

Work-related injury in the nursing profession: an investigation of modifiable factors

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ABSTRACT

Title. Work-related injury among the nursing profession: An investigation of modifiable factors

Aim. This paper is a report of a correlational study of the relations between work-related injury-risk events and modifiable risk factors in a nursing population after controlling for socioeconomic factors.

Background. Nurses are at high risk for work-related injury. Work-related injury is strongly influenced by psychosocial factors and physical job-related exposures, but the magnitude of effect from modifiable factors is unclear.

Method. Data were based on the Work Outcomes Research Cost-benefit survey conducted in Australia during 2005 and 2006. The study sample of 5724 represented ~14% of nurses in Queensland, Australia. Logistic regression was used to determine the magnitude of association of psychological distress (represented by the Kessler 6 score: six-item scale of psychological distress), the number of health conditions and various socio-economic factors with work place injury.

Results. High psychological distress was associated with a 5% probability of injury. As the number of health conditions increased, the probability of injury increased; 3 and ≥ 6 health conditions increased the chance of injury by 5% and 15% compared to no health conditions. Compared to the total sample, nurses that reported high levels of psychological distress demonstrated greater sensitivity to the number of health conditions. Computation of the marginal effects showed little difference in the likelihood of injury when the total sample was compared to nurses with less than 5 years of work experience.

Conclusion. Effective occupational health and safety workplace programs that target modifiable factors such as psychological distress and physical health conditions may improve the health capital of nurses and productivity levels within the profession.

SUMMARY STATEMENT

What is already known about this topic

- Nurses are at high risk for work-related injury.
- Research shows that work-related injury among health professionals is strongly influenced by psychosocial and physical job-related exposures.
- Previous injuries have been shown to be associated with future injury among nurses.

What this paper adds

- Nurses with moderate or high psychological distress are 1.4 and 1.7 times more likely to sustain an injury compared to those with low psychological distress.
- Nurses with three or more existing health conditions have significantly greater odds of work-related injury.
- Compared to the total sample, nurses that reported high levels of psychological distress demonstrated greater sensitivity to the number of health conditions on injury.

Implications for practice and/or policy

- Nurse managers, employers and other nurses need to be aware of the signs and symptoms of psychological distress and to encourage their colleagues to seek professional help when the psychological distress persists
- Effective occupational health and safety workplace programs should focus on the issue of providing adequate support to allow nurses greater opportunity to fully recover from physical and mental illness.
- Employers should implement injury risk-reducing strategies for nurses with psychological distress.

Keywords: Nurses, work-related injury, psychological distress, health conditions, risk, nursing, socio-economic.

INTRODUCTION

Globally, health workers number 35.4 million and comprise 67% of the total health workforce (World Health Organization 2006). In richer countries the health workforce can account up to 13% of the total workforce (World Health Organization 2006). Nurses are at high risk for work-related injury due to the physically demanding nature of their work and the environment in which it is conducted. Work-related injuries often impact on the health and economic well-being of nurses. Absenteeism and presenteeism associated with injuries at work also impose considerable costs to employers in terms of lower productivity, escalating workplace insurance and financial compensation.

There are reports in the literature of a link between the physical demands of clinical care and work-related injury among nurses and nursing assistants. Most relate to back and neck/shoulder pain (e.g. Smedley et al. 1997, Retsas and Pinikahna 2000). In the US, nurses and other health care workers are among the highest risk professions for back injury, ranking health care workers in the six of the top ten occupations at highest risk (Bureau of Labor Statistics 2001). Sharps and needlestick injuries are also commonly reported (Smith and Leggat 2005, Mustafa et al. 2006). Research from Turkey revealed that 79.7% of nurses experienced such injuries during their professional life (Mustafa et al. 2006). Sharp or needlestick injuries are particularly hazardous as they increase the risk of contracting infectious disease.

Langford (1997) conducted the first Australian study on the extent of occupational illness and injury sustained by nurses in the health industry. The report based on a survey of injured and ill nurses became the basis for the 1998 ANF (Australian Nursing Federation) Victorian Branch 'no lifting policy'. Further research commissioned by the Australian Safety and Compensation Council (2008) revealed that Australian nurses were exposed to a wide range of occupational hazards. Just over half

of the 955 nurses surveyed had sustained, at some stage of their career, at least one work-related injury or disease that required time off work. The most common injuries or diseases were reported as musculoskeletal (70.6%), stress (19.8%), bullying (15.1%) and infection (12.1%).

Given the high risk of injury among nurses, an important question then becomes: *what factors can be modified to reduce work-related injury among the nursing profession?*

BACKGROUND

Previous injuries have been shown to be associated with missed work and future injury among nurses (Videman et al. 2005). Other research has included workplace psychosocial factors as a risk factor of work-related injury (see Gillen et al. 2007 for a comprehensive review). Studnek and Crawford's (2007) investigation of 579 emergency medical technicians in the US identified satisfaction with current assignment and self reported physical fitness as strongly associated with self reported back problems. A similar study involving 1862 cases using multivariate logistic regression determined that increasing call volume, community size, certification level and a history of back problems were associated with reporting job related illness or injury (Studnek et al. 2007). The analysis of 1600 Turkish hospital employees showed that age, female gender, smoking, occupation, perceived work stress and heavy lifting were significant risk factors in the prevalence of low back pain (Karahan et al. 2009). Smith and Leggat's (2005) investigations of work related injuries among Australian nursing students found that being a third year student was the only statistically significant risk factor for needlestick injury.

Extending these investigations, other studies have explored the theoretical models of psychosocial stress factors as predictors of injury in hospital workers. These models included measures of Demand–Control (DC) and Effort-Reward Imbalance (ERI) (Karasek et al. 1998, Bosma et al.

1998, Gillen et al. 2007). The DC measure postulates that the combination of high psychological demands and low decision latitude can cause health disrupting stress reactions leading to “job strain”. The ERI measure proposes that stress reactions are caused by a combination of high effort and low rewards in terms of compensation, respect, advancement prospects and job security. Various studies have tested these and similar models on nursing staff (see Salminen et al. 2003, Eriksen et al. 2004, Jhun et al. 2004, Cheung et al. 2006, Gillen et al. 2007). Gillen’s (2007) study of two hospital sites in the US supports the consensus that work-related injury is strongly influenced by psychosocial and physical job-related exposures.

Australian studies of the nursing profession have focused on issues of work conditions, work-related stress, recruitment and retention (Moyle et al. 2003, Hegney et al. 2006, Eley et al. 2007a, Eley et al. 2007b). This is also the case overseas (see Andrews and Dziegielewski (2005) for a review of the literature, Shields and Ward 2001, Hart 2001, Tourangeau and Cranley 2006). However, research on the factors associated with work-related injury tends to be dominated by overseas investigations. Such findings cannot be easily translated into the Australian context. Factors associated with injury rates may vary in importance from one country to another based on differences in institutional, social and demographic settings relating to union membership, workplace laws, wage rates, health and safety regulations, level of qualifications, health expenditure per capita and management systems to name a few.

This study extends the work of previous research. This research benefits from the use of a large cross-sectional database (<http://www.qcmhr.uq.edu.au/worc>) that contains 5724 observations on Queensland nurses – making this the largest Australian study of this nature. Confining the analysis to nurses working in the State of Queensland captured the award agreements of that State and reduced the complexities associated with heterogeneous institutional factors and labour market

forces experienced among various Australian States. Information relating to health includes both mental and physical conditions.

Health production model

There is the widespread view that injuries within the nursing profession can be best prevented by engineering controls and new products that are touted as safer devices (Hanrahan and Reutter 1997) e.g. disposal containers and lifting devices. Research relating to potential influential factors has been given less attention by policy makers. On the basis of the findings of their critical review of the literature, Hanrahan and Reutter (1997) noted that interventions such as disposal containers were shown to alter the type, but not necessarily the overall number of sharps injuries. In the pursuit of reducing work related injuries, workforce policies need to consider a range of factors including issues relating to the individual.

The health production model assumes that the individual inherits an initial stock of health that depreciates over time. The individual can positively influence the stock of health capital (Grossman 1972). The greater the health stock the greater the number of healthy days. This in turn provides a greater number of days available for work to create income. Similar to machinery or capital stock, an individual's health can depreciate over time owing to excessive factors such as smoking, ageing or exposure to stressful environments. This can be offset by investments in health capital through a combination of an individual's own time and market goods such as regular exercise, diet, medical care, rest and education.

This study focuses on the health capital of nurses. Here work-related injury is used as a measure of health outcome that depends on certain characteristics and bundles of goods and services - some that add to injury and others that detract from injury.

THE STUDY

Aim

The aim of this study was to examine the relations between work-related injuries and modifiable risk factors among nursing professionals after controlling for socioeconomic factors.

Design

This cross sectional study was based on questionnaires sent to Australian employees in 2005/06.

Participants

The study utilised a large convenience sample that represented 14 percent (5724 out of 41,373 nurses (AIHW 2008)) of the employed registered and enrolled Queensland nurses. The analysis was confined to nursing professionals aged 18 to 65 years. Those aged over 65 were excluded from the analysis because the minimum Age Pension for males is 65 years in Australia. This excluded 0.26 percent of the respondents captured in the survey sample.

Data collection

The information in this paper was collected from the Health and Performance at Work Questionnaire (HPQ) developed by the World Health Organisation (WHO). The data were compiled as a component of the Work Outcomes Research Cost-benefit (WORC) Project (www.qcmhr.uq.edu.au/worc). The WORC Project was designed to investigate the return on investment, from an employer's perspective, from early detection of depression and facilitating help-seeking behaviours by employees.

Detailed information on the engagement of companies and HPQ survey distribution has been previously published (Hilton et al. 2008). Data were collected through 58 large (>1000 employees) companies (representing over 350,000 employees) across Australia. Employers agreed to distribute the surveys to their employees via paper or the internet between October 2005 and October 2006. Overall 78,726 employees responded to the HPQ survey.

There may be some degree of response bias based on the mode of survey administration. Response rates were greater for employers that distributed paper only (32% response rate) than for employers who distributed the survey by the internet only (26% response rate). Employers who used a combined internet and paper approach had an average response rate of 23%.

Each employer signed an agreement that responses of their employees would remain confidential. Several measures were also implemented to ensure confidentiality on the internet. The email inviting employees to answer the HPQ via the internet contained a link to a secure data server hosted by DataStat USA. DataStat's internal network was protected by a Linux-based stateful firewall. This utilized a conservative rule set and included protection against all common forms of attack. In addition, the firewall was equipped with a network-based intrusion detection system. All windows servers were equipped with virus detection agents and regularly updated for security. Physical access to DataStat's staff work areas was restricted by keyed code access and protected by an intrusion alarm to detect and send a remote alert in case of physical intrusion.

To further assure confidentiality survey data was supplied to the researchers via secure FTP in an encrypted format. Decryption codes were stored in a locked filing cabinet.

Questionnaire

The HPQ is a health risk assessment survey developed for the purpose of estimating the impact of health problems on the workplace (Kessler et al. 2003). It consists of 24 questions about chronic physical health conditions, four questions regarding chronic mental health conditions, in addition to work performance and demographic questions. Further information about the HPQ can be accessed at www.hcp.med.harvard.edu/hpq/.

Ethical considerations

The Human Research Ethics Committee of a major University approved the study protocol. Employees over the age of 18 years were invited to respond to the HPQ. Each survey was accompanied by an introductory letter informing the employee that the survey was voluntary and confidential. By completing the survey each employee indicated consent.

Data analysis

Data were analysed using the statistical package Stata version 10.1 (StataCorp, Texas, USA). A binary logistic regression is run to estimate the relationship between a work-related injury and risk factors.

$$\text{logit}(E(\text{Injury}_i)) = \alpha + \beta_1 \text{K6score}_i + \beta_2 \ln\text{HourlyWage}_i + \beta_3 \text{HlthCond}_i + \beta_4 Z_i + \beta_5 X_i + \varepsilon_i \quad (1)$$

where Injury_i is a dichotomous dependent variable: 1 is the i^{th} individual with a work-related injury. 0 is otherwise. The variable is based on the survey question that asked respondents, “*In the past 12 months, did you have a work-related accident, injury or poisoning that required medical attention?*”

Based on the availability of the data and the theoretical model, the variables in the model also consist of the following:

1. *K6score*. Previous research highlights the importance of considering mental health issues in examining work-related injury. Major causes of sickness presenteeism are related to mental health (Marlowe 2002). Research by Wang et al. (2004) showed depression as the only condition associated with a decrease in an employee's ability to stay focused on tasks. To capture the state of mental health, the K6 score was included as a measure of psychological distress (discussed below). This variable also becomes a proxy for the Demand–Control measure for job strain used by Gillen and colleagues (2007).
2. *lnHourlywage*. The hourly wage rate is a proxy for the Effort-Reward Imbalance that measures high effort and low reward. Previous research used an effort-reward score (Gillen et al. 2007) in the model for work-related injury.
3. *HlthCond*. This variable captures the number of pre-existing health conditions. As the number of health conditions experienced by an individual increases one would expect a greater strain on the individual. The number of health conditions is treated as exogenous.
4. *Z*. The vector *Z* represents employment characteristics such as work experience and employment status. Injury may reduce hours worked and hours worked are expected to positively correlate with the likelihood of injury. To overcome this issue of endogeneity the model uses employment status, either part-time or full-time employment, to represent hours worked. This categorical variable is less endogenous with injury. In the short run, if an individual possesses an injury they are likely to reduce hours worked rather than change from full-time to part-time employment.
5. *X*. Personal demographics is represented by *X*, a vector of control variables relating to the respondent's personal characteristics such as marital status, gender, education and the

number of children. Applying these characteristics allow the control for as much as possible of the unobserved individual fixed effects.

After fitting the model with logistic regression, the statistical package Stata10.1 allowed the computation of the marginal effects (Baum 2006). Initially the option computed the marginal effects at the multivariate point of means. That is, the marginal effects for an average nurse.

Previous studies have identified low nursing experience as a significant factor in work-related injury (Smith and Leggat 2005, Mustafa et al. 2006). The marginal effects analysis also evaluated the estimated function when nursing had less than 5 years of work experience. The output allowed a comparison between relatively inexperienced nurses (less than 5 years experience) with the mean of the total sample.

Lastly, an additional computation of the marginal effects set the psychological distress (K6score) to equal high. A sample of nurses with a high level of psychological distress was compared with the mean of the total sample.

Data

In the model, the number of health conditions is included as a categorical variable. The ability to isolate those with only one health condition takes into consideration the possibility that one health condition may relate to injury. 'No health condition' is the reference category.

To construct hourly wage several steps were taken. First, the variable hours worked per week, was derived from the hours employees were expected to work by their employer over the last 28 days divided by 4 weeks. This captured the shift work component within the nursing profession. Second,

the midpoint of each range of annual income before tax was used to obtain the income variable. Permanent income such as annual income has a stronger effect on health than transitory variations in income. The hourly wage was constructed by dividing the annual income by the hours employees were expected to work in a typical seven day period, divided by 52 weeks. The variable was then converted to its logarithm. This produced a level of skewness and kurtosis within the acceptable range of a normal distribution.

The data did not include information on actual labor market experience. In the absence of such information, the traditional approach is to use the Mincer proxy for potential labor market experience calculated as age minus number of years of education minus six (in Queensland children generally start school at 6 years of age). The derivation of this variable required a number of intermediate steps. In order to calculate the number of years of full-time equivalent education, it was assumed that each post-secondary qualification lasted a specific length of time (Kidd and Shannon 1996). Similar to other studies, Mincer and Mincer Squared were included in the model (Kidd and Shannon 1996, Langford 1995). Mincer Squared captured the effect of labour market experience. The analysis added a children status variable to capture the effect of child-rearing on women's labour force experience.

The remaining variables are used as covariates in the model.

Validity and reliability

The K6 (scale of psychological distress), embedded in the HPQ survey, was evaluated to give psychometric data. The K6 score is a six-item scale of psychological distress with high internal consistency and reliability. The K6 strongly discriminates between community mental health cases and non-cases (Kessler et al. 2002, Furukawa et al. 2003, Kessler et al. 2003, Cairney et al. 2007).

Each of the six items on the K6 is rated by the respondent on a five-point scale from “none of the time” (value = 0) to “all of the time” (value =4) (Furukawa 2003). The K6 is scored by the summation of the response values; thus, the range is 0 to 24. Calibration studies indicate that a score of 13 to 24 represents high psychological distress (mental disorder likely), 8-12 moderate psychological distress (possible mental disorder), and 0 to 7 low psychological distress (mental disorder unlikely) (Kessler 2003b). In this study we employ published methods to represent low, moderate and high psychological distress. Detailed information on the K6 including scoring has been published (Furukawa et al. 2003, Kessler et al. 2003).

The HPQ lists 24 physical health conditions. The reliability of the chronic conditions check list was also evaluated prior to analysis. Respondents were asked to identify the presence or absence of any physical health condition(s). Check lists of this sort have been widely used in previous population based studies. Good concordance between checklists and medical records has been shown (Heliövaara 1993; Halabi 1992; Kriegsman 1996).

RESULTS

Descriptive statistics

Table 1 presents the definitions, frequencies and proportions or mean values for the variables included in the models. Most respondents are female (90.57 percent), married (70.89 percent) and possess a low level of psychological distress (72.83 percent). The majority report an education above grade 12 level. The sample is almost evenly split between full time (50.49 percent) and part time (49.51 percent) employment. Respondents report a mean of 23 years labour market experience and a mean hourly wage of \$24.57. The mean age of 43 years reflects the ageing of the nursing workforce. Only 11.98 percent of those sampled report no existing health conditions.

The characteristics of the WORC sample resemble the nurse population in Queensland as reported by the Australian Bureau of Statistics (ABS). The ABS report 94 percent of nurses being female, nurses with an average age of 47 years and 50 percent of nurses employed part-time (AIHW 2008 p29).

INSERT TABLE 1 HERE

The analysis is presented for the pooled sample and also stratified into injury and no injury categories. Of the pooled sample, 10.13 percent of nurses reported a work-related accident, injury or poisoning in the last 12 months that required medical attention. Males, those who are unmarried, work full-time, have four or more health conditions and a medium to high K6 score appear more vulnerable to injury compared to their counterparts.

Regression analysis

The results of the binary logistic regression are presented in Table 2. Males and unmarried individuals have more work-related injury compared to their counterparts. The probability of injury increases by a multiplicative factor of 1.37 and 1.68, respectively, as the K6 score moves from low to medium and low to high levels of psychological distress. The odds ratio and significance level shows little significant change in the likelihood of injury on the basis of a change in the years of work experience (Mincer and Mincer Squared). Compared to individuals with no health conditions those with three or more conditions have greater odds of work-related injury.

INSERT TABLE 2 HERE

Marginal effects: total sample versus nurses with less than 5 years of work experience

Also of interest is the probability of injury for the average nurse who possesses over 20 years of work experience compared with nurses who possess fewer years of work experience. The marginal effects of the total sample *and the sample of nurses with less than 5 years of work experience* are presented in Table 3. The mean values of the average nurse are also reported.

Referring to the total nursing sample, the average nurse has a mean work experience value of 23 years. The marginal effects of the total sample indicate that males and the unmarried have a 2% higher probability of injury. Those with high psychological distress have a 5% probability of injury. As the number of health conditions increase, the probability of an individual receiving a work-related injury rises from 5% for 3 health conditions to 15% for 6 or more health conditions.

INSERT TABLE 3 HERE

A comparison of the marginal effects of the total sample with nurses of less than five years of work experience show that, with the exception of 5 and 6 or more health conditions, the significant coefficients are only between 0.2% and 0.8% higher for the less experienced nurses. There appears to be little difference in the likelihood of injury on the basis of work experience.

Marginal effects: total sample versus nurses with high levels of psychological distress

Table 4 presents the output of the analysis relating to the marginal effects of the total sample and the nurses that reported high levels of psychological distress. The significant marginal effects (sex, married, three or more health conditions) are exaggerated for the sample of high distressed nurses compared to the total sample. For instance, the effect of 3 or more health conditions on work-related injury are 2% (0.066 versus 0.047) to 5% (0.204 versus 0.149) higher for nurses experiencing high levels of psychological distress compared to the total sample.

INSERT TABLE 4 HERE

DISCUSSION

Study limitations

The study relied on a large sample of self-reported data. As such, previous health conditions, work performance, and injuries were not validated. The sample was obtained from 14 percent of the nursing population and therefore may suffer from responder bias. Nevertheless, the demographic characteristics of the responders closely resembled the National and State profiles of nurses.

The Mincer variable is not an ideal measure of the labour market experience. The mean labour market experience of 23 years reported in this study may be overestimated. Given that 91 percent of the sample respondents were women, it is expected that a high proportion would have experienced breaks in the workforce to perform carer and child rearing duties. This labour market experience figure is further exaggerated by 50 per cent of respondents that reported working part-time. Including the number of children variable in the model, to some extent, controlled for the breaks in the workforce. Eley and colleague's (2007b) investigation of 1369 Queensland nurses identified a break from the nursing profession of 5.1 mean years for the aged care sector, 2.6 for the public sector and 2.9 for the private sector (Eley et al. 2007b).

Discussion of results

This study investigated the depreciation of the health capital of nurses as measured by work-related injury. Higher psychological distress and health conditions were correlated with an increase in injury rates among nurses. Consistent with the health production model, the depreciation of health capital reduced the number of healthy days available for work. The identification of certain

variables that detract from health capital is important in developing policies that can improve the injury rates within the nursing profession.

Little research exists on the factors associated with work-related injury among the Australian nursing profession. Although studies from abroad do provide some insight into the modifiable risk factors, this study adds to the literature by investigating nurses in the Australian context that captures institutional, social and demographic settings.

Approximately 10 percent of the sample of nursing professionals reported a work-related accident, injury or poisoning that required medical attention. This rate resembled the 9.4 percent estimated by Studnek et al. (2007) for the prevalence of work-related illness or injury with time away from work.

The analysis of the data identified males as more vulnerable to work-related injury. This possibly reflects their greater exposure to physically demanding tasks. There may be a tendency for female nurses to call on male nurses to assist them when they are confronted with difficult patients. Also nurse managers may allocate male nurses to more physically demanding duties.

Our findings of a significant association between psychological distress and work-related injury, are consistent with previous investigations (Hegney et al. 2006, Eley et al. 2007a, ASCC 2008, Karahan et al. 2009). This association is concerning; that is, most unintentional injuries can be avoided and psychological distress can be reduced through appropriate prevention and early intervention strategies. Nurse managers, employers and other nurses need to be aware of the signs and symptoms of prolonged psychological distress and encourage nurses with psychological symptoms to seek professional help. Moreover, psychological distress in healthcare workers carries risks for patient care. For example, pediatricians with depression are 6.2 times more likely to make medication

errors than non-depressed colleagues (Fahrenkopf et al. 2008) and it is possible that similar risks exist for patients being treated by nurses with mental health problems

Studies have demonstrated a link between work-related injury and several characteristics such as previous injuries (Videman et al. 2005, Studnek et al. 2007) and physical fitness (Studnek and MacCrawford 2007). We found that the number of existing health conditions increased the likelihood of work-related injury. Effective occupational health and safety workplace programs should focus on providing adequate support to allow nurses greater opportunity to fully recover from physical and mental illness. Moreover, professional treatment should be facilitated, by encouraging referrals to appropriate services such as medical specialists, physiotherapists and/or psychologists, to improve management of chronic diseases, musculo-skeletal limitations, and psychological distress.

The analysis also involved the computation of the marginal effects of three groups - the total sample, nurses with less than 5 years work experience and nurses with high levels of psychological distress. Compared to the total sample, the likelihood of injury on the coefficients for the remaining two groups of nurses was exaggerated. The distress level more so than work experience mattered in the association with injury rates.

CONCLUSION

The purpose of this study was to determine which characteristics were associated with work-related injury and to discern what factors, if any, could be modified to reduce the risk of injury. If modifiable factors significantly impact on work-related injury, a case is made to develop strategically effective occupational health and safety workplace programs that proactively improve the health capital of nursing professionals. The evidence also provides a basis for future research

that relates to improvements in retention rates and productivity levels within the profession. An understanding of the risk factors associated with work-related injury is important to the nursing profession, planners of occupational health and safety, employers and clients of health care services.

The findings imply that any workplace program directed towards the reduction of injury should include prevention and early intervention strategies that reduce psychological distress. Also occupational and safety workplace programs need to focus on providing adequate support to allow nurses greater opportunity to fully recover from physical and mental health conditions.

Possessing several health conditions was associated with work-related injury. The possession of either one or two health conditions was not significant. This finding highlights the importance of co-morbidity when investigating injury at work. Future studies need to dispel the commonly held notion that the possession of one health condition has a similar impact on injury as does several health conditions.

Similar to other countries, Australia is experiencing a shortage of nurses (Buchan and Calman 2004). The state of Queensland possesses the lowest nursing rate of all the Australian states (AIHW 2008 p21). Given the current difficulties of attracting and retaining nursing professionals, the ability to provide additional resources, including adequate recovery time will be a challenge for policy makers.

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Table 1 Definition of variables. Queensland Nursing Professionals, 18 – 65 years

Variable Name	Definition of Variable	Pooled		Injury		No injury	
		n=5724	%/Mn	n=580	%/Mn	n=5144	%/Mn
Injury	Work-related injury requiring medical attention during last 12 months (percent)	5724	100	580	10.13	5144	89.87
Sex	1 = male (percent)	540	9.43	69	11.90	471	9.16
	2 = female (percent)	5184	90.57	511	88.10	4673	90.84
Marital status	0 = not married (percent)	1666	29.11	202	34.83	1464	28.46
	1 = married (percent)	4058	70.89	378	65.17	3680	71.54
Number of children – categorical variable	0	4965	86.77	507	87.41	4458	86.66
	1	154	2.68	15	2.59	139	2.70
	2	324	5.66	30	5.17	294	5.72
	>2	281	4.89	28	4.83	253	4.92
Educational level	Year 11 or under – referent (percent)	652	11.39	64	11.03	588	11.43
	Year 12 (percent)	561	9.80	51	8.79	510	9.91
	Tertiary education (percent)	1342	23.45	141	24.31	1201	23.35
	Degree graduate (percent)	1854	32.39	194	33.45	1660	32.27
	Post graduate (percent)	1315	22.97	130	22.41	1185	23.04
Hourly wage	Hourly wage. Continuous variable (mean)		24.57		24.17		24.61
Employment	1 = Full-time (percent)	2890	50.49	321	55.34	2569	49.94
	0 = Part-time (percent)	2834	49.51	259	44.66	2575	50.06
Mincer	Labour market experience proxy. Continuous variable (mean)		23.26		23.29		23.27
Number of health conditions – categorical variable	0 – referent (percent)	686	11.98	36	6.21	650	12.64
	1	843	14.73	50	8.62	793	15.42
	2	913	15.95	62	10.69	851	16.54
	3	844	14.74	69	11.90	775	15.07
	4	685	11.97	74	12.76	611	11.88
	5	483	8.44	62	10.69	421	8.18
	6 and over	1270	22.19	227	39.14	1043	20.28
K6score	Low – referent (percent)	4169	72.83	360	60.34	3819	74.24
	Medium (percent)	1297	22.66	188	32.41	1109	21.56
	High (percent)	258	4.51	42	7.24	216	4.20

Source: WORC Survey 2005/6

Table 2 Work-related injury among Queensland nurses: logistic regression

	Odds Ratio	P-value	95% Conf. Interval	
Sex (Female)	0.745	0.040	0.563	0.987
Marital status (married)	0.810	0.030	0.670	0.980
Number of children	0.957	0.434	0.858	1.068
Educational level ^a =Year12	0.998	0.994	0.658	1.512
=Tertiary	1.135	0.472	0.803	1.605
=Degree	1.129	0.521	0.779	1.636
=Postgraduate	1.021	0.916	0.693	1.503
Log of hourly wage	0.812	0.439	0.480	1.375
Employment (full-time)	1.112	0.262	0.924	1.339
Work exp (Mincer)	0.986	0.354	0.956	1.017
Work exp squared (MincerSq)	1.000	0.656	1.000	1.001
K6score ^b =medium	1.373	0.002	1.124	1.677
=high	1.680	0.004	1.175	2.403
No. of health conditions ^c =1	1.134	0.577	0.729	1.765
=2	1.320	0.201	0.863	2.020
=3	1.628	0.023	1.070	2.476
=4	2.207	<0.001	1.453	3.353
=5	2.651	<0.001	1.715	4.097
=6&over	3.740	<0.001	2.561	5.462

Source: WORC Survey 2005/6

^a Referent is year 11 and below

^b Referent is low K6score

^c Referent is no physical health conditions

Table 3 Marginal effects of work-related injury among Queensland nurses computed after logistic regression analysis: a comparison between the total sample and nurses reporting less than 5 years of work experience

Variable	Mean	Total sample of nurses with a mean of 23 years of work experience				Sample of nurses with less than 5 years of work experience			
		Marginal Effects	95% CI		P-value	Marginal Effects	95% CI		P-value
Sex (female)	1.906	-0.024	-0.047	-0.001	0.040	-0.027	-0.054	0.000	0.051
Marital status (married)*	0.709	-0.018	-0.035	-0.001	0.036	-0.020	-0.039	-0.001	0.035
Number of children	0.302	-0.004	-0.013	0.005	0.434	-0.004	-0.014	0.006	0.398
Educational level ^a									
=Year12*	0.098	-0.000	-0.034	0.034	0.994	-0.003	-0.039	0.034	0.893
=Tertiary*	0.234	0.011	-0.019	0.041	0.484	0.010	-0.023	0.042	0.56
=Degree*	0.324	0.010	-0.021	0.042	0.529	0.011	-0.024	0.045	0.555
=Postgraduate*	0.230	0.002	-0.030	0.034	0.916	0.001	-0.034	0.036	0.964
Log of hourly wage	1.358	-0.017	-0.060	0.026	0.439	-0.019	-0.067	0.029	0.442
Employment (full-time)*	0.505	0.009	-0.007	0.024	0.261	0.010	-0.007	0.026	0.267
Work experience (Mincer)		-0.001	-0.004	0.001	0.353	-0.012	-0.047	0.024	0.52
Work exp squared (MincerSq)	665.979	0.000	-0.000	0.000	0.656	-0.000	-0.000	0.000	0.238
K6score ^b									
=medium*	0.227	0.028	0.009	0.047	0.004	0.031	0.008	0.053	0.007
=high*	0.045	0.052	0.009	0.094	0.017	0.057	0.008	0.106	0.023
No. of health conditions ^c									
=1*	0.147	0.011	-0.028	0.050	0.590	0.012	-0.031	0.055	0.588
=2*	0.160	0.025	-0.016	0.065	0.234	0.027	-0.018	0.073	0.243
=3*	0.147	0.046	0.001	0.091	0.045	0.051	-0.001	0.103	0.056
=4*	0.120	0.083	0.029	0.138	0.003	0.091	0.027	0.155	0.005
=5*	0.084	0.111	0.047	0.176	0.001	0.121	0.044	0.198	0.002
=6&over*	0.222	0.148	0.094	0.202	0.000	0.161	0.089	0.233	0

Source: WORC Survey 2005/6

(*) marginal effect is for discrete change of dummy variable from 0 to 1

^a Referent is year 11 and below

^b Referent is low K6score

^c Referent is no physical health conditions

Table 4 Marginal effects of work-related injury among Queensland nurses computed after logistic regression analysis: a comparison between the total sample and nurses reporting high levels of psychological distress

Variable	Mean	Total sample				Nurses with high psychological distress			
		Marginal Effects	95% CI		P-value	Marginal Effects	95% CI		P-value
Sex (female)	1.906	-0.024	-0.047	-0.001	0.039	-0.035	-0.069	-0.001	0.042
Marital status (married)*	0.709	-0.018	-0.035	-0.001	0.036	-0.026	-0.050	-0.002	0.036
Number of children	0.302	-0.004	-0.013	0.005	0.435	-0.005	-0.018	0.008	0.439
Educational level ^a									
=Year12*	0.098	-0.000	-0.034	0.034	0.989	-0.000	-0.050	0.049	0.992
=Tertiary*	0.234	0.011	-0.019	0.041	0.492	0.015	-0.028	0.058	0.489
=Degree*	0.324	0.010	-0.022	0.042	0.532	0.015	-0.031	0.060	0.532
=Postgraduate*	0.230	0.001	-0.031	0.033	0.932	0.002	-0.044	0.048	0.929
Log of hourly wage	1.358	-0.017	-0.060	0.026	0.442	-0.025	-0.087	0.038	0.443
Employment (full-time)*	0.505	0.009	-0.006	0.024	0.257	0.013	-0.009	0.035	0.260
Work experience (Mincer)	23.249	-0.001	-0.004	0.001	0.360	-0.002	-0.005	0.002	0.351
Work exp squared (MincerSq)	665.979	0.000	-0.000	0.000	0.674	0.000	-0.000	0.000	0.660
K6score^b		0.023	0.011	0.035	0.000	0.034	0.011	0.057	0.004
No. of health conditions ^c									
=1*	0.147	0.011	-0.028	0.050	0.588	0.016	-0.041	0.072	0.587
=2*	0.160	0.025	-0.016	0.066	0.231	0.036	-0.022	0.094	0.227
=3*	0.147	0.047	0.001	0.092	0.043	0.066	0.003	0.130	0.040
=4*	0.120	0.084	0.030	0.138	0.002	0.117	0.043	0.190	0.002
=5*	0.084	0.112	0.048	0.177	0.001	0.154	0.069	0.238	0.000
=6&over*	0.222	0.149	0.096	0.203	0.000	0.204	0.134	0.274	0.000

Source: WORC Survey 2005/6

(*) marginal effect is for discrete change of dummy variable from 0 to 1

^a Referent is year 11 and below

^b K6score is a continuous variable.

^c Referent is no physical health conditions