Examining the Impact of Worker and Workplace Factors on Prolonged Work Absences Among Canadian Nurses

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Objective: To evaluate the impact of worker and workplace factors and of their relationships on work absence duration. **Methods:** Structural equation modeling of 11,762 female, Canadian nurses from the 2005 National Survey of the Work and Health of Nurses. **Results:** Worker and workplace factors were associated with prolonged work absence. Key proximal predictors were pain-related work interference, depression, pain severity, and respect and support at work. More distal predictors were multimorbidity, abuse at work, and organizational culture. **Conclusions:** Worker health and workplace factors are important in explaining work absence duration. Self-management for pain and mood, adapted to the work context, may be useful for nurses with chronic pain or depression. Policy makers and administrators should focus on creating respect and support at work, and improving organizational culture.

Health-related work absence and its associated compensation and costs are major public health concerns and have major economic and social implications in Canada and most developed countries. In the past 10 years, there has been an increase in the duration and costs associated with absenteeism, with increases expected to persist as an aging population drives the prevalence of chronic conditions in the workforce higher.[1–3] Work absence duration is of particular importance in the health care sector, where workers are at high risk for work disability: Health care workers in Canada have the highest rate of lost-time claims[4] and work absence[5] of any sector. In 2000, full-time health care workers in Canada missed an average of 11.8 days compared with 6.7 days for workers from other sectors.[5] By 2005, the average yearly work absence duration for Canadian health care workers had increased to 14.5 days.[6] Nurses, in particular, experience high rates of prolonged work absence, with 14% of Canadian nurses reporting 20 days or more of work absence because of illness or injury in 2005.[6]

Current conceptual models of work absence duration suggest that both workplace factors, such as the psychosocial work environment, and worker factors, such as health status, need to be considered to understand what drives absence duration.[7–10] Moving away from an overly narrow strictly biomedical model of work disability, the World Health Organization's International Classification of Function, Disability, and Health model reconceptualized work disability by highlighting the distinction between pathophysiology, impairment, activities, and participation.[10] The World Health Organization model was followed by the development of multiple models, including that of Loisel et al[9] and models of work disability by Franche and Krause,[8] which clearly outlined the role of the main players of work disability: the workplace, the insurer system, the health care system, and the workers and their families. By including contextual factors in the conceptualization of work disability, these models pointed to the dynamic and reciprocal nature of the relationship between work-disabled workers and their environment, including the work environment. Despite widespread acceptance of these models, the relationships between worker and workplace factors have not been empirically verified.

In this study, we sought to explore a model that combined worker health factors with workplace factors in predicting work absence duration. In constructing our hypothesized model, we based our selection of worker and workplace variables on existing knowledge of factors that have been shown to influence work absence duration independently. Key worker health factors implicated in work absence duration include multimorbidity,[11,12] depression,[13] and pain,[14–16] while workplace factors known to impact work absence duration include low social support, workplace interpersonal relationships,[17,18] and organizational factors.[19]

The worker health factors, workplace factors, and their relationships, used to construct our model, are discussed in the following sections.

WORKER HEALTH FACTORS

Multimorbidity is defined as the presence of multiple chronic health conditions and has been measured in various ways, including as a dichotomous variable indicating the presence or absence of any conditions, as a count variable, and incorporating measures of condition severity.[20,21] Studies have demonstrated a dose–response relationship between increasing numbers of chronic health conditions and increased work absence duration.[11,12,22,23]

Depression and depressive symptoms have been found to be associated with increased work absence in a number of studies.[13,24–26] In addition, there is a strong association between depression and workplace injury: The prevalence of depression and depressive symptoms among workers with workplace injuries is estimated to range from 31% to 55%.[27–29]

The relationship between pain and work absence duration is complex, and may depend on multimorbidity, depression, and workplace factors. Pain is often associated with chronic health conditions, including arthritis, migraines, and back problems, three of the most common chronic health conditions affecting Canadian nurses.[6] In addition, pain and depression often co-occur, with each increasing the likelihood of the other.[30] Several studies have established a relationship between severe pain and increased work absence duration,[14,15,31] while levels of co-occurring pain and depressive symptoms have also been shown to be associated with increased work absence duration.[32] When studying pain, it is important to differentiate pain severity from pain interference: Although pain severity refers to one's assessment of the magnitude of the pain, pain interference refers to the impact of the pain on various activities.[10]

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WORKPLACE FACTORS

Tompa et al[33] proposed a framework of work-related experiences that impact health outcomes. These experiences include social support at work, work-role status, control over work processes, exposure to hazards, legal and institutional protection, degree of certainty of continuing work, training and advancement opportunities, and income and benefits.[33]

We have used this model to guide our selection of workplace factors that may affect work absence duration. Low social support, including poor workplace interpersonal relationships[17,18]; low control over practice[19]; and exposure to hazards, such as heavy physical work,[34] have been associated with longer work absence duration. Relationship between work absence duration and other types of workplace factors have been less consistent, such as with income and benefits, and job security.[35]

Relationship Between Worker and Workplace Factors

Previous research has linked work absence duration to both worker and workplace factors, separately,[7–10] but their combined effects have not been considered in detail. Only a few studies have examined the relationship between worker health and workplace environment on work absence duration. For example, one study found that good communication with one's supervisor reduced work absence duration among workers with low levels of depressive symptoms who are absent from work, but not among workers with high levels of depressive symptoms.[36]

OBJECTIVES

The objectives of this study are to examine the relationships between worker health and workplace factors, and to determine the relative contributions of these two groups of factors in predicting prolonged work absence. We will examine these relationships by first examining worker health and workplace factors separately and then combining these factors into one model of prolonged work absence, using structural equation modeling. To fully understand the complexity of these relationships, analytic methods capable of modeling both proximal and distal factors are necessary. In traditional regression procedures, proximal factors, those directly related to the outcome, take precedence over more distal factors, those indirectly related to the outcome, despite the potential importance of these distal factors and their relationships with mediating factors. Structural equation modeling (SEM), by contrast, can assess the adequacy and fit of a more complex model that includes both proximal and distal factors, in addition to assessing the significance of each individual variable. This allows a more detailed understanding of the relationships and patterns between highly intercorrelated workplace factors.

The Statistics Canada 2005 National Survey of the Work and Health of Nurses (NSWHN) contains a rich set of worker and workplace variables. It therefore provides an ideal opportunity to evaluate the relationships between worker and workplace factors on prolonged work absence. It also allows examination of whether the impact of workplace factors on absence differs across workers with and without physical and mental health conditions, among a large sample of Canadian nurses.

METHODS

Population and Study Sample

This study utilized data from the NSWHN, a national, cross-sectional survey conducted in 2005 in all 10 Canadian provinces and 3 territories by Statistics Canada, together with the Canadian Institute for Health Information and Health Canada. The survey collected information on nurses who were registered with a provincial nursing college, association or council, and who were either working as a nurse or temporarily absent from a position in nursing at the time the survey was conducted. Nurses were selected at random to participate in the survey, using a stratified design to ensure adequate sample sizes in each province and territory, and for each type of nurse. Full details of the survey methodology have been published elsewhere.[37]

Of the 24,443 randomly selected nurses, 1015 were not currently employed in nursing and, therefore, were ineligible to participate. Out of the remaining 23,428 eligible, sampled nurses, 18,876 consented to participate and completed the telephone survey, for a response rate of 80%. For the purpose of these analyses, the sample was restricted to employed *female* nurses engaged in *direct care* for some or all of their workday ($n = 15{,}167$). Male nurses were excluded because of the small sample size, while nondirect care female nurses were excluded because many of the workplace environment survey questions were only applicable to the direct care setting. Of this sample, 3405 were missing data for one or more measures of interest. The primary areas of nonresponse were work conditions (1674 nonresponders; 11% of sample) and organizational culture (1517 nonresponders; 10% of sample). Missing responses to work conditions were more likely among nonunionized nurses, as well as among long-term care or community health care workers compared with acute care workers, and among certificate holders or nurses with a master's degree or higher. Lower-income nurses were also more likely to be missing data on work conditions, with a gradient of increasing nonresponse associated with decreasing household income. Missing responses on organizational culture were more likely among nurses working in Quebec, community health care nurses, nonunionized nurses, and nurses with lower household income. Community health care nurses were particularly likely to be missing data on organizational culture, potentially because of the number of items related to work unit structure, staffing levels, or daily supervisor interaction, which may not be applicable in the community health setting. After removing respondents with missing information, our remaining sample totaled 11,762 nurses (77.5% of the original sample).

MEASURES

Outcome: Work Absence Duration

Work absence duration was measured by total cumulative days of self-reported absence from work because of physical and/or mental health reasons in the past 12 months. Work absence duration was coded as a three-level ordinal categorical variable: no absences (0 work days), short-term absences (1 to 10 work days), and prolonged absences (11 or more work days). Therefore, an absence greater than two work weeks was classified as a prolonged absence and an absence of less than two work weeks as a short-term absence. The cut points for these categories were based on meaningful differences, since physician notes for work absence are often given in week periods. Furthermore, this distinction was informed by the reported average number of cumulative sick days taken by Canadian nurses—11.8 days in 2001 and 14.5 days in 2005.[5,6] We also considered the distribution of work absence in the NSWHN dataset.[37] Work absence was common among female, direct care nurses included in our sample: only 36% reported no work absences in the past 12 months, while 45% reported short-term absences and 19% reported prolonged work absences (Table 1).

Worker Factors

On the basis of current literature and theory, four worker health factors were considered in the model: (1) pain-related multimorbidity, (2) depression, (3) work-related and non–work-related pain severity, and (4) pain-related work interference (Table 1 and Supplemental Digital Content 1, http://links.lww.com/JOM/A62, which provides the survey items used to derive each modeled factor).

1. Pain-related multimorbidity was measured using a four-level ordinal categorical variable to indicate the presence of none, one, two, or three of the most prevalent chronic health conditions among

TABLE 1. Distributions for Sociodemographic Factors, Work Absence, Worker Factors, and Workplace Factors in 11,672 Canadian Female, Employed Nurses

Variables	Categories	Prevalence: *n* (%)
Cumulative work absence duration	0 days (ref*)	4,223 (35.9)
	1–10 days	5,272 (44.8)
	11 or more days	2,267 (19.3)
Age	Continuous	Mean (SD): 43.4 (10.6)
Household income	$0–39,999 (ref)	857 (7.3)
	$40,000–59,999	2,249 (19.1)
	$60,000–79,999	2,728 (23.2)
	$80,000–99,999	2,195 (18.7)
	$100,000 or more	3,733 (31.7)
Marital status	Married or common-law (ref)	8,860 (75.3)
	Single or never married	1,491 (12.7)
	Widowed, divorced, or separated	1,411 (12.0)
Pain-related multimorbidity	0 conditions (ref)	6,603 (56.1)
	1 condition	3,633 (30.9)
	2 conditions	1,328 (11.3)
	3 conditions	198 (1.7)
Depression	Not depressed (ref)	10,463 (89.0)
	Depressed	1,299 (11.0)
Work-related pain severity	No pain (ref)	8,392 (71.3)
(Work-related causes only, or both work-related and non–work-related causes)	Mild pain	593 (5.0)
	Moderate pain	1,641 (14.0)
	Severe pain	964 (8.2)
	Unbearable pain	172 (1.5)
Non–work-related pain severity (non–work-related causes only)	No pain (ref)	10,739 (91.3)
	Mild pain	167 (1.4)
	Moderate pain	466 (4.0)
	Severe pain	311(2.6)
	Unbearable pain	79 (0.7)
Pain-related work interference	Not at all (ref)	8,884 (75.5)
	Some of the time	2,392 (20.3)
	Most of the time	282 (2.4)
	All of the time	204 (1.8)
Organizational culture	Continuous	*Autonomy*
		Mean (SD): 10.4 (3.2)
		Control over practice
		Mean (SD): 12.1 (4.5)
		Nurse-physician relationship
		Mean (SD): 6.7 (2.0)
Respect and support	Continuous	Mean: 5.2 (1.9)
Emotional or physical abuse or assault at work-–by a coworker (Including: physician, nursing manager, another coworker, or student)	No (ref)	8,832 (75.1)
	Yes	2,930 (24.9)
Emotional or physical abuse or assault at work-–by a patient or visitor	No (ref)	5,356 (45.5)
	Yes	6,406 (54.5)
Job insecurity	Secure (ref)	11,287 (96.0)
	Insecure	475 (4.0)

continued

TABLE 1. Continued

Variables	Categories	Prevalence: *n* (%)
Facility type	Acute care (ref)	7,833 (66.6)
	Long-term care	2,011 (17.1)
	Community care or other	1,918 (16.3)
Unionization	Nonunionized (ref)	1,413 (12.0)
	Unionized or collective agreement	10,349 (88.0)
Employment status	Full-time (ref)	8,008 (68.1)
	Part-time	3,754 (31.9)

*Ref indicates reference category.

all female nurses surveyed, excluding allergies[6]: back problems, migraine headaches, and arthritis or rheumatism. Nurses reporting any one of these three conditions were given a multimorbidity score of 1; nurses reporting any two, or all three, of these conditions received scores of 2 and 3, respectively. Nurses reporting none of these conditions were scored as 0, despite the presence or absence of any chronic health conditions other than those listed here.

2. The presence of depression was measured using a dichotomous variable on the basis of a subset of questions from the Composite International Diagnostic Interview[37] comprising 14 items, 2 of which were screening questions. Following the guidelines provided by Statistics Canada on this measure, a score at or above 0.90 (corresponding to a 90% likelihood of a major depressive episode) was taken to indicate depression in the past 12 months.[37]
3. Pain severity in the past 12 months was assessed using survey questions addressing occurrence of pain, associated severity (*no pain, mild, moderate, severe, unbearable*), and cause as work-related, non–work-related, or a combination of the two. For analysis, pain because of both work-related and non–work-related factors was considered work related. Work-related and non–work-related pain severity measures were coded as five-level ordinal variables.
4. Pain-related work interference was measured as self-reported difficulty performing regular work activities because of work-related or non–work-related pain. Nurses who reported no pain were not asked about pain-related work interference, and were considered to have no pain-related work interference for these analyses.

Sociodemographic factors were also included in the model, including age, marital status, and household income (Table 1). Aboriginal status and province of residence were considered in early models, but dropped from the final model because of lack of significance.

Workplace Factors

Seven workplace factors were considered in the models. We list them and include in brackets the theoretical construct from the model given by Tompa et al[33] to which they correspond: (1) organizational culture—autonomy at work (control over work processes), nurse–physician relationships (social support), and control over practice (control over work processes); (2) respect and support at work (work-role status); (3) physical assault or emotional abuse by a coworker, or patient or visitor (exposure to hazard); (4) job insecurity (degree of certainty of continuing to work); and (5) unionization status (legal and institutional protection) (Table 1 and Supplemental Digital Content 1, http://links.lww.com/JOM/A62). We also considered facility type and employment status, as they can help direct the targeting of specific subgroups when developing policy. Role overload (control over practice) and unpaid overtime (exposure to hazards) were considered in early models, but were dropped from the final model because of lack of significance.

1. Organizational culture was assessed using three subscales from the Nurse Work Index developed for the NSWHN: autonomy at work (five items), nurse–physician working relations (three items), and control over practice (seven items). Individual items on these subscales were measured using five-point Likert scales (ranging from 0 = *strongly disagree* to 5 = *strongly agree*). Scores on the individual items were then summed to obtain three subscale scores. A continuous latent variable representing organizational culture was then constructed using these scores, where higher scores indicated a better organizational culture. The reliability of the subscores was generally high, with previously reported Cronbach α values of .905 for the control subscale, 0.934 for the autonomy subscale, and 0.959 for the nurse–physician relations subscale.[37] For the current sample, the Cronbach α value of the combined Nurse Work Index scale was .70.
2. Respect and support at work was measured as a continuous variable using a three-item subset of the Effort-Reward Imbalance scale,[37,38] which asked nurses to agree or disagree on a five-point Likert scale (from 0 = *strongly disagree* to 5 = *strongly agree*) with statements addressing perceived receipt of deserved respect and prestige at work from coworkers and/or superiors. Scores on the three individual items were summed to create an overall score for respect and support at work, with higher scores indicative of greater perceived respect and support. For the current sample, the Cronbach α value for respect and support was 0.74.
3. Emotional abuse and/or physical assault at work was measured using two dichotomous variables (*yes/no*), one indicating experience of abuse and/or assault by a coworker and a second indicating abuse and/or assault by a patient or visitor. Abuse or assault by a coworker, including nursing manager, physician, student, or other coworker, was differentiated from abuse or assault by a patient or visitor since the effects of these variables on work absence duration were hypothesized to be mediated via different pathways. However, emotional abuse and physical assault were combined in each variable since there was no theoretical basis to assume differential pathways to prolonged work absence existed.

Job insecurity was based on nurses' perceived insecurity. Facility type indicated whether nurses reported working primarily in acute care, long-term care, or community health care/other settings. Unionization status categorized both nonunionized nurses covered by collective bargaining agreements and unionized nurses, as *unionized*. Employment status was included as a control variable, since full-time workers, by definition, have more potential work-absent days than part-time workers.

ANALYSES

An initial descriptive analysis was conducted to examine the distributions of all study variables to ensure they met the requirements for SEM (eg, skew less than three and kurtosis less than eight[39]).

For the SEM analyses, we first developed a theoretical combined model on the basis of worker and workplace variables (Figure 1), with organizational culture as the only latent variable. To examine the relative contribution to explained variance of worker and workplace factors, and because of the large number of variables included in the initial model, we then conducted a partial modeling phase, whereby the worker portion of the model was tested separately from the workplace portion. These worker and workplace partial models were adjusted on the basis of theoretical considerations and on suggestions provided by model modification indices until a good fit with the data was achieved. In all cases, where model modification indices suggested relationships that were not supported by theoretical knowledge, theory took precedence and the suggested relationships were not included.

The resulting partial worker and workplace models were then combined into a single model to examine the relationships between worker and workplace factors and their combined effects on work absence. This new combined model contained only those worker health and workplace factors that were demonstrated to be of statistical and theoretical importance in the partial modeling phase, and initially contained no linking paths between worker health and workplace factors. To assess the relationships between worker health status and workplace factors, linkages were added stepwise between the two partial models guided by theoretical considerations and model modification indices. The final combined model (Figure 2) was accepted on the basis of theoretical knowledge and goodness-of-fit indications.

Statistical analyses were performed using Mplus Version 5.2 (Muthen & Muthen, Los Angeles, CA).[40] The study protocol was approved by the University of Toronto Health Sciences research ethics board and the University of British Columbia behavioral research ethics board.

RESULTS

Structural Model

Table 2 presents the regression coefficients for the direct, indirect, and total effects of worker health and workplace factors in the final combined model (Figure 2).

Worker Factors

Worker health variables were highly important in determining prolonged work absences, as they explained 30% of the variance in work absence duration. Overall, worker health factors, namely pain-related work interference, work-related pain, and depression, had the largest total effects on work absence duration of all variables in the final model (Table 2). It should be noted that while pain-related work interference is referred to as a worker factor, it is the product of the worker's pain and work conditions, and as such, is not a variable solely driven by worker characteristics. Pain-related multimorbidity had a significant indirect effect on work absence duration (Figure 2): Nurses with a greater number of pain-related conditions had an increased level of work-related pain severity, which led to increased levels of pain-related work interference, and in turn to increased work absence duration. In addition, nurses with higher levels of pain-related multimorbidity were more likely to experience depression, and consequently, increased work absence duration. Non–work-related pain severity was directly associated with increased work absence duration, as well as indirectly through increased levels of pain-related work interference. Important sociodemographic factors associated with increased work absence duration included higher age, marital status other than married or common-law, and household income less than $100,000.

Workplace Factors

Workplace factors had smaller total effects on work absence duration, explaining only 7% of variance in work absence duration. Emotional abuse or physical assault from a patient or visitor had the largest total effect on work absence duration of all workplace factors,

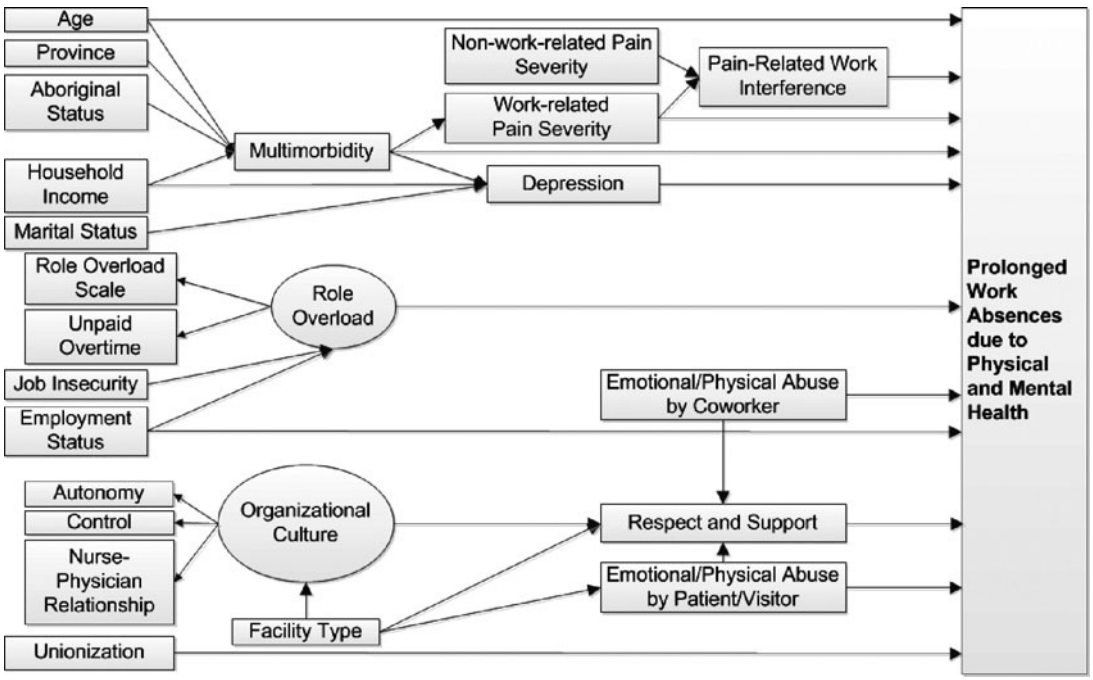

FIGURE 1. Hypothesized combined model of work absence duration driven by worker and workplace factors. Rectangular boxes indicate observed variables, ovals indicate latent variables.

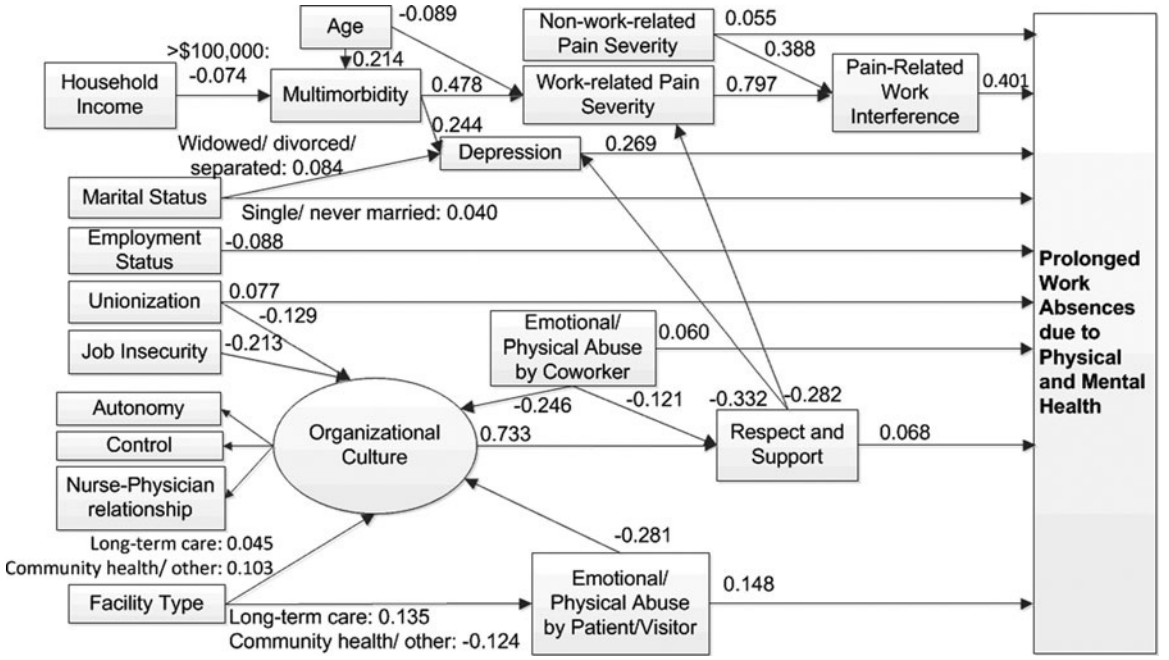

FIGURE 2. Final model of work absence duration driven by worker and workplace factors. Rectangular boxes indicate observed variables, ovals indicate latent variables. Values presented are standardized regression coefficients for paths significant at $P \leq 0.05$. Paths not significant at $P \leq 0.05$ are not shown.

TABLE 2. Standardized Regression Coefficients from the Final Model (Figure 2) for Direct, Indirect, and Total Effects of Worker and Workplace Factors on Work Absence Duration, Controlling for Employment Status

	Direct Effect			Total Indirect Effects			Total Effects		
Variable	***b***	***t*-stat**	***P***	***b***	***t*-stat**	***P***	***b***	***t*-stat**	***P***
Sociodemographic factors									
Age	n/a			0.011	1.298	0.194	0.011	1.298	0.194
Marital status									
Single/never married	0.040	2.191	0.028	0.005	0.747	0.455	0.045	2.469	0.014
Widowed/divorced/separated	0.032	1.842	0.065	0.023	3.280	0.001	0.054	3.112	0.002
Household income									
$40,000–59,999 per year	n/a			− 0.004	− 0.751	0.453	− 0.004	− 0.751	0.453
$60,000–79,999 per year	n/a			− 0.007	− 1.092	0.275	− 0.007	− 1.092	0.275
$80,000–99,999 per year	n/a			− 0.010	− 1.644	0.100	− 0.010	− 1.644	0.100
$100,000 per year or more	n/a			− 0.016	− 2.385	0.017	− 0.016	− 2.385	0.017
Worker health factors									
Pain-related multimorbidity	n/a			0.219	15.090	<0.001	0.219	15.090	<0.001
Depression	0.269	9.474	<0.001	n/a			0.269	9.474	<0.001
Work-related pain severity	n/a			0.320	15.469	<0.001	0.320	15.469	<0.001
Non–work-related pain severity	0.055	2.070	0.038	0.156	10.721	<0.001	0.211	8.159	<0.001
Pain-related work interference	0.401	13.539	<0.001	n/a			0.401	13.539	<0.001
Workplace factors									
Organizational culture	n/a			− 0.082	− 5.684	<0.001	− 0.082	− 5.684	<0.001
Respect and support	0.068	2.917	0.004	− 0.180	− 11.469	<0.001	− 0.112	− 5.732	<0.001
Abuse or assault from a coworker	0.060	3.445	0.001	0.034	5.543	<0.001	0.094	5.606	<0.001
Abuse or assault from a patient or visitor	0.148	6.826	<0.001	0.023	5.340	<0.001	0.171	8.090	<0.001
Job insecurity	n/a			0.017	5.436	<0.001	0.017	5.436	<0.001
Facility type									
Long-term care	n/a			0.021	5.002	<0.001	0.021	5.002	<0.001
Community health care/other	n/a			− 0.027	− 6.356	<0.001	− 0.027	− 6.356	<0.001
Unionized or collective agreement	0.077	4.172	<0.001	0.011	4.426	<0.001	0.087	4.767	<0.001

followed by low respect and support at work and abuse or assault by a coworker.

Organizational culture played a critical role in mediating the effects of unionization, job insecurity, facility type, and abuse or assault by a coworker or by a patient or visitor on work absence duration. Experiences of abuse and assault at work, both by coworkers and by patients or visitors, had the largest effect on organizational culture. However, other work environment factors also impacted organizational culture: Nurses who perceived their jobs as more secure reported better organizational culture, while nurses who were unionized or covered by collective bargaining agreements reported somewhat poorer organizational culture. In addition, nurses working in long-term care, community health care, or other settings reported slightly better organizational culture, relative to nurses in acute care settings.

In turn, better organizational culture, including greater levels of perceived autonomy at work, higher perceived control over practice, and improved relations between nurses and physicians, was associated with higher levels of perceived respect and support at work and thereby with reduced work absence duration. Respect and support also mediated the effects on work absence duration of abuse and assault by a coworker and indirectly mediated the effects of unionization, job insecurity, facility type, and abuse or assault by a coworker or by a patient or visitor.

Finally, unionization had a direct effect on work absence, where nurses who were unionized experienced a small increase in work absence duration relative to nonunionized nurses. Working in long-term care facilities was indirectly associated with an increase in work absence duration, relative to working in an acute care setting. The impact of facility type was mediated by abuse and assault by a patient or visitor: Nurses who worked in long-term care were most likely to experience abuse or assault by a patient/visitor, while nurses who worked in community care or other settings were least likely to experience abuse or assault by a patient/visitor.

Relationship Between Worker and Workplace Factors

The relationship between worker health and workplace factors was examined by examining paths between the two groups of factors (Figure 2).

The combined model of prolonged work absence that included both worker and workplace factors explained 33% of the variance in work absence duration (Table 3).

Respect and support at work provided critical connections between the worker and workplace factors. Nurses perceiving more respect and support from coworkers or supervisors were less likely to report depression and were therefore less likely to experience prolonged work absence. Similarly, nurses perceiving more respect and support at work reported lower levels of work-related pain severity and were less likely to experience prolonged work absence.

Model Fit

Fit statistics are presented in Table 3, and indicated that all models fit the data well. However, the Comparative Fit Index and Tucker-Lewis Index were marginal for categorical outcomes in the final ungrouped model. Although the final ungrouped model still returned several model modification indices suggestive of additional pathways of significance that may have improved the model fit, theoretical considerations overruled the inclusion of these pathways. Rather, it was felt that a theoretically sound model with marginal fit was of more value than a well-fit, theoretically unsound model.

DISCUSSION

Conceptual models of work absence duration have postulated that workplace factors and insurance and health care systems combine with worker factors to drive absence duration.[7–10] Using a sample of female, direct care Canadian nurses, the present analysis modeled the relationships between workplace factors and worker factors and the combined effect of these factors on work absence duration.

TABLE 3. Model Fit Statistics and R^2 Values for the Final Model of Work Absence Duration

Statistic	Final Model
Chi-square	550.517
Degrees of freedom	64
Comparative Fit Index	0.943
Tucker-Lewis Fit Index	0.928
Root mean square error of approximation	0.025
R^2 for work absence duration	0.330

Our final model stresses the importance of considering both worker and workplace factors to explain work absence duration. We summarize our findings in a higher-level model (Figure 3), which includes modifiable and nonmodifiable workplace factors, experiences of violence at work, worker health, sociodemographics, and health-related quality of work life

Three important findings are directly relevant to the proposition that worker and workplace factor relationships matter in understanding work absence duration. First, a key variable of the model—pain-related work interference—can be understood as the product of the interaction between the worker's health condition and workplace demands. Second, both worker and workplace factors were important in modeling prolonged work absence. Although worker health factors, including multimorbidity, depression, and pain severity, explained 30% of the variance in work absence alone, the addition of workplace factors significantly improved the model fit. Key modifiable workplace factors were organizational culture, respect, and support at work; emotional and physical assault at work by coworkers as well as by patients/visitors; and job insecurity. Additional nonmodifiable workplace factors, including facility type and unionization, were also important.

Third, important relationships were observed between the worker and the workplace. In particular, perceived respect and support from coworkers and supervisors appear to be a key intermediary between workplace factors, including organizational support and abuse/assault at work, and worker health factors, including depression and work-related pain severity. This finding suggests that the success of efforts to improve organizational support or to reduce workplace violence could be enhanced by including components focused on increasing respect and support between coworkers and between supervisors and supervisees. In addition, adding respect and support components to programs aimed at helping workers cope with depression and pain at work may have additional benefits in terms of reduction of work absence.

Pain-related multimorbidity and depression are associated in important ways with work absence duration. Increasing numbers of pain-related health conditions are associated with prolonged work absences, a finding supported by a number of previous studies.[12,32,41] Pain-related multimorbidity is associated with increases in depression and the level of work-related pain severity. In turn, work-related pain severity increases frequency of pain-related work interference, a critical variable in our model. Depression, by contrast, is not mediated by pain severity or pain-related work interference and is instead directly associated with prolonged work absence. This finding supports previous research by Kessler et al,[12] which suggested that workers with comorbid chronic physical and mental health conditions experience longer work absence duration than workers with chronic physical health conditions alone.[12] We build upon the finding of Kessler et al[12] with the suggestion that pain-related multimorbidity

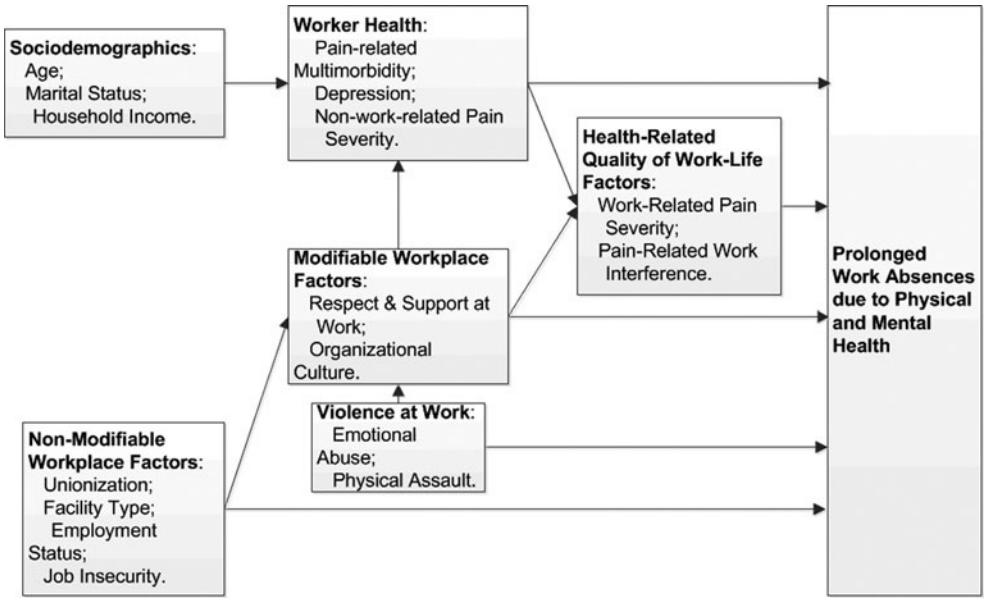

FIGURE 3. Higher-level model of work absence duration driven by worker and workplace factors. Suggested by modeling results.

affects prolonged work absence through two separate pathways, a depression pathway and a pain pathway, which both act to increase the likelihood of prolonged absence.

Among workplace variables considered, abuse and assault by a patient or visitor has the greatest total effect on work absence duration, and abuse or assault by a coworker had the third largest effect. Experiencing abuse or assault at work not only has a direct impact on the duration of a nurse's work absence, but is also indirectly associated with work absence through lower quality of organizational culture, and of lower respect and support from coworkers and supervisors. This is a particularly troubling finding given the high prevalence of abuse and assault at work among Canadian nurses: In our sample, 57% of female Canadian nurses reported emotional abuse at work from any source and 31% reported physical assault at work from any source, in the past 12 months. Abuse or assault at work by a coworker was particularly prevalent, with 55% of female, direct care nurses in our sample reporting abuse or assault of any kind by a coworker, compared with 25% reporting abuse or assault by a patient or visitor. Since the NSWHN was conducted in 2005, violence prevention programs have been implemented in health care workplaces across Canada and may lead to reduction in work absence duration and improvements in nurses' work environments.

Limitations

Our findings should be interpreted carefully, because of the limitations of the study design and survey sample. Importantly, the NSWHN is a cross-sectional survey and the ability to infer directionality or causal relationships is therefore limited. For most relationships in the model, the possibility of reverse causation cannot be ruled out on the basis of these analyses. However, the directions modeled were supported by the findings of previous research.

In addition, the outcome of cumulative days absent is modeled using the parallel lines assumption that assumes that the relationships between the predictor variables and the three levels of the outcome variable can each be modeled using a single regression coefficient. Analyses were carried out to test this assumption using a range of modeling strategies and the parallel lines assumption was deemed appropriate for all variables. However, it should be noted that the relationship between depression and total absence was somewhat reduced when using this assumption. The true relationship between depression and work absence duration may be stronger for nurses experiencing prolonged work absences than that found under the parallel lines assumption.

Furthermore, the possibility of measurement error exists. Information on worker health and workplace conditions was self-reported by nurses. In addition, the validity and reliability of most measures have not been rigorously assessed. In particular, although the value of Cronbach α coefficients are high for the organizational culture subscores, as calculated for the whole NSWHN sample, the final measure for our sample had an α value of only 0.70.

Finally, the data set limited us to focus on understanding the impact of worker and workplace factors. This is not meant to exclude other well-known environmental factors, such as insurance factors and health care system factors, as important forces driving work absence duration.

Strengths

This study has several strengths including the large sample size and breadth of worker and workplace variables available for analysis. These characteristics allowed for the simultaneous modeling of a greater number of workplace and worker health factors than have been considered in past research. In addition, the large sample size allowed us to employ SEM, providing the benefit of modeling both proximal and distal factors on work absence duration, as well as the relationships between these factors. Finally, the detailed information on worker health factors allowed the systematic evaluation of interactive effects between worker health and workplace factors, answering an important, but previously unanalyzed, question about the validity of worker and workplace factor relationships.

Implications

There are several applied implications to our findings. First, our findings suggest that work disability prevention cannot be offered in a rigid and predetermined fashion, but instead, flexibility is required to address the relationships between workers and their workplace conditions. One method of work disability prevention may address the needs of one worker in one type of work environment, but not those of another, because of worker factor variations.

From an organizational perspective, it is imperative to continue violence prevention at work to address the very high prevalence

rate of the phenomenon among Canadian nurses. Although a number of violence prevention programs have been rolled out in Canada, administrators should be aware of the complex linkages between emotional and physical abuse, organizational factors, depression, pain experiences, and prolonged work absence, and of the occurrence of abuse and assault among nurses in Canada. Future work should focus on developing ways to improve organizational culture and respect and support at work. Respect and support appears to be a key link between worker health and workplace factors in determining prolonged work absence. Also, the significance of the impact of worker and workplace factors on the outcome of work limitations should also be studied.

Finally, efforts should be made to offer pain management and self-management support, adapted to the work context, to the many nurses experiencing pain and other chronic health conditions. Such programs would help improve not only quality of life, but may also improve quality of work life and reduce work absence duration.

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REFERENCES

1. Health Council of Canada. *Why Health Care Renewal Matters: Learning from Canadians With Chronic Health Conditions*. Toronto, Canada: Health Council of Canada; 2007.
2. Hogg-Johnson S, Cole D. Early prognostic factors for duration on benefits among workers with compensated occupational soft tissue injuries. *Occup Environ Med*. 2003;60:244–253.
3. World Economic Forum. *Working Towards Wellness: The Business Rationale*. Geneva, Switzerland: World Economic Forum; 2008.
4. Engst C, Chokar R, Miller A, Yassi A. Preventing back injuries to healthcare workers in British Columbia, Canada and the ceiling lift experience. In: Charney W, Hudson A, eds. *Back Injury Among Healthcare Workers: Causes, Solutions, and Impacts*. Boca Raton, FL: Lewis Publishers; 2004:253–263.
5. Canadian Institute for Health Information (CIHI). *Canada's Health Care Providers, 2007*. Ottawa, Ontario, Canada: Canadian Institute for Health Information; 2007.
6. Shields M, Wilkins K, Statistics C, Health C. *Canadian Institute for Health I. Findings from the 2005 National Survey of the Work and Health of Nurses*. Ottawa, Ontario, Canada: Statistic Canada; 2006.
7. Franche RL, Krause N, Sullivan T, Frank J. *Critical Factors in Recovery and Return to Work. Preventing & Managing Disabling Injury at Work*. New York, NY: Taylor & Francis; 2003:33–55.
8. Franche RL, Krause N. Readiness for return to work following injury or illness: conceptualizing the interpersonal impact of health care, workplace, and insurance factors. *J Occup Rehabil*. 2002;12:233–256.
9. Loisel P, Durand MJ, Berthelette D, et al. Disability prevention: new paradigm for the management of occupational back pain. *Dis Manag Health Outcome*. 2001;9:351–360.
10. World Health Organization. *International Classification of Functioning, Disability and Health*. Geneva, Switzerland: World Health Organization; 2001.
11. Collins JJ, Base CM, Sharda CE, et al. The assessment of chronic health conditions on work performance, absence, and total economic impact for employers. *J Occup Environ Med*. 2005;47:547–557.
12. Kessler RC, Greenberg PE, Mickelson KD, Meneades LM, Wang PS. The effects of chronic medical conditions on work loss and work cutback. *J Occup Environ Med*. 2001;43:218–225.
13. Goetzel RZ, Hawkins K, Ozminkowski RJ, Wang S. The health and productivity cost burden of the "top 10" physical and mental health conditions affecting six large U.S. employers in 1999. *J Occup Environ Med*. 2003;45:5–14.
14. McIntosh G, Frank J, Hogg-Johnson S, Hall H, Bombardier C. Low back pain prognosis: structured review of the literature. *J Occup Rehabil*. 2000;10:101–115.
15. Shaw WS, Pranksy G, Fitzgerald TE. Early prognosis for low back disability: intervention strategies for health care providers. *Disabil Rehabil*. 2001;23:815–828.
16. Turner JA, Franklin G, Fulton-Kehoe D, et al. Prediction of chronic disability in work-related musculoskeletal disorders: a prospective, population-based study. *BMC Musculoskelet Disord*. 2004;5:14.
17. Nielsen ML, Rugulies R, Christensen KB, Smith-Hansen L, Kristensen TS. Psychosocial work environment predictors of short and long spells of registered sickness absence during a 2-year follow up. *J Occup Environ Med*. 2006;48:591–598.
18. Crook J, Milner R, Schultz IZ, Stringer B. Determinants of occupational disability following a low back injury: a critical review of the literature. *J Occup Rehabil*. 2002;12:277–295.
19. Stone PW, Du Y, Gershon RR. Organizational climate and occupational health outcomes in hospital nurses. *J Occup Environ Med*. 2007;49:50–58.
20. John R, Kerby DS, Hagan Hennessy C. Patterns and impact of comorbidity and multimorbidity among community-resident American Indian elders. *The Gerontol*. 2003;43:649–660.
21. van den Akker M, Buntinx F, Knottnerus JA. Comorbidity or multimorbidity: what's in a name? A review of literature. *Europ J Gen Pract*. 1996;2:65–70.
22. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States: results from the National Comorbidity Survey. *Arch Gen Psychiatry*. 1994;51:8–19.
23. Nordin M, Hiebert R, Pietrek M, Alexander M, Crane M, Lewis S. Association of comorbidity and outcome in episodes of nonspecific low back pain in occupational populations. *J Occup Environ Med*. 2002;44:677–684.
24. Dewa CS, Goering P, Lin E, Paterson M. Depression-related short-term disability in an employed population. *J Occup Environ Med*. 2002;44:628–633.
25. Kessler RC, Barber C, Birnbaum HG, et al. Depression in the workplace: effects on short-term disability. *Health Aff*. 1999;18:163–171.
26. Lerner D, Adler DA, Chang H, et al. The clinical and occupational correlates of work productivity loss among employed patients with depression. *J Occup Environ Med*. 2004;46:S46–S55.
27. Dersh J, Gatchel RJ, Polatin P, Mayer T. Prevalence of psychiatric disorders in patients with chronic work-related musculoskeletal pain disability. *J Occup Environ Med*. 2002;44:459–468.
28. Franche RL, Carnide N, Hogg-Johnson S, et al. Course, diagnosis, and treatment of depressive symptomatology in workers following a workplace injury: a prospective cohort study. *Can J Psych*. 2009;54:534–546.
29. Keogh JP, Nuwayhid I, Gordon JL, Gucer P. The impact of occupational injury on injured worker and family: outcomes of upper extremity cumulative trauma disorders in Maryland workers. *Am J Indust Med*. 2000;38:498–506.
30. Bair MJ, Robinson RL, Katon W, Kroenke K. Depression and pain comorbidity. A literature review. *Arch Intern Med*. 2003;163:2433–2445.
31. Turner JA, Franklin G, Heagerty PJ, et al. The association between pain and disability. *Pain*. 2004;112:307–314.
32. Corbière M, Sullivan M, Stanish WD, Adams H. Pain and depression in injured workers and their return to work: a longitudinal study. *Can J Behav Sci*. 2007;39:23–31.
33. Tompa E, Scott-Marshall H, Dolinschi R, Trevithick S, Bhattacharyya S. Precarious employment experiences and their health consequences: towards a theoretical framework. *Work*. 2007;28:209–224.
34. Steenstra IA, Verbeek JH, Heymans MW, Bongers PM. Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the literature. *Occup Environ Med*. 2005;62:851–860.
35. Bloch FS, Prins R. *Who Returns to Work and Why*? New Brunswick, NJ: International Social Security Association and Transaction Publishers; 2001.
36. Nieuwenhuijsen K, Verbeek JH, de Boer AG, Blonk RW, van Dijk FJ. Supervisory behaviour as a predictor of return to work in employees absent from work due to mental health problems. *Occup Environ Med*. 2004;61:823.
37. Shields M, Wilkins K. *Technical Appendix. Findings from the 2005 National Survey of the Work and Health of Nurses*. Ottawa, Canada: Statistics Canada; 2006.
38. Peter R, Alfredsson L, Hammar N, Siegrist J, Theorell T, Westerholm P. High effort, low reward, and cardiovascular risk factors in employed Swedish men and women: baseline results from the WOLF Study. *J Epidemiol Community Health*. 1998;52:540–547.
39. Kline RB. *Principles and Practice of Structural Equation Modeling*. New York, NY: The Guilford Press; 2005.
40. Muthen LK, Muthen BO. *Mplus User's Guide*. Los Angeles, CA: Muthen & Muthen; 2004.
41. Collins JJ, Baase CM, Sharda CE, et al. The assessment of chronic health conditions on work performance, absence, and total economic impact for employers. *J Occup Environ Med*. 2005;47:547–557.

