



Nurse Health, Work Environment, Presenteeism and Patient Safety

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Abstract

Presenteeism is linked to negative outcomes for patients, nurses and healthcare organizations; however, we lack understanding of the relationships between nurse fatigue, burnout, psychological well-being, team vitality, presenteeism and patient safety in nursing. Therefore, the two aims were: 1) to examine the fit of a literature-derived model of the relationships between presenteeism, psychological health and well-being, fatigue, burnout, team vitality and patient safety, and 2) to examine the role of presenteeism as a mediator between patient safety and the other model variables. Survey data were analyzed using Composite Indicator Structural Equation modeling, a type of Structural Equation Modeling. Model fit was acceptable with multiple significant relationships. Presenteeism due to job-stress mediated multiple relationships to patient safety. Our findings indicate that focusing on job-stress presenteeism may be relevant for this population and may offer additional insight into factors contributing to decreased nurse performance and resulting risks to patient safety.

Keywords: nursing practice, nurses, fatigue, systems/management/leadership

Nurse Health, Work Environment, Presenteeism and Patient Safety

It is estimated that presenteeism costs the United States economy more than \$150 billion annually (Hemp, 2004). Presenteeism is defined as when one is present at work but not fully performing or engaged, and there are two sub-types: sickness or job-stress (Rainbow & Steege, 2017). The operational definition of sickness presenteeism is presence at work when illness, either acute or chronic, interferes with work performance or engagement (Johns, 2010). Job-stress-related presenteeism is defined as presence at work when stressors from the work environment (e.g., relationships with management) hinder job performance or ability to focus on work (Gilbreath & Karimi, 2012). Just as sickness and job-stress are related, so are the two types of presenteeism; however, the vast majority of studies focus on one sub-type or the other (Rainbow & Steege, 2017). We have chosen to include both sub-types of presenteeism in this study to provide crucial information about overall causes and consequences of presenteeism in the work environment. This inclusive study of presenteeism is of particular importance in nursing because of the high rates of presenteeism when compared to other work sectors, and presence of both sickness and job-stress presenteeism (Karimi, Cheng, Bartram, Leggat, & Sarkeshik, 2015; Letvak, Ruhm, & Gupta, 2012; Rainbow, Gilbreath, & Steege, 2019). Ninety-two percent of nurses report moderate-to-very high stress levels, with the work environment as a primary cause, and 54% report suboptimal health (Jordan, Khubchandani, & Wiblishauser, 2016; Melnyk et al., 2018). The consequences of presenteeism in nursing include negative patient outcomes not found in other industries, including patient falls, medication errors, and missed care (Cassie, 2014; Letvak et al., 2012). These consequences may contribute to adverse patient events and the subsequent estimated 400,000 patient deaths that occur annually in the United States (James, 2013). If so, presenteeism may be a mediator between the work environment and individual health, and patient safety.

The Presenteeism and Patient Safety Model

To examine this hypothesis, we created a literature-derived model of known protective and opposing work and individual factors, presenteeism and patient safety. The model is based on presenteeism literature from business and occupational health scholars and the relatively recent literature on presenteeism in the nursing context. The model is also influenced by human factors models, particularly the Systems Engineering Initiative for Patient Safety (SEIPS) model, that suggest there are multiple individual and organizational structures that are a part of processes and outcomes in healthcare settings (Carayon et al., 2006). The SEIPS model has been found to be used to improve patient safety in healthcare settings in multiple studies (Holden et al., 2013). We identified four work and individual characteristics that have been linked to presenteeism in other industries, or presenteeism and patient safety in nursing: 1) team work environment, 2) individual psychological well-being, 3) fatigue, and 4) burnout. Team work environment and individual psychological well-being have been identified as potential protective factors against presenteeism in other industries (Ashby & Mahdon, 2010; Dew, Keefe, & Small, 2005). Greater healthcare team vitality has also been linked to positive patient care (Upenieks, Lee, Flanagan, & Doebbeling, 2010). Presenteeism is linked to fatigue and burnout (Demerouti, Le Blanc, Bakker, Schaufeli, & Hox, 2009). Presence at work when fatigued or burned out can lead to presenteeism. Like presenteeism, fatigue and burnout have been linked to negative patient safety outcomes and have been found to be high among nurses (Barker & Nussbaum, 2011; Epp, 2012). We hypothesize that presenteeism may play a role as a mediator, because of the previously established relationships to the other concepts in the model. If this hypothesis is true, it could mean that the decision to attend work when not fully engaged or performing could significantly affect patient safety practices and nurse burnout and fatigue. If a nurse is fatigued or

burned out enough that their performance at work is impacted, then absence from work may be safer for patient care than nurse presenteeism. The relationships between these protective and negatively linked concepts, presenteeism, and patient safety found in the literature are depicted in the Presenteeism and Patient Safety Model guiding this research study (Figure 1). This literature-derived model can increase our understanding of the patient safety consequences of presenteeism, fatigue and burnout and the potentially protective factors of team vitality and psychological well-being.

Purpose

The purpose of this study was to explore the relationships between nurse fatigue, burnout, psychological well-being, team vitality, presenteeism and patient safety. We proposed the Presenteeism and Patient Safety Model of the relationships based on literature (Figure 1). The specific aims were:

- 1) To examine the model fit of the proposed model of relationships between fatigue, burnout, psychological well-being, team vitality, presenteeism and patient safety.
- 2) To examine if presenteeism acts as a mediator between burnout, fatigue, psychological well-being, and team vitality and patient safety.

Method

Design

This study used a cross-sectional design.

Setting, Population, and Procedures

The current survey study was conducted at a large acute care non-profit Southern California hospital. This was the second Hospital Nurse Force Survey conducted by the organization. The primary aim of the study team was to better understand the association of

hospital nurse fatigue with patient harm, nurse wellness and methods to improve patient safety practices. Survey items were selected and reviewed by a hospital study team including a nurse research scientist, a human factors engineer, hospital nursing administration directors, managers, and staff nurses. The study was approved by the Institutional Review Board in December 2015. All hospital nurses, approximately one thousand registered nurses (RNs), employed at the organization were invited to participate in the Hospital Nurse Fatigue Survey 2 Study between March 17, 2016 and August 1, 2016. A power analysis was not conducted as the goal of the survey was to recruit as many RNs as possible at the hospital. The dataset used for this analysis included responses from hospital registered nurses who identified as staff or charge nurses providing direct-care for at least 50% of the work shift. The survey response rate for direct-care nurses was 30%.

Measurement

Patient safety outcome variables. The Overall Perceptions of Patient Safety and Frequency of Events Reported composites of the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient Safety Culture were utilized in this analysis (Sorra et al., 2016). The scale includes multiple subscales. In this analysis, we used the Overall Perceptions of Patient Safety subscale that was created from four items using a 5-point “strongly disagree” to “strongly agree” scale. The Frequency of Events Reported composite was created from three items using a 5-point “never” to “always” scale. The Cronbach’s alphas for the Overall Perceptions of Patient Safety composite was 0.63 and Frequency of Events Reported was 0.87 in this study.

Protective and opposing variables. Our model included variables identified in the literature as protecting patient safety, team vitality and psychological well-being, and variables opposing patient safety, burnout and fatigue.

Burnout. The Burnout subscale of the Professional Quality of Life Scale was used to assess burnout on this survey (Stamm, 2005). The entire scale is 30 items in length. The burnout subscale is ten items in length. The scale uses a 5-point response scale that ranges from “never” to “very often.” Scale scoring was completed using the published guidelines. Higher scores indicate a higher risk for burnout. The Cronbach’s alpha for the Burnout subscale on this survey was 0.72.

Team vitality. The Healthcare Team Vitality Instrument was used to measure team vitality (Upenieks et al., 2010). The instrument has ten items and uses a 5-point “strongly disagree” to “strongly agree” response scale. The instrument was scored according to published guidelines with higher summative scores indicating more team vitality. The Cronbach’s alpha for the Healthcare Team Vitality Instrument on this survey was 0.88.

Psychological well-being. The Flourishing Scale provides a psychological well-being score by measuring a respondent’s perception of their success in different life areas (e.g. relationships, purpose) (Diener et al., 2009). The instrument is eight items in length and uses a 7-point response scale that ranges from “strongly disagree” to “strongly agree.” The instrument was scored according to published guidelines with higher scores indicated better psychological well-being. The Cronbach’s alpha for the Flourishing Scale on this survey was 0.86.

Fatigue. The Chalder Fatigue Scale has two subscales that measure mental and physical fatigue (Chalder et al., 1993). The scale is fourteen items in total with eight items as a part of the physical fatigue subscale and six items as a part of the mental fatigue subscale. The scale lists

symptoms of fatigue and respondents answer “yes” or “no.” Higher scores indicate more fatigue symptoms, thereby indicating higher fatigue. The Cronbach’s alphas for the mental fatigue subscale was 0.85 and the physical fatigue subscale was 0.84 in this study. The Occupational Fatigue Exhaustion/Recovery Scale has fifteen items and uses a 7-point response scale that ranges from “strongly disagree” to “strongly agree” (Winwood, Winefield, Dawson, & Lushington, 2005). There are three subscales – chronic fatigue, acute fatigue and intershift recovery. For the Acute and Chronic Fatigue subscales, higher scores indicate more fatigue. The Cronbach’s alphas for the acute fatigue subscale was 0.85 and the chronic fatigue subscale was 0.89 in this study.

Mediator variables. In our model, we hypothesized that presenteeism was a mediator between the protective and opposing variables and patient safety.

Presenteeism. We chose to measure two types of presenteeism in this study – sickness presenteeism and job-stress-related presenteeism. Sickness presenteeism was measured using the Stanford Presenteeism Scale (SPS-6) (Koopman et al., 2002). This scale is six items in length and has a 5-point response scale ranging from “strongly disagree” to “strongly agree.” Traditionally, higher scores on this scale indicate lower presenteeism. In order to align with the directionality of other scales used in this survey, we reverse coded the total scores so that higher scores would indicate more presenteeism in our sample. The Cronbach’s alpha for this scale in our sample was 0.72. Job-stress-related presenteeism was measured using the job-stress-related presenteeism scale (Gilbreath & Karimi, 2012). This is a six-item scale with a 5-point response scale ranging from “strongly disagree” to “strongly agree.” The item mean is calculated with higher means indicating more presenteeism. The Cronbach’s alpha for this scale in our sample was 0.93.

Sociodemographics. Sociodemographic data collected included: age, sex, education, marital status, shift length, and ethnicity.

Statistical Analysis

Descriptive statistics were produced for all of the sociodemographic data. The scales scored according to scale guidelines using SPSS. Survey scales were analyzed for missing completely at random data using Little's test (Little, 1988). Based on the result, we felt confident in imputing our data. Total scores for the different scales were imputed using the Imputation by Chained Equations (ICE) command in STATA (2017) (Azur, Stuart, Frangakis, & Leaf, 2011; Royston, 2009). The complete dataset was then transferred to MPLUS to test the model (Muthén & Muthén, 1998-2017). Prior to testing the model, we examined the relationships between the four fatigue subscales (OFER Chronic and Acute Fatigue and Chalder Fatigue Scales measures of physical and mental fatigue) in our survey to check for potential overlap between areas of fatigue measured. We ran an exploratory factor analysis and found that the acute, mental and physical fatigue measures fit together, but that chronic fatigue loaded by itself. This can be explained by the temporal differences between acute, physical, mental and chronic fatigue. Therefore, we elected to measure fatigue using a variable comprised of the physical, mental and acute fatigue measures. We then analyzed the Presenteeism and Patient Safety Model using Composite Indicator Structural Equation (CISE) (Figure 1). CISE is a type of Structural Equation Modeling that incorporates measurement error into the model on a scale variable level to improve estimates as described by McDonald, Behson, & Seifert (2005). Indicator variables are created for each scale by combining measurement error for each scale variable in the model and the composite scale variable. Measurement error for each scale is calculated by fixing the error variance of the scale to $(1 - \alpha) * \sigma^2$, where α is Cronbach's alpha, and σ^2 is the variance of the

composite variable. CISE has been found to be an alternative to traditional path modeling and structural equation modeling to estimate model fit and proposed relationship with measurement error on a scale level (Yoon & Brown, 2014). Model fit was assessed using Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) (0.95 or higher), Root Mean Square Error of Approximation (RMSEA) (less than 0.08), and Standardized Root Mean Square Residual (SRMR) (should be around 0.90 or lower) (Kenny, Kaniskan, & McCoach, 2014). We ran the model with and without the proposed mediating variables, job-stress and sickness presenteeism, to test for mediation. Figure 2 depicts the CISE-alpha model used in this analysis.

Results

Sample Characteristics

Of the 386 responders (response rate 39%), 332 nurses completed 90% of the survey items. Average survey completion was 28 minutes based on Qualtrics survey generated survey completion times between 10 and 60 minutes. Of the completed responders, 270 identified as direct-care nurses (not managers, directors or advanced care practitioners) and were included in this secondary analysis. The sample was predominately female (90%), married (67%), and self-identified as white (67%). The mean age of nurses was 41.43 ($SD = 11.07$) with a range of 22–65 years of age. Sixty-seven percent had a baccalaureate or higher degree in nursing, and 12% were enrolled in a nursing program. A majority (91%) reported working 11 or more hour shifts.

Model Findings

To address aim 1 (fit of the Presenteeism and Patient Safety Model), we re-ran the Presenteeism and Patient Safety Model with the new fatigue variable and compared fit with published guidelines using Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) (0.95 or higher), Root Mean Square Error of Approximation (RMSEA) (less than 0.08), and Standardized

Root Mean Square Residual (SRMR) (should be around 0.90 or lower) (Kenny, Kaniskan, & McCoach, 2014). We found acceptable fit: CFI = 0.97, TLI = 0.92, RMSEA = 0.072, and SRMR = 0.039. In addition to having acceptable fit, the relationships within the model were interpretable (Figure 3).

Significant negative relationships identified in the model include: job-stress-related presenteeism to both lower frequency of events reported and perceived safety; and healthcare team vitality to job-stress-related presenteeism (Table 1 for all relationship estimates). Significant positive relationships included: burnout to frequency of events reported; psychological well-being to frequency of events reported; healthcare team vitality to frequency of events reported and perceived safety. Psychological well-being and burnout were also both significantly positively linked to job-stress related presenteeism. In addition to job-stress-related presenteeism, burnout was also significant positively linked to sickness presenteeism.

In response to aim 2 and our mediation analysis, job-stress presenteeism was found to completely mediate the relationship between psychological well-being and perceived safety; and the relationship between burnout and perceived safety (Table 2). Job-stress presenteeism partially mediates the relationships between team vitality and perceived safety; psychological well-being and frequency of events reported; burnout and frequency of events reported; and team vitality and frequency of events reported. Sickness presenteeism was not a mediator of any relationships in this model.

Discussion

The two aims of this study were to: examine the fit of Presenteeism and Patient Safety Model and explore the role of presenteeism as a potential mediator. This study addressed gaps in our knowledge about the relationships between presenteeism and fatigue, psychological well-

being, team vitality, and burnout. We found multiple significant relationships between nurse and environmental concepts and presenteeism. Our hypothesis about the role of presenteeism as a potential mediator between burnout, fatigue, psychological well-being, and team vitality and patient safety was true for a majority of the relationships. This study was also innovative in the measurement of both job-stress and sickness presenteeism as prior work has focused on one or the other.

Our findings that presenteeism is linked to lower frequency of events reported and perceptions of patient safety echo findings about presenteeism and specific adverse patient events (e.g. falls, medication errors and missed care) (Cassie, 2014; Letvak et al., 2012). Patient safety culture describes how an organization supports and promotes patient safety and how that culture influences practitioner actions and behaviors (Sorra et al., 2016). Improving patient safety culture is an element of improving patient safety and outcomes. The link between presenteeism and patient safety culture suggest presenteeism as an important concept to target to improve patient safety practices.

The majority of studies on presenteeism in nursing, specifically those looking at presenteeism and patient outcomes have focused on sickness presenteeism (Cassie, 2014; Letvak et al., 2012). However, a prior study on nurse sickness presenteeism and patient safety culture found no link between the two concepts (Brborović, Brborović, Brumen, Pavleković, & Mustajbegović, 2014). By using measures of both job-stress and sickness presenteeism to assess for presenteeism in this survey, we were able to explore the unique relationships between the different concepts and two types of presenteeism. While sickness presenteeism was significantly related to burnout, job-stress presenteeism was related to team vitality, psychological well-being, and burnout. Job-stress presenteeism was also significantly related to both patient safety outcome

measures. The role of job-stress presenteeism as a mediator between burnout, team vitality, and psychological well-being and patient safety culture means that improving team vitality and addressing job-stress presenteeism on an organizational level may improve the patient safety culture. The mediating role of job-stress presenteeism means that even with these different protective factors in a work environment, if an individual is at work when not fully performing, there can still be negative consequences for patient safety practices. Addressing presenteeism through attendance policies and a work environment culture that promotes discussing when someone is not fully performing and giving the individual the ability to not attend work has the potential to improve safety culture. Changing hospital and super-nurse culture can be difficult, but is necessary to improve safety (Steege & Rainbow, 2017).

Presenteeism is a complex concept and related to multiple organizational and individual factors. These different factors need to be considered when developing interventions to prevent presenteeism. Building on our understanding of these interactions, human factors methods and theories can be applied to improve human performance, safety, and well-being and optimize overall system performance. One specific area where human factors has successfully been employed to understand and identify strategies to improve the nurse work environment is fatigue (Steege & Dykstra, 2016). Future work to address presenteeism and the associated workplace and individuals factors can build on human factors research.

While this study did identify multiple significant relationships that we hypothesized based on the literature, we did not find significant relationships between fatigue and other variables in the model. Further, sickness presenteeism was only related to burnout. Relationships between fatigue, burnout and presenteeism have been found previously (Demerouti et al., 2009). Fatigue in nurses has been defined as multidimensional (including mental and physical

dimensions) with different states ranging from acute to chronic (Barker & Nussbaum, 2011). Therefore, we utilized reliable and valid measures of acute, mental and physical fatigue in this study that had been linked to patient outcomes. These fatigue measures had been linked to patient safety in a prior survey of fatigue and nurse performance (Barker & Nussbaum, 2011). It is possible that utilizing a measure for one specific type of fatigue or different fatigue measures overall may have changed the relationships between fatigue and other variables in this study.

Sickness presenteeism has been found in other studies of nurses to be linked to patient safety outcomes. These studies have usually included a health measure. We included a measure of psychological well-being but did not include a measure of overall health status. Psychological well-being was selected over other health measures due to the high rates of psychological health issues in nurses and the findings on consequences of these issues for worker performance (Melnik et al., 2018). We were surprised that psychological well-being and sickness presenteeism were not related in this study. We posit that it may be due to the measures that we chose for our population. There are more than twelve measures of sickness presenteeism, so it is possible that selecting a different measure may have provided more insight into the relationships between sickness presenteeism and other variables in the model (Ospina, Dennett, Wayne, Jacobs, & Thompson, 2015). Future work should further explore sickness presenteeism levels and measurement in a nurse population.

The strengths of this study were its use of reliable and validated measures of the multiple included concepts, sample size, and CISE-alpha approach that addressed measurement error. We found that our literature-derived Presenteeism and Patient Safety Model had acceptable fit, there were multiple significant relationships and presenteeism was a mediator. Our study was cross-sectional in design, which limits confidence in our mediation findings, but can be further tested

in a longitudinal study. These findings address current knowledge gaps and can be useful in development of studies to further explore presenteeism as well as in the development of interventions. It is important to acknowledge the limitations of this study. All participants in this study were from one hospital organization meaning that the findings may not be generalizable to other settings or populations. The concepts studied in this model all have been measured in prior studies through various reliable and valid measures. The measures that we elected to use in this study were chosen based on literature and past experiences with these measures for use in the nursing population. It is possible that different measures may have improved the precision of the model. Analysis of our measures found a Cronbach's Alpha over the recommended 0.7 for all measures except for the Perceptions of Patient Safety measure (Cronbach's alpha = 0.63) (Nunnally, 1978). The AHRQ Patient Safety Culture Survey has been widely used and tested in the nursing population (Sorra & Dyer, 2010). Finally, we did not consider the possible role of demographic covariates in this study. These variables have been considered in studies of presenteeism outside of nursing, but there has not been work to compare different nursing demographics (e.g., level of education) to levels of presenteeism. This research will add to our overall understanding of presenteeism. Without this information and the homogeneity of our sample, we determined it would be best to not include demographic covariates for this analysis. Even with these limitations, we believe that this study adds to our overall understanding of presenteeism and its relationships with burnout, team vitality, psychological wellbeing and patient safety within the hospital nurse context.

Nurse managers and hospital administrators would be wise to pay close attention to the amount of job-stress their staff is experiencing as it has been linked to presenteeism. Our study has indicated there are strong relationships between workplace influences and job stress

presenteeism, and between job stress presenteeism and important patient safety outcomes.

Periodically measuring stress and presenteeism among employees and taking action to address causes is likely a good investment—not only for health-care organizations—but for the patients they serve.

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