



## Original Article

# Workplace System Factors of Obstetric Nurses in Northeastern Ontario, Canada: Using a Work Disability Prevention Approach



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## ABSTRACT

**Background:** The purpose of this study was to examine the relationship nursing personal and workplace system factors (work disability) and work ability index scores in Ontario, Canada.

**Methods:** A total of 111 registered nurses were randomly selected from the total number of registered nurses on staff in the labor, delivery, recovery, and *postpartum* areas of four northeastern Ontario hospitals. Using a stratified random design approach, 51 participants were randomly selected in four northeastern Ontario cities.

**Results:** A total of 51 (45.9% response rate) online questionnaires were returned and another 60 (54.1% response rate) were completed using the paper format. The obstetric workforce in northeastern Ontario was predominately female (94.6%) with a mean age of 41.9 (standard deviation = 10.2). In the personal systems model, three variables: marital status ( $p = 0.025$ ), respondent ethnicity ( $p = 0.026$ ), and mean number of patients per shift ( $p = 0.049$ ) were significantly contributed to the variance in work ability scores. In the workplace system model, job and career satisfaction ( $p = 0.026$ ) had a positive influence on work ability scores, while work absenteeism ( $p = 0.023$ ) demonstrated an inverse relationship with work ability scores. In the combined model, all the predictors were significantly related to work ability scores.

**Conclusion:** Work ability is closely related to job and career satisfaction, and perceived control at work among obstetric nursing. In order to improve work ability, nurses need to work in environments that support them and allow them to be engaged in the decision-making processes.

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## 1. Introduction

By 2022, Canada will be deficient by almost 60,000 full-time equivalent nurses [1]. Canada is in the midst of a nursing shortage that is expected to intensify as baby boomers age and the demand for health care grows, in particular in rural and northern regions of the country [2,3]. Similar trends are observed internationally [4]. Joined with increased demand for health services is a decreased supply of nurses [4]. In the province of Ontario, its

residents living in the north have higher rates of chronic disease than the average provincial rate and have higher proportion of the population that are overweight or obese [5]. Moreover, there are higher proportions of the population that are heavy drinkers and smokers [6,7]. Exacerbating matters is an undesirable work environment that includes heavy workloads, inadequate support staff, stress, low quality of work life, and little involvement in decision making [3,4]. As a result, this leads to diminished work capacity and increased work disability.

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Psychosocial factors play a significant role in the current theorizing on processes related to work disability [8–10]. Over two decades of research pinpoint that sources of stress to include high psychological job demands, and a low level of control over these demands increase a nurses' exposure to job stress [11–13]. Research on the impact of workplace on worker' health and well-being demonstrates that occupational stress increases the risk of musculoskeletal injuries, accidents, physical and mental illness, job satisfaction, substance abuse, and smoking [12,14–16]. Excessive occupational stress has been linked with increased risk for physical and mental health issues, decreased job satisfaction, role conflict, geography, and role stress [3,16–19]. Moreover, factors such as stress, depression, job control, and job satisfaction are associated with poor work ability [20–22]. Work ability is an important construct to examine because it takes into consideration the demands of work, the worker's mental health status, and resources available [23]. Specifically, work ability results from the interaction of several person-related and workplace variables including working conditions (e.g., physical strain and environmental influences), social environment (e.g., relation with supervisors and work colleagues), a worker's training and competencies, and the worker's state of health (e.g., physical and mental domains) [24]. Therefore, workplace and personal system factors are represented by work ability and play an important role in psychological exposure for nurses [25]. Furthermore, work ability encompasses the relationships between a nurse's health, duties, and workplace environment. Policy and practice changes such as strategies to alleviate the nursing shortage, organizational initiatives to reduce levels of stress in nursing due to staffing and workload issues, and leadership/management initiatives consider these personal and workplace system factors [26–30].

The working environment determines the psychosocial and physical exposures for nurses [26]. Working in obstetrics may be an especially stressful area of health care because of its long work hours and disruptions of health care professionals personal time as seen among obstetrician and gynecologists [31]. Given the amount of time and energy people expend at the workplace, it is crucial for employees to be satisfied about their life at work [32]. Work occupies an important place in many individuals' lives and the workplace environment is likely to affect not only their physical but also their psychological wellbeing, as well as preventing work disability. There is a dearth of evidence examining the workplace factors of obstetric nurses. There have been few studies that examine the effects of the obstetric environment on nurses and its relationship to preventing work disability.

Loisel et al [33] proposed a framework in which the workplace, compensation and the health care system influence employee disability. The framework suggests that work disability is influenced by various elements and levels (e.g., physical and psychological elements) from the perspective of the worker [33], challenges and opportunities of the return to work process while paying close attention to the worker's job, the workplace organization, and possibly the external environment in which the firm functions. These elements require a systematic consideration and organized manner if work disability is to be avoided.

The aim of work disability prevention is to reduce and ideally eliminate the causes of work-related injuries [34]. In practice, this model has been used by stakeholders to better understand the relationship between work, health, and disability prevention [33].

Home–work interface is related to work–life balance and is about having a measure of an employee's control over their work [35]. Home–work interface has shown a positive influence in mitigating occupational stress and increasing work ability scores [3]. Control over nurses' home–work environment was found to be an important component of work ability [3]. Our previous work of

stress and home–work interface in nurses has found that higher work ability scores related to accommodating family and work commitments lead to elevated work ability scores [3]. One possible explanation is that work–life balance relates to the degree to which employees feel they have control over when, where, and how they work. This reflects a worker's perception that they can fulfill life inside and outside of paid employment, to the benefit of the individual, organization, and broader society [36], additionally, reflecting the extent to which the employer supports the employee's home life.

Work disability is defined as a worker's inability (related to impairment, injury, or illness), to participate fully in employment over the short- or long-term. Furthermore, some workers have permanent impairments, while others have chronic or episodic conditions. This is based on the Ontario Human Rights Commission definition in the human Rights Code [37].

In the 2005 *National Survey of the Work and Health of Nurses*, which surveyed Canadian nurses, absenteeism rates for nurse supervisors and nurses totaled 17.7 million hours (due to illness and injuries) [38]. This number of hours is the equivalent of 9,754 full-time nursing jobs [38]. Over half (54%) of nurses said that they often arrived early or worked late in order to get their work done; 62% reported working through breaks. Two-thirds (67%) of nurses felt that they often had too much work for one person, and 45% of nurses said that they were not given enough time to do what was expected of them [38]. This situation is a direct call to nurses' unions, nurses, and employers to work collaboratively to address these critical occupational health issues. These factors have been shown to be associated with decreased work ability scores [21].

The purpose of this study was to examine the relationship between nursing personal and workplace system factors (work disability) and work ability index scores in Northeastern Ontario, Canada.

## 2. Materials and methods

### 2.1. Participants

A total of 111 registered nurses were randomly selected from the total number of registered nurses on staff in the labor, delivery, recovery, and *postpartum* areas from four hospitals in northeastern Ontario, Canada. Using a stratified random design approach, 51 participants were randomly selected in Sudbury, 21 participants in North Bay, 20 individuals in Sault Ste. Marie, and 18 individuals in Timmins. The response rate for Health Sciences North was 100% (51/51 participants), 67.7% (21/31 participants) for North Bay Regional Health Centre, 62.5% (20/32 participants) for Sault Area Hospital, and 75% (18/24 participants) for Timmins & District Area Hospital. All nurses had an equal chance of being selected for the study. A list of the names of these nurses was obtained from the unit and assigned a number. Then, the list was randomized. A random number generator selected nurses: 51 in Sudbury, 31 in North Bay, 32 in Sault Ste. Marie, and 24 in Timmins. A total of 138 nurses represent potential participants from the four hospital sites.

### 2.2. Definition of work ability

Work ability is defined as the worker's capacity to perform their work, and was measured by an index describing their health resources in relation to work demands [26]. The WAI [39] is a widely used 57-item scale used for evaluating registered nurses' work ability. The operational definition of work ability can be defined as the ability of a worker to perform their job, considering the specific work demands, individual health conditions and mental resources. The WAI contains seven subscales and response ranges from 0 to 10.

### 2.3. Job position (location of cross-training)

In this sample, a cross-trained nurse in obstetrics is a nurse who is able to perform the job tasks and responsibilities of the three areas of the obstetric unit including labor, delivery, recovery, and *postpartum*. Only nurses at Health Sciences North (51 participants) were cross-trained. The remaining nurses at North Bay Regional Health Centre (31 participants), Timmins and District Area Hospital (24 participants), and Sault Area Hospital (32 participants) were not cross-trained. Of the total 138 nurses at the four hospitals, 36.9% were cross-trained and 63.0% were not.

### 2.4. Job and career satisfaction

Job and career satisfaction was defined according to the subscale of the Work-Related Quality of Life Scale. It presents the level to which the workplace furnishes a worker with the best things at work: the factors that make a worker feel good (sense of accomplishment, high self-esteem, and fulfillment of potential) [35].

### 2.5. Quality of work life

For the purposes of this study, quality of work life is defined according to Question 24 of the Work-Related Quality of Life Scale: "I am satisfied with the overall quality of my working life." Evidence has shown that a negative quality of work–life situation is related to lack of work–life balance [35,40,41]. This is founded on the elements of having a safe work environment, equitable wages, and equitable career and educational opportunities [36].

### 2.6. Worker demographics

Through a questionnaire, the participating nurses provided information about sex, age, place of birth, marital status, ethnicity (English-Canadian, French-Canadian, and Aboriginal), born in northeastern Ontario, years of experience in nursing, work hours, employment status, and mean number of patients per shift. The Nursing Stress Scale [42], Work-Related Quality of Life Scale [35], and the Work Ability Index (WAI) [39] were included as components of the questionnaire in order to gather data about the various occupational stressors in the workplace.

### 2.7. WAI

The WAI Questionnaire was developed by researchers at the Finnish Institute of Occupational Health, Helsinki, Finland as an instrument for use in occupational health care. Work ability is defined as the ability of a worker to perform his or her job, based on specific work demands, individual health conditions, and mental resources. The WAI uses a point scale between 1 and 5 but varies for each factor [39]. A widely used 57-item scale, the WAI [39] is often used for evaluating nurses' work ability.

The WAI includes seven subscales (current work ability compared with lifetime best; work ability in relation to the demands of the job; number of current diseases diagnosed by a physician; estimated work impairment due to diseases; sick leave during the past year; the worker's prognosis of work ability 2 years from now; and mental health resources). Responses range from 0 to 10. Possible scores range from 7 to 49 and are classified as follows: 7–27 (poor work ability), 28–36 (moderate work ability), 37–43 (good), and 44–49 (excellent work ability). The WAI will examine both health care and workplace systems through its subscales and how they impact a nurse's resources (physical and mental). Additional questions pertain to a nurse's mental health and to workplace absenteeism. These variables will help understand the link between occupational

stress and nurses' health in acute care obstetric nursing units. Analysis in 10 European countries showed that the Cronbach  $\alpha$  for total sample amounted to 0.72, while coefficients for national samples ranged from 0.54 for Slovakia to 0.79 for Finland [43].

### 2.8. Nursing Stress Scale

The Nursing Stress Scale (NSS) is the most widely used and best known measure of stress among nurses [44]. The NSS [42] is a 34-item scale that describes situations that have been identified as causing stress for nurses in the workplace. The NSS has four response options ranging from *very frequently* to *never*.

The NSS has four response options: *very frequently*, *frequently*, *occasionally*, and *never*. The NSS is divided into seven subscales examining the psychological, physical, and social work environment (death and dying; conflict with physicians; inadequate preparation; lack of support; conflict with other nurses; workload; and uncertainty concerning treatment). The NSS has good internal consistency (0.79) [42] and individual item responses are added together for groups of items and for all 34 items in order to obtain subscale scores and total scores, respectively [42].

### 2.9. The Work-Related Quality of Life Scale

The Work-Related Quality of Life Scale (WRQoL) explores employment and nonemployment facets of life as well as current issues in the respondent's life such as occupational stress. Overall scale reliability for the item pool is very good, with a Cronbach  $\alpha$  of 0.94 [36].

WRQoL is a 24-item psychometric scale that gauges the perceived quality of work of an employee as measured in relation to six psychosocial subfactors: job and career satisfaction; general wellbeing; home–work interface; stress at work; control at work; and working conditions [35]. The WRQoL has five response options ranging from *strongly disagree* to *strongly agree*. Individual item responses are added together to obtain a total score [35]. Scores are generated for employment and nonemployment aspects of life.

### 2.10. Data analyses

Frequencies, percentages, Fisher's exact test, and multiple regression were computed using Stata version 11.0 (College Station, Texas, United States of America: Stata Press). Multiple regression analyses considered the following: (1) personal; and (2) workplace system factors as outlined by the work disability prevention framework [33]. Multiple regression analysis was used to determine if personal system variables (age, sex, job and career satisfaction, employment status, and education level) were associated with nurses' work ability scores. The second multiple regression model was used to determine if work ability index scores are related to location of cross-training, death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, workload, uncertainty concerning treatment, total stress scores, work absenteeism, and job satisfaction. Finally, we combined the factors in each of the previous two models and provided a final model that incorporates both personal and system factors. Only the models with statistical significant results are reported.

### 2.11. Ethics

This study was approved by the Laurentian University Research Ethics Board (Laurentian University, Sudbury, ON, Canada) Health Sciences North Ethics Committee (Sudbury, ON, Canada), North Bay Regional Health Centre Research Ethics Board (North Bay, ON,

Canada), the Joint Sault Area Hospital/Group Health Centre Research Ethics Board (Sault Ste. Marie, ON, Canada), and Timmins and District Hospital Research Ethics Board (Timmins, ON, Canada).

### 3. Results

In total, 111 nurses completed the survey (80.4% response rate) either online or in paper format (Table 1). The quality of data was identical for the paper and online versions of the questionnaire. Fifty-one respondents (100% response rate) at Health Sciences North completed the paper-based survey. Twenty-two respondents (70.1% response rate for site) at North Bay Regional Health Centre, 20 respondents (62.5% response rate for site) at Sault Ste. Marie, and 18 respondents (75% response rate for site) at Timmins and District Hospital completed the paper version of the survey. The majority of respondents completed the paper-based survey. A total of 51 (45.9% response rate) online questionnaires were returned and another 60 (54.1% response rate) questionnaires were completed using the paper format ( $n = 111$ ).

The majority of respondents were women (94.6%) ranging in age from 24 years to 64 years (mean = 41.9,  $\sigma = 10.2$ ). The mean age of respondents at Health Sciences North (Sudbury) was 41.6 ( $\sigma = 9.5$ ) years, 44.1 ( $\sigma = 8.64$ ) years at Timmins and District Hospital, 41.2 years ( $\sigma = 11.3$ ) at Sault Area Hospital, and 40.6 years ( $\sigma = 11.9$ ) at North Bay Health Centre. Forty-six percent of respondents worked at Health Sciences North; 19.8% worked at North Bay Regional Health Centre; 18.0% worked at Sault Area Hospital; and 16.2% at Timmins and District Hospital. The nurses had, on average, 16.3 years ( $\sigma = 10.8$ ) of nursing experience and 11.6 years ( $\sigma = 9.01$ ) of experience working in obstetrics. Sixty-three percent of respondents worked full-time, 33% worked part-time, and 4.5% were casual workers. Of the total 111 nurses included in the analysis, 60 (54.1%) were cross-trained (nurses at Health Sciences), while the remaining 51 (45.9%) were not cross-trained (nurses at North Bay Regional Health Centre, Sault Area Hospital and Timmins and District Hospital). Additionally, 21 (29.2%) participants had *low* or *medium* work ability (WAI < 37), whereas 51 participants (70.8%) had *good* or *very good* work ability (WAI  $\geq 37$ ).

Multiple regression analyses considered the following: (1) personal; (2) workplace systems; and (3) combined systems factors. Hierarchical multiple regression was calculated to explain work ability based on personal systems factors (age, sex, job and career satisfaction, marital status, employment status mean number of hours worked per week in nursing, mean number of patients per shift, income level, born in northeastern Ontario, and education level). This approach was used in order to control for the effects of covariates. Results for demographic multiple regression variables are presented in Table 2. A significant regression equation was found [ $F(7,72) = 2.32$ ,  $p = 0.04$ ], with an  $R^2$  of 0.22. The personal systems variables explained 22.1% of the variance in work ability scores, and marital status ( $p = 0.03$ ), respondent ethnicity ( $p = 0.03$ ), and mean number of patients per shift ( $p = 0.04$ ) were significantly associated with nurses' work ability scores.

The second multiple regression model calculated to explain work ability index was based on location of cross-training, death and dying, conflict with physicians, inadequate preparation, lack of support, conflict with other nurses, workload, uncertainty concerning treatment, total stress scores, work absenteeism, and job satisfaction (Table 3). Two variables, including work absenteeism ( $p = 0.015$ ) and QWL total scores ( $p = 0.005$ ), significantly contributed to the variance in work ability scores. A significant regression equation was found [ $F(11,59) = 2.23$ ,  $p = 0.02$ ], with an  $R^2$  of 0.293, or 29.3%, thus explaining variance in work ability scores. Nurses' job satisfaction scores ( $p = 0.03$ ) and workplace

**Table 1**  
Characteristics of participants

	<i>n</i>	%
Sex		
Female	87	94.6
Male	5	5.4
Age (y)		
< 35	20	24.4
35–44	29	35.3
45–54	19	23.2
$\geq 55$	14	17.1
Employment status		
Full-time	55	62.5
Part-time	33	37.5
Nursing experience (y)		
$\leq 10$	29	34.1
11–20	26	30.6
> 20	30	35.3
Nursing experience in obstetrics (y)		
< 5	24	28.2
5–14	32	37.7
> 14	29	34.1
Highest attained nursing education		
RN Diploma	50	45.0
RN University Degree	59	53.2
Masters	2	1.8
Country of birth		
Canada	87	98.9
USA	1	1.1
Born northeastern Ontario		
Yes	84	76.4
No	7	6.4
Ethnicity		
English-Canadian	58	68.2
Francophone	22	25.8
Aboriginal	3	3.5
Other	2	2.5
Marital status		
Married	69	77.5
Single	10	11.2
Divorced	8	9.0
Widowed	2	2.3
Mean time worked in nursing (h/wk)		
< 17	28	32.6
17–34	14	16.3
> 34	44	51.1
Mean number of patients per shift		
< 3	16	19.5
3–5	38	46.3
> 5	28	34.2
Mean annual income (Canadian dollars)		
< 70,000	28	32.9
70,000–80,000	9	10.6
> 80,000	48	56.5

absenteeism ( $p = 0.02$ ) were statistically associated with work ability scores.

In the final model, we combined the statistically significant factors from the personal and workplace systems in order to explain the work ability scores of nurses (Table 4). A significant

**Table 2**  
Multiple regression analysis for personal system factors explaining work ability scores of nurses ( $n = 80$ )

	$\beta$	$R^2$	<i>F</i>
Age	0.45	0.22	2.32
Sex	–0.58		
Marital status	–0.28*		
Born in north-eastern Ontario	0.04		
Years of nursing experience	–0.44*		
Ethnicity	–0.28*		
Mean number of patients per shift	–0.21		

\* $p < 0.05$ .

**Table 3**

Multiple regression analysis for workplace system factors explaining work ability scores of nurses ( $n = 71$ )

	$\beta$	$R^2$	$F$
Location of cross-training	-0.99	0.29	2.23
Death & dying	-0.38		
Conflict with physicians	0.08		
Inadequate preparation	0.05		
Lack of support	-0.13		
Conflict with other nurses	-0.18		
Workload	0.14		
Uncertainty concerning treatment	-0.07		
Total stress	-0.01		
Work absenteeism	-0.31*		
Job satisfaction	0.30 <sup>†</sup>		

\* $p < 0.05$ .

<sup>†</sup> $p < 0.01$ .

regression equation was found [ $F(4, 72) = 9.34, p < 0.01$ ], with an  $R^2$  of 0.34, or 34.2%, thus explaining variance in work ability scores. Moreover, all the factors were statistically associated with respondents work ability scores.

#### 4. Discussion

The purpose of this study was to examine the relationship between nursing personal and workplace system factors (work disability) and WAI scores in northeastern Ontario, Canada.

Rural and northern residents are unique in their culture, health needs, and health behaviors which may be both challenging and rewarding [45]. They are, on average, sicker, from lower socioeconomic status, and have lower levels of education than Ontarians in the southern portion of the province [46]. They also have inferior access to health care than people in urban areas [46].

The results of this study provide evidence that nurses' job and career satisfaction scores, nurses' control in their work environment, and workplace absenteeism are important variables in influencing work disability (personal and workplace systems).

The workplace system factors facing nurses working in northern and rural communities will reflect these distinct characteristics and warrants investigation. However, no studies have assessed occupational stress among registered nurses in northern urban areas of Canada. This research can have direct health services consequences by identifying the occupational stressors present in the workplace of nurses working in northeastern cities in Ontario.

Job and career satisfaction reflects the extent to which nurses are content with their job and prospects at work. We found that job and career satisfaction had the largest positive influence on work ability scores and is consistent with previous findings [21,22,47–49]. This presents opportunities for employers to closely work with policy

**Table 4**

Multiple regression analysis for combined systems (personal and workplace) factors explaining work ability scores of nurses ( $n = 77$ )

	$\beta$	$R^2$	$F$
Work absenteeism	-0.22*	0.34	9.34
Job satisfaction	-0.24*		
Marital status	0.29 <sup>†</sup>		
Ethnicity	0.27 <sup>†</sup>		

\* $p < 0.05$ .

<sup>†</sup> $p < 0.01$ .

makers to promote positive work environments that foster job and career satisfaction opportunities for nurses. Employers who are motivated by the imperatives of productivity, competitiveness, flexibility, and efficiency need to be made mindful of the growing evidence that work quality and satisfaction (e.g., skill, discretion, autonomy, consultation, and a healthy work environment) all contribute directly to the achievement of their goals [50]. While employers have recognized some of these factors, opportunities for nurses' career and job advancement, coupled with a positive work environment will help promote retention of staff and bolster recruitment strategies. Intuitively, we also found that higher rates of work absenteeism are associated with lower work ability scores and thus diminish nurses' capacity to do their jobs. Previous research demonstrates the importance of improving the quality of work life of nurses through improved career and educational opportunities [21,51].

This study found that nurses' perceptions of control at work had a positive influence on high work ability scores. Nurses' ability to have control and an active role in their work environment has been shown to retain nurses [52,53]. Control has shown as a principal concept in many stress research studies [15,54,55]. Nurses' perception of personal control may also influence their experience of stress and their health [36], vital to enabling nurses to cope with stress [15].

Marital status was a significant factor in the personal system ( $p = 0.03$ ) and combined ( $p = 0.013$ ) with work ability, suggesting that being married leads to higher work ability among obstetric nurses. Studies have indicated that different sources of social support work in unique ways to mitigate the strain of work stress [56]. Beyond the home environment, social support from coworkers was important and that social support and diminished level of stress were components in nurse retention [57]. Geiger-Brown and colleagues [58] examined common themes that nurses expressed regarding their work environment and how they viewed the impact of work on their personal health and wellbeing [59]. The researchers used constant comparative analysis to review raw data and identify themes, patterns, and meanings. These findings also indicated that when administrators make change within their organizations, they provide a better environment and encourage teamwork within the nursing environments [59].

We also found respondents' ethnicity was negatively related to work ability scores. This may suggest that nurses' work environments should be more attentive to the unique needs of francophone and aboriginal nurses in this region of Canada.

##### 4.1. Limitations

The representativeness of participants in this study is of potential concern and constitutes a limitation. Firstly, the cross-sectional design by which exposure and health outcomes were measured concurrently does not permit causative conclusions. Furthermore, a single survey cannot establish causal relationships between work ability and occupational stress.

Secondly, the sample population is confined to the obstetric units of four northeastern urban centers in Ontario, Canada. Generalizations beyond the study participants should be made with caution. Third, while the role of work stress and its relationship to work ability is of great interest, employees may not accurately recall sources of occupational stress. Therefore, this may be why we did not find a statistically significant relationship between total stress scores and work ability scores.

Fourthly, the views of the nurses in these units may not be representative of nurses elsewhere in different work settings (e.g., mental health, emergency, etc.), regions, or provinces. Differences

may be due to the specific organizational behaviors and workplace cultural practices as well as different jurisdiction regulations and laws. It is also important to recognize that the nurses who experienced the greatest stress may have left the workplace and, therefore, are not represented in the sample. It is anticipated that, in the future, through a snowball sampling technique in relation to the semistructured interviews, these nurses could be identified and may choose to share their experiences. How employers assist their workers in dealing with work stress and work ability is of great interest; however, assessing this relationship is a complex study. One concern is that employees may not accurately recall details of their occupational histories in order to provide accurate pictures of their self-reported work ability.

#### 4.2. Conclusion

It is understood that nursing is an especially challenging occupation with unique personal and workplace system factors in both rural and urban contexts. Ultimately, a work disability prevention may be used to better understand the relationship between the nurses work environment and its influences on their overall health status. Globally, with numerous nurses approaching retirement and fewer individuals entering the profession, nursing is experiencing a serious workforce shortage [60,61]. The mindset that work should encompass more than paid employment and consider social, political, and economic aspects as well is vital. This approach is needed in shaping public policy and guiding occupational health strategies in improving the overall quality of work life of nurses. There also is a greater need to offer and promote work flexibility in work assignments. Job responsibilities are expanding and proper training and education opportunities are necessary.

#### Conflicts of interest

All contributing authors declare no conflicts of interest.

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#### References

- Canadian Nurses Association. The Nursing Shortage – The Nursing Workforce. Ottawa (Canada): Canadian Nurses Association; 2012.
- Canadian Federation of Nurses Unions. The Nursing Workforce: Canadian Federation of Nurses Unions Background. Ottawa (Canada): Canadian Federation of Nurses Unions; 2013.
- Nowrouzi B, Lightfoot N, Carter L, Larivière M, Rukholm E, Schinke R, Belanger-Gardner D. Work ability and work-related stress: a cross-sectional study of obstetrical nurses in urban northeastern Ontario [Internet]. Work 2014.
- Oulton JA. The global nursing shortage: an overview of issues and actions. Policy Polit Nurs Pract 2006;7:345–95.
- Ministry of Health and Long Term Care. Rural and northern health care framework. Toronto (Canada): Ministry of Health and Long Term Care, Government of Ontario, Canada; 2011.
- North West Local Health Integration Network. Integrated Health Services Plan. Thunder Bay (Canada); 2013.
- North East Local Health Integration Network. Integrated Health Service Plan. North Bay (Canada); 2013.
- Sullivan MJ, Ward LC, Tripp D, French DJ, Adams H, Stanish WD. Secondary prevention of work disability: community-based psychosocial intervention for musculoskeletal disorders. J Occup Rehabil 2005;15:377–92.
- Nicholas MK, Linton SJ, Watson PJ, Main CJ. “Decade of the Flags” Working Group. Early identification and management of psychological risk factors (“yellow flags”) in patients with low back pain: a reappraisal. Phys Ther 2011;91:737–53.
- Gatchel RJ. Musculoskeletal disorders: primary and secondary interventions. J Electromyogr Kinesiol 2004;14:161–70.
- Cagno E, Micheli GJL, Masi D, Jacinto C. Economic evaluation of OSH and its way to SMEs: a constructive review. Saf Sci 2013;53:134–52.
- Lu H, Barriball KL, Zhang X, While AE. Job satisfaction among hospital nurses revisited: a systematic review. Int J Nurs Stud 2012;49:1017–38.
- Razavi JK, Kirsten W. Gulf Cooperation Council. Global Perspectives in Workplace Health Promotion; 2011.
- Rajala HK, Väyrynen S. Constructing “core stories” for contributing practical safety actions in industrial units. Saf Sci 2010;48:1393–401.
- Schmitz N, Neumann W, Oppermann R. Stress, burnout and locus of control in German nurses. Int J Nurs Stud 2000;37:95–9.
- Wu H, Chi TS, Chen L, Wang L, Jin YP. Occupational stress among hospital nurses: cross-sectional survey. J Adv Nurs 2010;66:627–34.
- Gray P. Mental health in the workplace: tackling the effects of stress. London (UK): Mental Health Foundation; 2000.
- de Jonge J, Bosma H, Peter R, Siegrist J. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. Soc Sci Med 2000;50:1317–27.
- Kudielka BM, Hanebuth D, von Känel R, Gander M-L, Grande G, Fischer JE. Health-related quality of life measured by the SF12 in working populations: associations with psychosocial work characteristics. J Occup Health Psychol 2005;10:429–40.
- Elfering A, Grebner S, Semmer NK, Gerber H. Workplace observation of work stressors, catecholamines and musculoskeletal pain among male employees. Scand J Work Environ Health 2008;34:337–44.
- Golubic R, Milosevic M, Knezevic B, Mustajbegovic J. Work-related stress, education and work ability among hospital nurses. J Adv Nurs 2009;65:2056–66.
- Opie T, Dollard M, Lenthall S, Wakerman J, Dunn S, Knight S, Macleod M. Levels of occupational stress in the remote area nursing workforce. Aust J Rural Health 2010;18:235–41.
- Ilmarinen J. The work ability index (WAI). Occup Med 2007;57:160.
- Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L, Tulkki A. Work ability index. 2nd ed. Helsinki (Finland): Finnish Institute of Occupational Health; 1998.
- Simon M, Tackenberg P, Nienhaus A, Estryn-Behar M, Conway PM, Hasselhorn H-M. Back or neck-pain-related disability of nursing staff in hospitals, nursing homes and home care in seven countries—results from the European NEXT-Study. Int J Nurs Stud 2008;45:24–34.
- Aylward M, Gaudine A, Bennett L. Nurse recruitment and retention in rural Newfoundland and Labrador communities: the experiences of healthcare managers. Online J Nurs Health Care 2011;11:54–69.
- Lea J, Cruickshank M. Factors that influence the recruitment and retention of graduate nurses in rural health care facilities. Collegian 2005;12:22–7.
- Moseley A, Jeffers L, Paterson J. The retention of the older nursing workforce: a literature review exploring factors which influence the retention and turnover of older nurses. Contemp Nurse 2008;30:46–56.
- Reitz OE, Anderson MA, Hill PD. Job embeddedness and nurse retention. Nurs Adm Q 2010;34:190–200.
- Roberge CM. Who stays in rural nursing practice? An international review of the literature on factors influencing rural nurse retention. Online J Rural Nurs Health Care 2012;9:82–93.
- Promecene PA, Monga M. Occupational stress among obstetrician/gynecologists. South Med J 2003;96:1187–9.
- Requena F. Social capital, satisfaction and quality of life in the workplace. Soc Indic Res 2003;61:331–60.
- Loisel P, Durand MJ, Berthelette D, Vezeina N, Baril R, Gagnon D, Larivière C, Tremblay C. Disability prevention—new paradigm for the management of occupational back pain. Dis Manage Health Outcomes 2001;9:351–60.
- Sancini A, Fioravanti M, Andreozzi G, Di Giorgio V, Tomei G, Tomei F, Ciarrocca M. Meta-analysis of studies examining long-term construction injury rates. Occup Med 2012;62:356–61.
- Van Laar D, Edwards JA, Easton S. The Work-Related Quality of Life scale for healthcare workers. J Adv Nurs 2007;60:325–33.
- Easton S, Van Laar D. User manual for the Work-Related Quality of Life (WRQoL) Scale: a measure of quality of working life. Portsmouth (UK): University of Portsmouth; 2012.
- Ontario Human Rights Commission. 2. What is disability? Toronto (Canada): Government of Ontario; 1990.
- Canadian Institute for Health Information. 2005 National Survey of the Work and Health of Nurses. Ottawa (Canada): Health Canada; 2005.
- Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L, Tulkki A. Work ability index. Helsinki (Finland): Finnish Institute for Occupational Health; 1994.
- Spreitzer G. Psychological empowerment in the workplace: dimensions, measurement, and validation. Acad Manag J 1995;38:1442–62.
- Pino O, Rossini G. Perceived organizational stressors and interpersonal relationships as predictors of job satisfaction and well-being among hospital nurses. Int J Psychol Behav Sci 2012;2:196–207.
- Gray-Toft P, Anderson JG. The Nursing Stress Scale: development of an instrument. J Psychopathol Behav Assess 1981;3:11–23.
- Radkiewicz P, Widderszal-Bazył M., the Next-Study group. Psychometric properties of Work Ability Index in the light of comparative survey study. Int Congress Series 2005;1280:304–9.
- French SE, Lenton R, Walters V, Eyles J. An empirical evaluation of an expanded Nursing Stress Scale. J Nurs Meas 2000;8:161–78.

- [45] Lightfoot N, Strasser R, Maar M, Jacklin K. Challenges and rewards of health research in northern, rural, and remote communities. *Ann Epidemiol* 2008;18: 507–14.
- [46] Wilson NW, Couper ID, De Vries E, Reid S, Fish T, Marais BJ. A critical review of interventions to redress the inequitable distribution of healthcare professionals to rural and remote areas. *Rural Remote Health* 2009;9:1060.
- [47] Stordeur S, D'Hoore W. Organizational configuration of hospitals succeeding in attracting and retaining nurses. *J Adv Nurs* 2007;57:45–58.
- [48] Berland A, Natvig GK, Gundersen D. Patient safety and job-related stress: a focus group study. *Intensive Crit Care Nurs* 2008;24:90–7.
- [49] Penz K, Stewart NJ, D'Arcy C, Morgan D. Predictors of job satisfaction for rural acute care registered nurses in Canada. *West J Nurs Res* 2008;30:785–800.
- [50] Lowe G, Lowe GS. *Creating healthy organizations: how vibrant workplaces inspire employees to achieve sustainable success*. University of Toronto Press; 2010.
- [51] Nowrouzi B, Lightfoot N, Carter L, Larivière M, Rukholm E, Schinke R, Belanger-Gardner D. The relationship between quality of work life and location of cross-training among obstetric nurses in urban northeastern Ontario, Canada: a population-based cross sectional study. *Int J Occup Med Environ Health* 2015;28:571–86.
- [52] Spence Laschinger H, Leiter M, Day A, Gilin D. Workplace empowerment, incivility, and burnout: impact on staff nurse recruitment and retention outcomes. *J Nurs Manag* 2009;17:302–11.
- [53] Verhaeghe R, Vlerick P, De Backer G, Van Maele G, Gemmel P. Recurrent changes in the work environment, job resources and distress among nurses: a comparative cross-sectional survey. *Int J Nurs Stud* 2008;45:382–92.
- [54] Jex SM, Spector PE. The impact of negative affectivity on stressor-strain relations: a replication and extension. *Work Stress* 1996;10:36–45.
- [55] Spector PE. Perceived control by employees: a meta-analysis of studies concerning autonomy and participation at work. *Human Relat* 1986;39: 1005–16.
- [56] Table R. The Fifth Romanian-German Symposium on Occupational Medicine. *J Prevent Med* 2007;15:136–91.
- [57] Gabe SG. *Occupational health and safety survey in small-scale clothing enterprises in Gaborone (Botswana)*. University of Limpopo (Medunsa Campus); 2010.
- [58] Geiger-Brown J, Trinkoff AM, Nielsen K, Lirtmunlikaporn S, Brady B, Vasquez EI. Nurses' perception of their work environment, health, and well-being: a qualitative perspective. *AAOHN J* 2004;52:16–22.
- [59] Shaqiri A. *Safety and health at work in the Republic of Macedonia*. SEEU Review; 2007.
- [60] Vandewater D. *Retirement and retention of late career nurses*. Halifax (Canada): College of Registered Nurses of Nova Scotia; 2005.
- [61] Murphy GT, MacKenzie A. Using evidence to meet population healthcare needs: successes and challenges. *Healthcare Papers* 2013;13:9–21.