatry*, 15(2), 103–111. https://doi.org/10.1002/wps.20311

O'Mahony, N. (2011). Nurse burnout and the working environment. *Emergency Nurse*, 19(5), 30–37. https://doi.org/10.7748/en2011.09.19.5.30.c8704

Richardson, S. K., Grainger, P. C., Ardagh, M. W., & Morrison, R. (2018). Violence and aggression in the emergency department is under-reported and under-appreciated. *New Zealand Medical Journal*, 131(1476), 50–58.

Roberts, R. K., & Grubb, P. L. (2014). The consequences of nursing stress and need for integrated solutions. *Rehabilitation Nursing*, 39(2), 62–69. https://doi.org/10.1002/rnj.97

Sawatzky, J. A., & Enns, C. L. (2012). Exploring the key predictors of retention in emergency nurses. *Journal of Nursing Management*, 20(5), 696–707. https://doi.org/10.1111/j.1365-2834.2012.01355.x

Schaufeli, V. B. & Bakker, A. B. (2003). Voorlopige handleiding Utrechtse Bevlogenheidsschaal [Utrecht work engagement scale: Preliminary manual]. Utrecht: Occupational Health Psychology Unit, Utrecht University.

Schaufeli, W.B., & Dierendonck, D. (2000). Utrechtse Burnout Schaal (UBOS). *Handleiding [Utrecht Burnout Scale, Manual]*. Swets & Zeitlinger.

Schneider, A., & Weigl, M. (2018). Associations between psychosocial work factors and provider mental well-being in emergency departments: A systematic review. *PLoS ONE*, 13(6), e0197375. https://doi.org/10.1371/journal.pone.0197375

Sorour, A. S., & El-Maksoud, M. M. (2012). Relationship between musculoskeletal disorders, job demands, and burnout among emergency nurses. *Advanced Emergency Nursing Journal*, 34(3), 272–282. https://doi.org/10.1097/TME.0b013e31826211e1

Strobl, C., Malley, J., & Tutz, G. (2009). An introduction to recursive partitioning: Rationale, application, and characteristics of classification and regression trees, bagging, and random forests. *Psychological Methods*, 14(4), 323–348. https://doi.org/10.1037/a0016973

van der Ploeg, E., Mooren, T. T. M., Kleber, R. J., van der Velden, P. G., & Brom, D. (2004). Construct validation of the Dutch version of the impact of event scale. *Psychological Assessment*, 16(1), 16–26. https://doi.org/10.1037/1040-3590.16.1.16

Wolf, L. A., Perhats, C., Delao, A. M., Moon, M. D., Clark, P. R., & Zavotsky, K. E. (2016). "It's a burden you carry": Describing moral distress in emergency nursing. *Journal of Emergency Nursing*, 42(1), 37–46. https://doi.org/10.1016/j.jen.2015.08.008

World Health Organization. (2020). State of the World's Nursing 2020: Investing in Education, Jobs and Leadership. World Health Organization. https://www.who.int/publications/i/item/9789240003279