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Association between work-family conflict and musculoskeletal pain among hospital patient care workers

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Abstract

Background—A growing body of evidence suggests that work-family conflict is an important risk factor for workers' health and well-being. The goal of this study is to examine association between work-family conflict and musculoskeletal pain among hospital patient care workers.

Methods—We analyzed a cross-sectional survey of 1119 hospital patient care workers in 105 units in two urban, academic hospitals. Work-family conflict was measured by 5-item Work-

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Family Conflict Scale questionnaire. Multilevel logistic regression was applied to examine associations between work-family conflict and self-reported musculoskeletal pain in the past 3 months, adjusting for confounders including work-related psychosocial factors and physical work factors.

Results—In fully adjusted models, high work-family conflict was strongly associated with neck or shoulder pain (OR: 2.34, 95% CI: 1.64 - 3.34), arm pain (OR: 2.79, 95% CI: 1.64 - 4.75), lower extremity pain (OR: 2.20, 95% CI: 1.54- 3.15) and any musculoskeletal pain (OR: 2.45, 95% CI: 1.56 - 3.85), and a number of body areas in pain (OR: 2.47, 95% CI: 1.82 - 3.36) in the past 3 months. The association with low back pain was attenuated and became non-significant after adjusting for confounders.

Conclusions—Given the consistent associations between work-family conflict and self-reported musculoskeletal pains, the results suggest that work-family conflict could be an important domain for health promotion and workplace policy development among hospital patient care workers.

Keywords

Work-family conflict; musculoskeletal symptoms; low back pain; hospital worker

Introduction

A growing body of evidence demonstrates that work-family conflict, defined as a bidirectional conflict between work and family roles, is an important risk factor for workers' health and well-being [Amstad, et al. 2011, Allen and Armstrong 2006]. Previous studies have focused on the impacts of work-family conflicts on workers' well-being (e.g. job satisfaction[Cortese, et al. 2010], intention to turnover[Fuss, et al. 2008], and health satisfaction[Knecht, et al. 2011]) and mental health outcomes (e.g. depression [Hammer, et al. 2005, Frone, et al. 1996, Okechukwu, et al. 2012] , substance dependence disorder[Frone 2000], and mood/anxiety disorders[Wang, et al. 2007]).

Recently, several studies have suggested that work-family conflict could be detrimental to workers' physical health outcomes as well [Clays, et al. 2009, Jansen, et al. 2006, Berkman, et al. 2010, Sabbath, et al. 2012, Ohta, et al. 2011]. For example, in a prospective study of over 6000 employees, Jansen et al showed that workers with high work-family conflict were more likely to have long duration of sickness absence than workers with low-medium work-family conflict after adjusting for confounders including work schedule and having dependent children [Jansen, et al. 2006]. Also, Berkman et al found that working with managers who are supportive about work-family need is associated with reduced cardiovascular disease risk [Berkman, et al. 2010].

Work-family conflict is of increasing concern for workers who provide direct patient care in hospitals [Grzywacz, et al. 2006] . For example, one U.S. survey of nurses showed that more than 90% experienced work-family conflict more than once over the past six months and fully half reported experiencing work-family conflict more than one day per week [Grzywacz, et al. 2006]. Previous studies have also found that work-family conflict is associated with various negative outcomes such as job dissatisfaction [Cortese, et al. 2010],

lower sense of coherence [Takeuchi and Yamazaki 2010], and increase of perceived work demand[Camerino, et al. 2010] among patient care workers in hospitals.

However, little is known about how work-family conflict is related to physical health outcomes such as musculoskeletal disorders among hospital patient care workers despite their high prevalence of musculoskeletal disorders [Engels, et al. 1996]. In two studies, Hammig and colleagues investigated the association between work-family conflict and musculoskeletal pain [Hammig and Bauer 2009, Hammig, et al. 2011]. They found an association between high work-family conflict and self-reported neck/shoulder pain and back pain among workers across four different industries including the healthcare sector [Hammig, et al. 2011]. However, this study did not adjust for working conditions such as night shift work and number of work hours. These factors are particularly critical for hospital health care workers in relation to both their experiences of work-family conflict and their potential exposure to musculoskeletal pain [Camerino, et al. 2010, Trinkoff, et al. 2006, Dex and Bond 2005, Eriksen, et al. 2004]. In addition, the focus on neck, shoulder and back pain may miss other types of musculoskeletal pain common among hospital patient care workers, who are known to experience a high rate of musculoskeletal pain in other body areas such as arm and low extremities [Ando, et al. 2000, Smith, et al. 2003].

In this study, we selected potential confounders that have been associated with work-family conflict and musculoskeletal pain based on previous studies. After adjusting for those confounders including six physical work factors and four work-related psychosocial factors, we examined whether work-family conflict is associated with self-reported musculoskeletal pain (i.e. neck or shoulder pain, arm pain, low back pain, leg pain, any musculoskeletal pain, and a number of body areas in pain) in the past 3 months among hospital patient care workers.

Materials and Methods

Study population

We conducted a cross-sectional survey of 2000 randomly selected patient care workers in two large academic hospitals in the metropolitan Boston area between October 2009 and February 2010. This survey was part of the “Be Well Work Well” study, conducted by the Harvard School of Public Health Center for Work, Health and Wellbeing. Eligible participants included registered nurses, licensed practical nurses, and patient care/nursing assistants with direct patient care responsibilities. A detailed description of the study design, protocol and process of data collection is provided elsewhere [Sorensen, et al. 2011, Dennerlein, et al. 2012]. All project materials and methods were approved by the Institutional Review Board of Partners HealthCare.

Among 2000 workers, 1572 (79%) health care workers completed the survey. After excluding workers with missing values either for work-family conflict or for any confounder, we analyzed a total of 1199 patient care workers in 105 units with 12 different types of units (i.e. emergency department, operating room, adult medical/surgical, adult intensive care, step-down, pediatric medical/surgical, pediatric/ neonatal intensive care, psychiatry, obstetrics/postpartum, float pool, ambulatory units and orthopedics).

Measures

Work-family conflict—Work-family conflict was measured by the Work-Family Conflict Scale questionnaire, which was developed by Netemeyer to address how work can interfere with family life [Netemeyer, et al. 1996]. We modified wording of the questionnaire so that workers without family member in their household could also be eligible to answer the questions. The survey questions include: How much do you agree or disagree with the following statements: (1) The demands of my work interfere with my family or personal time. (2) The amount of time my job takes up makes it difficult to fulfill family or personal responsibilities. (3) Things I want to do at home do not get done because of the demands my job puts on me. (4) My job produces strain that makes it difficult to fulfill my family or personal duties. (5) Due to work-related duties, I have to make changes to my plans for family or personal activities. For each question, five ordinal answers were available (1: strongly disagree, 2: disagree, 3: neither disagree nor agree, 4: agree, 5: strongly agree). We classified the summed responses of workers into three categories (5-12: Low, 13-17: Intermediate, 18-25: High). Cronbach's alpha among five questions used to measure work-family conflict was 0.89.

Self-reported musculoskeletal pains in the past 3 months—Musculoskeletal pains were assessed for the past 3 months based on the Standardized Nordic Questionnaire for musculoskeletal symptoms [20-21]. Specifically we asked, “During the past 3 months, have you had pain or aching in any of the areas shown on the diagram?” The areas were lower back, shoulder, neck, wrist or forearm, knee, ankle or feet, and none of the above. We combined responses for the neck and shoulder into a single neck/shoulder area and the responses for the knees, ankle and feet were grouped into a single lower extremity body area. We then created an ordinal variable of the number of body areas in pain (0 to 4) by summing the responses. We also created the variable ‘any musculoskeletal pain’ to assess whether the worker had a pain in at least one body part with those who did not have any pain as a reference.

Covariates—We first included basic socio-demographic variables as covariates: age (18-24 years, 25-34 years, 35- 44 years, 45-54 years, ≥55 years); race (Hispanic, White, Black, and mixed race/others), capability to pay bills (0: great deal of difficulty, 1: some difficulty, 2: a little difficulty, 3: no difficulty, 4: don't know, 5: refused), the number of children under 5 years old in home (0 - 5 children). In addition, we included job title (staff nurse, patient care associate, and others) because workers in the same job title are expected to have similar expected workloads that could be associated with both work-family conflict and musculoskeletal pain.

To find other relevant work-related confounders, we selected variables that are reported to be associated with work-family conflict and musculoskeletal pain based on previous reports [Camerino, et al. 2010, Trinkoff, et al. 2006, Dex and Bond 2005, Eriksen, et al. 2004, Ariens 2001, Grönlund 2007, Pisarski, et al. 2008]. As a result, we included seven work-related variables including four psychosocial factors. We included worked hours per week five categories (<30 hours, 30-34 hours, 35-39 hours, 40-44 hours, 45-50 hours, and > 50 hours) [Trinkoff, et al. 2006, Dex and Bond 2005]. Since worked hours per week does not

include working time in a second job, we included having a second job or not because it reflects extra working hours and potential risk burden. Shift work was dichotomized into having a night shift versus working only on daytime [Camerino, et al. 2010, Eriksen, et al. 2004]. Four work-related psychosocial factors were measured using a modified the Job Content Questionnaire [Karasek, et al. 1998, Landsbergis, et al. 2002, Karasek 1979]: psychological demands (5 items) and decision latitude (9 items) [Ariens 2001, Grönlund 2007], supervisor support (2 items) and co-worker support (3 items) [Eriksen, et al. 2004, Pisarski, et al. 2008].

To assess organizational factors related to ergonomic practices in a hospital unit, we included an organizational ergonomic policies and practices questionnaire [Amick, et al. 2000] modified as described previously[Dennerlein, et al. 2012]. The modified questionnaire is composed of six questions to assess workers' perceptions about organizational practices around patient lifting and equipment lifting; pushing pulling, bending, reaching and stooping; workstation design; and purchasing tools, equipment or furniture. Workers could answer on a five-point scale for each of six questions with higher score indicating better ergonomic practice. Summed responses ranged from 6 to 30.

To take physical work factors into account, we also adjusted for physical activity on the job and use of a lifting device. Physical activity on the job was assessed using five questions asking patient care workers to “estimate how much of a typical shift you spend: a) sitting, b) standing, c) walking, d) lifting and carrying, e) pushing and pulling” [Reis, et al. 2005]. Workers could answer in a five-point ordinal scale for each of five questions (all, more than half, about half, less than half, and none). The response was collapsed into three levels: all and more than half, about half, less than half and none. Use of a lifting device was measured using a question “In general, when a patient needs to be moved, how often do you use a lifting device?” Workers could answer in a five-point scale from “never” to “always” or indicate that they do not move patients on their job. The response was categorized into four groups: low (never and rarely), medium (sometimes), high (often and always), and not applicable.

Data analyses—Because patient care workers were nested within work unit, prevalence of musculoskeletal pain among workers in the same unit could be highly correlated with each other. To take those correlations and a hierarchical data structure into account, we applied multilevel logistic regression with a random intercept in a hospital unit to examine associations between work-family conflict and musculoskeletal pain. The number of body areas in pain was assessed as an ordinal scale; therefore, multilevel ordinal logistic regressions were applied to examine the association. All analyses were performed using STATA/SE version 11.0 (StataCorp, College Station, TX).

Results

Table I shows the distribution of the study population and the prevalence of any self-reported musculoskeletal pain in the past 3 months and the mean score of work-family conflict by key covariates. Among 1,199 hospital patient care workers, 89.9% were female, 73.9% were staff nurse, 28.4% worked some night shift. Female workers were more likely

to report any musculoskeletal pain in the past 3 months compared to male workers. Workers who had a second job or who worked night shift reported significantly higher levels of work-family conflict compared to their counterparts. For the prevalence of musculoskeletal pain in the past 3 months, the highest prevalence was for back pain (55.2%) while the lowest prevalence was for arm pain (10.5%) (Table II). Overall, 76.0% of hospital patient care workers reported pain in at least one body part and 3.8% reported pain in all of four body parts (i.e. neck/shoulder, arm, low back, and lower extremity pain).

As shown in Table III, after adjusting for confounders included in the analyses, work-family conflict remained statistically significantly associated with all indicators of musculoskeletal pain in the past 3 months except low-back pain. We found the strong associations of high work-family conflict with neck or shoulder pain (OR: 2.34, 95% CI: 1.64 - 3.34), arm pain (OR: 2.79, 95% CI: 1.64 - 4.75), lower extremity pain (OR: 2.20, 95% CI: 1.54 - 3.15) and any musculoskeletal pain (OR: 2.45, 95% CI: 1.56 - 3.85), and a number of body areas in pain (OR: 2.47, 95% CI: 1.82 - 3.36) in the past 3 months in the fully adjusted model. However, the association between high work-family conflict and low back pain was attenuated and became non-significant after adjustment for potential confounders (OR: 1.22, 95% CI: 0.86 - 1.74); whereas, the association with intermediate work-family conflict remained significant (OR: 1.49, 95% CI: 1.12 - 1.98).

Discussion

We found consistent associations between work-family conflict and self-reported musculoskeletal pain (i.e. neck or shoulder pain, arm pain, leg pain and any musculoskeletal pain, and co-morbidity) in the past 3 months among hospital patient care workers. This analysis adjusted for relevant confounders, including physical work factors and work-related psychosocial factors. These results extend the findings of previous research reporting that work-family conflict is associated with neck/shoulder pain and low back pain, and are consistent with prior findings that work-family conflict is associated with a variety of negative consequences including depression [Hammig and Bauer 2009], substance dependence disorder [Frone 2000], cardiovascular disease risk [Berkman, et al. 2010] and sickness absence [Clays, et al. 2009, Sabbath, et al. 2012].

Although we found that high work-family conflict was associated with most indicators of musculoskeletal pain, the association between high levels of work-family conflict and self-reported low back pain was attenuated and became non-significant in the adjusted model, whereas the association between intermediate levels of work-family conflict and low back pain remained significant. This finding is different from findings from previous studies that reported an association between work-family conflict and low back pain, and may reflect previous studies' lack of full adjustment for working conditions such as shift work, worked hours per week, job title [Hammig, et al. 2011] or other relevant psychosocial factors such as job demand, decision latitude, and supervisor support [Hammig, et al. 2009]. In addition, future research needs to examine why the relationship of work-family conflict with low-back pain could be potentially different from the relationships with other MSDs.

There could be several explanations of pathways linking work-family conflict and musculoskeletal pain. When workers experience work-family conflict, workers could be preoccupied at the workplace with home-related duties. Accordingly, it could influence psychosocial working conditions, such as job demand, which could then impact musculoskeletal pain [Lang, et al. 2012, Bongers, et al. 2002]. However, the adjustment of potential confounders including work-related psychosocial stressors (i.e. job demand, job control, supervisor support, and co-worker support), work physical factors (i.e. sitting, standing, walking, lifting and carrying, pushing and pulling), and work characteristics (i.e. job title, having a second job or not, only day shift or not, worked hours per week) attenuated less than 20% of the crude associations for most of musculoskeletal outcomes in this study, this suggests that the association would not be wholly explained by psychosocial and other working conditions.

It is also possible that psychological stress play a role in the pathway because experiences of work-family conflict could increase physiological stress reaction such as increased muscle tension which can lead to musculoskeletal pain[Lundberg, et al. 2002]. Hammig et al examined a hypothesis that the association between work-family conflict and musculoskeletal pain is mediated by general stress, showing that the association was substantially attenuated when they adjusted for general stress in addition to other covariates [Hammig, et al. 2011]. However, in a post-hoc analysis when we adjusted for non-specific psychological distress assessed by the six-item Kessler scale [Kessler, et al. 2002] in addition to other covariates, we found only slight attenuation in the associations between work-family conflict and musculoskeletal pain. Because there could be remained exposure to stress which could not be captured self-reported questionnaire, future research is required to examine the role of stress in the association between work-family conflict and musculoskeletal pain as a mediator.

This study also found that workers who worked more than 45 hours per week or who has a second job or who worked at night shift were more likely to experience work-family conflict than their counterparts, which is consistent with the findings of previous literature [Camerino, et al. 2010, Dex and Bond 2005]. We also found that staff nurse reported higher level of work-family conflict than others. The difference of work-family conflict level by job title may be explained by our finding that the prevalence of ‘having only a day shift’ is much lower among staff nurse (22.6%) compared to patient care associate (34.2%) and others (49.2%). Future studies with larger samples of different types of workers are needed to understand joint differences in work-family conflict and health-related associations by job title and other work characteristics. Future studies are also needed to investigate the impact of hospital-level policies, such as access to paid leave, on the association between work-family conflict and injury outcomes [Asfaw, et al. 2012].

Several limitations to this study should be noted. First, temporal precedence cannot be established due to the cross sectional design of the study. We cannot rule out the possibility of reverse causation in which workers with musculoskeletal pain reported more work-family conflict. Second, although we had a strong adjustment of potential confounders related to working conditions, there could be residual confounding pertaining to worker's health condition because workers with poor health conditions may be more likely to report

musculoskeletal pain and also more likely to report high work-family conflict. This is particularly possible because both of exposure and outcome variables were assessed using a self-reported questionnaire.

Another limitation would be that, because of the high prevalence of several outcome variables such as low back pain and any musculoskeletal pain, the estimated odds ratio could overestimate the ratio that would have been observed had adjusted prevalence ratios been computed. However, we found strong relationship of work-family conflict with relatively low prevalent outcomes like arm pain as well as other highly prevalent outcomes , the observed strong association could not be wholly explained by the potential overestimation. Finally, work-life conflict consists of two reciprocal components: work-family conflict that work interferes with family life and family-work conflict that family interferes with work, this study only assessed work-family conflict. A previous study, which measured both of these components and examined their associations with musculoskeletal pain, found that family-work conflict is not associated with musculoskeletal pain whereas work-family conflict is a strong predictor of musculoskeletal pain[Hammig, et al. 2011], as we have observed.

There are also several strengths in this study. First, we could adjust for confounders including working conditions, other work-related psychosocial constructs, organizational practice, physical work factors, and the number of children under 5 years old at home. Second, we applied multilevel logistic regression with a random intercept at the work unit level to take into account the hierarchical data structure.

Our study found that work-family conflict could be a potential risk factor of musculoskeletal pain among hospital health care workers. These findings remained significant after adjustments for working conditions (i.e. job title, having a second job or not, working only day shift or not, hours worked per week), psycho-social factors (i.e. demand, decision latitude, co-worker support, and supervisor support), organizational ergonomic practice, and physical work factors. Work-family conflict could be proposed as an important domain for health promotion strategy among hospital patient care workers. However, it will be important for future studies to first replicate these findings with a prospective study design.

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Table I

Distribution of study population and prevalence of any musculoskeletal pain in the past 3 months and mean score of work-family conflict by key covariates (N=1,199)

Characteristics	Distribution	Prevalence of any musculoskeletal pain		Work-family conflict (5 ∼ 25)	
	N (%)	N (%)	P-value[a]	Mean (SD)	P-value[b]
Gender			0.012		0.906
Male	120 (9.9)	80 (66.7)		13.6 (4.1)	
Female	1079 (89.9)	831 (77.0)		13.6 (4.4)	
Age (years)			0.059		0.008
18 - 24	90 (7.5)	68 (76.0)		14.4 (4.1)	
25 - 34	339 (28.3)	265 (78.2)		14.0 (4.0)	
35 - 44	287 (24.0)	200 (69.7)		13.3 (4.4)	
45 - 55	319 (26.6)	253 (79.3)		13.4 (4.4)	
55 - 65	164 (13.7)	125 (76.2)		12.9 (4.7)	
Race			0.016		<0.001
Hispanic	45 (3.8)	35 (77.8)		12.1 (4.1)	
White, non-Hispanic	985 (82.2)	761 (77.3)		13.8 (4.3)	
Black, non-Hispanic	103 (8.6)	65 (63.1)		11.7 (4.0)	
Other	66 (5.5)	50 (75.8)		13.2 (4.2)	
Job title			<0.001		0.001
Staff Nurse	886 (73.9)	700 (79.1)		13.7 (4.2)	
Patient Care Associate	70 (5.8)	50 (71.4)		12.0 (4.5)	
Others	243 (20.3)	161 (66.3)		13.2 (4.7)	
Hours worked per week			0.748		<0.001
<30	276 (23.0)	208 (75.4)		13.0 (3.9)	
30-34	144 (12.0)	111 (77.1)		13.8 (4.5)	
35-39	361 (30.1)	276 (76.5)		13.6 (4.0)	
40-44	364 (30.4)	279 (76.7)		13.5 (4.6)	
≥45	54 (4.5)	37 (68.5)		16.5 (5.2)	

Characteristics	Distribution	Prevalence of any musculoskeletal pain		Work-family conflict (5 ∼ 25)	
	N (%)	N (%)	P-value[a]	Mean (SD)	P-value[b]
Having a second job			0.366		<0.001
Yes	172 (14.4)	126 (73.6)		14.6 (4.4)	
No	1027 (85.7)	785 (76.4)		13.4 (4.3)	
Having only day shift, %			0.643		0.001
Yes	341 (28.4)	256 (75.1)		12.9 (4.5)	
No (also night shift)	858 (71.6)	655 (76.3)		13.8 (4.3)	

[a] P-value of the Chi-square test comparing the prevalence of any musculoskeletal pain across the different groups

[b] P-value of the analysis of variance test comparing the mean scores of work-family conflict across the different groups

Table II

Distribution of self-reported musculoskeletal pain in the past 3 months among hospital patient care workers (N=1,119)

Self-reported musculoskeletal pain	Distribution	
	N	%
Neck/Shoulder pain	537	44.8
Arm pain	126	10.5
Low back pain	662	55.2
Lower extremity pain	454	37.8
Any musculoskeletal pain	911	76.0
Number of body areas in pain		
0	288	24.0
1	323	27.0
2	353	29.4
3	190	15.9
4	45	3.8

Table III

Association between work-family conflict and musculoskeletal pain in the past 3 months among hospital patient care workers (N=1,199)

Work-family conflict (5 ~ 25)	Neck/Shoulder pain				Arm pain			
	Unadjusted		Fully adjusted[a]		Unadjusted		Fully adjusted[a]	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Low (5~12)	1	Referent	1	Referent	1	Referent	1	Referent
Moderate (13~17)	1.63***	(1.25, 2.14)	1.50**	(1.13, 2.01)	1.53	(0.97, 2.42)	1.55	(0.95, 2.53)
High (18~25)	2.58***	(1.88, 3.55)	2.34***	(1.64, 3.34)	2.88***	(1.82, 4.56)	2.79***	(1.64, 4.75)

Work-family conflict (5 ~ 25)	Low back pain				Lower extremity			
	Unadjusted		Fully adjusted[a]		Unadjusted		Fully adjusted[a]	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Low (5~12)	1	Referent	1	Referent	1	Referent	1	Referent
Moderate (13~17)	1.84***	(1.40, 2.40)	1.49**	(1.12, 1.98)	1.80***	(1.27, 2.30)	1.71***	(1.32, 2.30)
High (18~25)	1.63**	(1.19, 2.22)	1.22	(0.86, 1.74)	2.32***	(1.69, 3.17)	2.20***	(1.54, 3.15)

Work-family conflict (5 ~ 25)	Any musculoskeletal pain				Number of body areas in pain			
	Unadjusted		Fully adjusted[a]		Unadjusted		Fully adjusted[a]	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Low (5~12)	1	Referent	1	Referent	1	Referent	1	Referent
Moderate (13~17)	2.22***	(1.61, 3.05)	1.89***	(1.34, 2.67)	2.01***	(1.61, 2.58)	1.78***	(1.39, 2.28)
High (18~25)	2.87***	(1.92, 4.30)	2.45***	(1.56, 3.85)	2.86***	(2.16, 3.79)	2.47***	(1.82, 3.36)

*p<0.05

**p< 0.01

***p<0.001

[a]Fully adjusted: Adjusted for age, race, gender, job title, having a second job or not, only day shift or not, worked hours per week, job demands, job control, supervisor support, co-worker support, use of a lifting device, physical activities on the job (i.e. sitting, standing, walking, lifting and carrying, pushing and pulling), organizational ergonomic practice and the number of children under 5 years old