Work–Family Conflict, Psychological Distress, and Sleep Deficiency Among Patient Care Workers

Henrik B. Jacobsen, PsyD; Silje Endresen Reme, PsyD, PhD; Grace Sembajwe, MSc, ScD; Karen Hopcia, ScD, NP; Anne M. Stoddard, ScD; Christopher Kenwood, MS; Tore C. Stiles, PsyD, PhD; Glorian Sorensen, MPH, PhD; Orfeu M. Buxton, PhD

ABSTRACT

This study examined whether work–family conflict was associated with sleep deficiencies, both cross-sectionally and longitudinally. In this two-phase study, a workplace health survey was completed by a cohort of patient care workers (n = 1,572). Additional data were collected 2 years later from a subsample of the original respondents (n = 102). Self-reported measures included work–family conflict, workplace factors, and sleep outcomes. The participants were 90% women, with a mean age of 41 ± 11.7 years. At baseline, after adjusting for covariates, higher levels of work–family conflict were significantly associated with sleep deficiency. Higher levels of work–family conflict also predicted sleep insufficiency nearly 2 years later. The first study to determine the predictive association between work–family conflict and sleep deficiency suggests that future sleep interventions should include a specific focus on work–family conflict. [*Workplace Health Saf* 2014;62(7):282-291.]

Sleep deficiency has been shown to affect both psychological well-being (Baglioni & Riemann, 2012) and work performance (Daley, Morin, LeBlanc, Grégoire, & Savard, 2009). Sleep deficiency includes three components (short sleep duration, sleep maintenance problems, and sleep insufficiency), which have been independently associated with pain, functional limitations (Buxton et al., 2012), and quality of life (Knutson, 2012). Sleep de-

ABOUT THE AUTHORS

Dr. Jacobsen is from Harvard School of Public Health, Center for Work, Health, and Well-being, Boston, Massachusetts, and The Norwegian University of Science and Technology, Trondheim, Norway. Dr. Reme is from Harvard School of Public Health, Center for Work, Health, and Well-being, Boston, Massachusetts, and Uni Health, Uni Research, Bergen, Norway. Dr. Sembajwe is from Harvard School of Public Health, Center for Work, Health and Wellbeing, Boston, Massachusetts, CUNY School of Public Health at Hunter College, New York, New York, and Dana Farber Cancer Institute, Boston, Massachusetts. Dr. Hopcia is from Harvard School of Public Health, Center for Work, Health, and Well-being, Boston, Massachusetts, and University of Illinois at Chicago, College of Nursing, Chicago, Illinois. Drs. Stoddard and Kenwood are from New England Research Institutes, Watertown, Massachusetts. Dr. Stiles is from The Norwegian University of Science and Technology, Trondheim, Norway. Dr. Sorensen is from Harvard School of Public Health, Center for Work, Health, and Well-being, Boston, Massachusetts, and Dana Farber Cancer Institute, Boston, Massachusetts. Dr. Buxton is from Harvard School of Public Health, Center for Work, Health, and Well-being, Boston, Massachusetts, the Division of Sleep Medicine, Harvard Medical School, Boston, Massachusetts, the Department of Medicine, Brigham and Women's Hospital, Boston, Massachusetts, and the Department of Behavioral Health, Pennsylvania State University, University Park, Pennsylvania.

Submitted: November 4, 2013; Accepted: May 27, 2014; Posted online: July 2, 2014

Supported by a grant from the National Institute for Occupational Safety and Health (U19 OH008861) for the Harvard School of Public Health Center for Work, Health and Well-being, the Harvard Clinical and Translational Science Center (grant UL1 RR025758-04 from the National Center for Research Resources, and additional support was provided by Partners Occupational Health. Dr. Buxton is in part support by HL R01HL107240.

The authors have disclosed no potential conflicts, financial or otherwise.

This study would not have been accomplished without the participation of Partners HealthCare System and leadership from Dennis Colling, Sree Chaguturu, and Kurt Westerman. The authors thank Partners Occupational Health Services, including Marlene Freeley for her guidance, as well as Elizabeth Taylor, Elizabeth Tucker O'Day, and Terry Orechia; individuals at each of the hospitals, including Jeanette Ives Erickson and Jacqueline Somerville in Patient Care Services leadership, and Jeff Davis and Julie Celano in Human Resources; Charlene Feilteau, Mimi O'Connor, Margaret Shaw, Eddie Tan, and Shari Weingarten for assistance with supporting databases; and Evan McEwing, Project Director, and Linnea Benson-Whelan for her assistance with the production of this manuscript.

Correspondence: Henrik B. Jacobsen, PsyD, The Norwegian University of Science and Technology, Department of Public Health/Circulation and Medical Imaging, P.O. Box 8905 MTFS, 7491 Trondheim, Norway. E-mail: henrik.b.jacobsen@ntnu.no

ficiencies have also been shown to produce a substantial economic burden for society (Léger & Bayon, 2010).

Patient care workers are at high risk for sleep deficiency. A recent study showed that the prevalence of self-reported insomnia symptoms and sleep deficiency was 40 per 100 and 57 per 100 patient care workers, respectively (Buxton et al., 2012). Patient care workers are vulnerable because they often work shifts and at night (Äkerstedt & Wright, 2009). Long shifts (more than 8 hours) and short recovery time between shifts (less than 10 hours) have been associated with sleep disturbance and poor sleep quality (Havlovic, Lau, & Pinfield, 2002).

Patient care workers also struggle with several risk factors for sleep deficiency because they are prone to work–family conflict (Grzywacz, Frone, Brewer, & Kovner, 2006; Kim et al., 2013), psychosocial stress, and several workplace hazards (Rogers & Ostendorf, 2001).

Sleep maintenance problems create well-documented effects on workers (Kessler et al., 2011). Insomnia is commonly defined as difficulty initiating or maintaining sleep, or experiencing non-restorative sleep with impaired daytime functioning lasting at least 4 weeks (American Academy of Sleep Medicine, 2001). Insomnia should only be diagnosed by a health care provider trained in sleep disorders after a clinical interview during which other explanations (e.g., substance abuse, medication side effects, respiratory disorders, comorbid conditions, time zones changes, or other nighttime events [e.g., nightmares, night terrors, sleep walking, or parasomnias]) are excluded from consideration. The estimated cost and impact of insomnia symptoms are staggering. A recent study of American workers reported a prevalence of insomnia as high as 23.2 per 100 workers, and calculated that the annual cost of insomnia symptoms rose above $60 billion when researchers estimated the effect of impaired work performance and increased absenteeism (Kessler et al., 2011).

In addition to insomnia, experimental studies on sleep have shown several adverse effects from sleep insufficiency and short sleep duration (Knutson, 2012). Shortened duration of regular or habitual sleep (e.g., less than 6 hours per night) has been associated with increased risk of all-cause mortality, diabetes, obesity, hypertension and cardiovascular disease, and less psychological well-being (Buxton & Marcelli, 2010; Dew et al., 2003; Knutson, 2012). Perceived sleep insufficiency has been associated with less supervisor support, job satisfaction (Buxton et al., 2012), and physical activity and exercise (Strine & Chapman, 2005), and more risk of mental disorders (Vandeputte & de Weerd, 2003).

Several studies have associated job stress with both sleep deficiency (Buxton et al., 2012; Äkerstedt, 2006) and the development of psychological disorders (Bhui, Dinos, Stansfeld, & White, 2012; Vandeputte & de Weerd, 2003). The concept of job stress has been defined in part by two models: the demand–control model (Karasek, 1979) and the later demand–control–support model (Johnson & Hall, 1988). Although both models have explanatory value, they have been challenged because of their narrow conceptualization of job stress and how job stress is measured (Wall, Jackson, Mullarkey, & Parker, 2011).

Applying Research to Practice

Patient care workers are prone to work–family conflict, psychosocial stress, and sleep deficiency. Previous studies have shown that work–family conflict is associated with sleep quality, but these studies had limitations related to sleep outcome measures, choice of covariates, and lack of subsequent data collection. The results of this study show both a predictive and associative relationship between high work–family conflict and not feeling rested upon awakening, which were findings that remained when controlling for covariates. The results in both this study and previous work argue that sleep is lost when workers try to increase or protect other resources. The researchers conclude that sleep adequacy should be targeted in organizational health promotion programs. Increasing job flexibility and refining worker schedules could be significant steps in managing sleep deficiency.

A factor shown to be salient in several studies of job stress is work–family conflict (Bellavia & Frone, 2005; Butler, Grzywacz, Bass, & Linney, 2005). A premise in current stress theory is that humans wish to acquire and maintain resources (e.g., time, money, and/or knowledge). According to this theory, the threat of losing resources, actual loss of resources, or lack of expected gain in resources will cause stress (Grandey & Cropanzano, 1999). An established way to measure these three processes and how they affect occupational health is through conflicts between the demands from work and family (Grandey & Cropanzano, 1999; Nylén, Melin, & Laflamme, 2007). If one experiences work–family conflict, it would drain these resources over time, and could lead to dissatisfaction and tension between job and family roles. Such dissatifaction has previously been linked to life distress and a degradation of physical health (Grandey & Cropanzano, 1999).

Balancing domestic and occupational workloads, as well as planning and maneuvering schedules and interests, are identified as major causes of stress (Bellavia & Frone, 2005). Several factors influence work–family conflict. Social support at work has been identified as affecting both health outcomes and perceived levels of conflict (Lapierre & Allen, 2006). Marital status, child care, and traditional sex roles have also been shown to impact work–family conflict; females have greater workload at home and less time to recover from work (Byron, 2005; Lindfors, Berntsson, & Lundberg, 2006). On an organizational level, both work flexibility and the option to receive paid sick leave have been shown to affect the amount of conflict reported (Eaton, 2003; Hill, 2013).

Nurses have been shown to have more problems with work interfering with home life than home life interfering with work (Grzywacz et al., 2006). This finding was supported by a study showing how females are more likely to carry work stress home (Lundberg & Frankenhaeuser,

1999). Nurses are primarily female and it has been argued that work–family conflict is more common in these workers (Grzywacz et al., 2006).

The connection between stress and sleep disturbance is well established (Morin, Rodrigue, & Ivers, 2003). Previous studies have shown that work–family conflict is associated with perceived sleep quality (Britt & Dawson, 2005; Lallukka, Rahkonen, Lahelma, & Arber, 2010; Nylén, Melin, & Laflamme, 2007; Sekine, Chandola, Martikainen, Marmot, & Kagamimori, 2006; Williams, Franche, Ibrahim, Mustard, & Layton, 2006); however, sleep deficiency does not negatively affect work–family conflict (Butts, Eby, Allen, & Muillenburg, 2013). Another study reported a negative association between work–family conflict and sleep quality (Williams et al., 2006). However, this study was limited by small sample size and only investigated one component of sleep deficiency: global quality of sleep (Williams et al., 2006). Another similar study reported a larger sample size, but lacked adequate data about sleep variables because they relied on a single item to assess sleep quality (Nylén et al., 2007). Also, none of these studies investigated the effects of conflict on sleep longitudinally. Thus, the question remained whether work–family conflict influences other components of sleep deficiency to a significant degree, and whether this association remains after using other measures to control for work stress and psychological distress. The associations and predictive relationships between these constructs should be investigated to support interventions and further investigation via prospective cohort studies.

The aims of the current study were to (1) investigate cross-sectional associations between work–family conflict and composite sleep deficiency, as well as its components in patient care workers, controlling for potential confounders (e.g., iso-strain, psychological distress, and sociodemographic factors), and (2) investigate (longitudinally and in a subset of workers) whether work–family conflict identified at baseline increased workers' experience of sleep deficiency and its components 2 years later, controlling for baseline sleep outcomes.

METHODOLOGY

The data for this study were collected as part of a larger project at the Harvard School of Public Health, Center for Work, Health, and Well-being and used to inform the development of an integrated health protection and health promotion intervention.

The Harvard School of Public Health institutional review board approved the study.

Participants

The Patient Care Worker Survey included workers who had patient care responsibilities from these hospitals (Brigham and Women's Hospital and Massachusetts General Hospital, two large Boston area teaching hospitals with large workforces) from May 30, 2009, to August 22, 2009. To be eligible, employees had to work on units primarily defined as patient care units because environmental services and physical medicine units (physical therapy, occupational therapy, and speech therapy) were excluded. Workers on extended absence (>12 weeks) or with average work weeks of less than 20 hours were also excluded. From 7,019 eligible workers (3,474 from one hospital, 3,545 from the other), a random sample of 2,000 workers was selected (Buxton et al., 2012).

Self-Reported Sleep Outcomes

All sleep outcomes were reported both at baseline and by the subsample 2 years later. Short sleep duration was assessed by asking participants approximately how many hours they slept per night during the previous 4 weeks and was defined as less than 6 hours per night during the past month. Another item assessed sleep maintenance by asking how often participants woke up during the night; sleep maintenance problems were defined as waking up three or more times per week during the past month. Both items had four response categories ranging from "not at all in the last 4 weeks" to "3 or more times a week." Sleep insufficiency was measured by asking how often participants "felt rested upon awakening," with five response categories ranging from "never" to "always." The presence of sleep insufficiency was defined as responding "never" or "rarely" to the item. Sleep deficiency was operationalized as the presence of one or more of these components.

Work–Family Conflict

Work–family conflict was measured using a five-item scale (Netemeyer, Boles, & McMurrian, 1996). The scale included the question "How much do you agree or disagree with the following statements?" and the following responses: (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. Response categories ranged from 5 = "Strongly agree" to 1 = "Strongly disagree," yielding a score between 5 and 25; higher scores indicated greater work–family conflict. The researchers trichotomized the scores into low (5 to 12), intermediate (13 to 17), and high (18 to 25) conflict, as was done in previous studies (Kim et al., 2013), making the variable more intuitive and easier to interpret.

Covariates From Baseline Measures

Covariates, sociodemographics, work-related stress, psychological distress, and night work were selected a priori among variables known to be associated with sleep quality, duration, and sufficiency. Sociodemographic covariates included self-reported age (years), gender, race/ethnicity (Hispanic, white, black, and mixed race/others), occupation (staff nurse, patient care associate, and others), ability to pay bills (great deal of difficulty, some difficulty, a little difficulty, no difficulty, don't know, refused), height (inches), and weight (pounds). Body mass index was calculated using self-reported weight and height (kilograms per square meter).

Work-related stress was assessed by self-reported job demands, decision latitude, coworker support, and

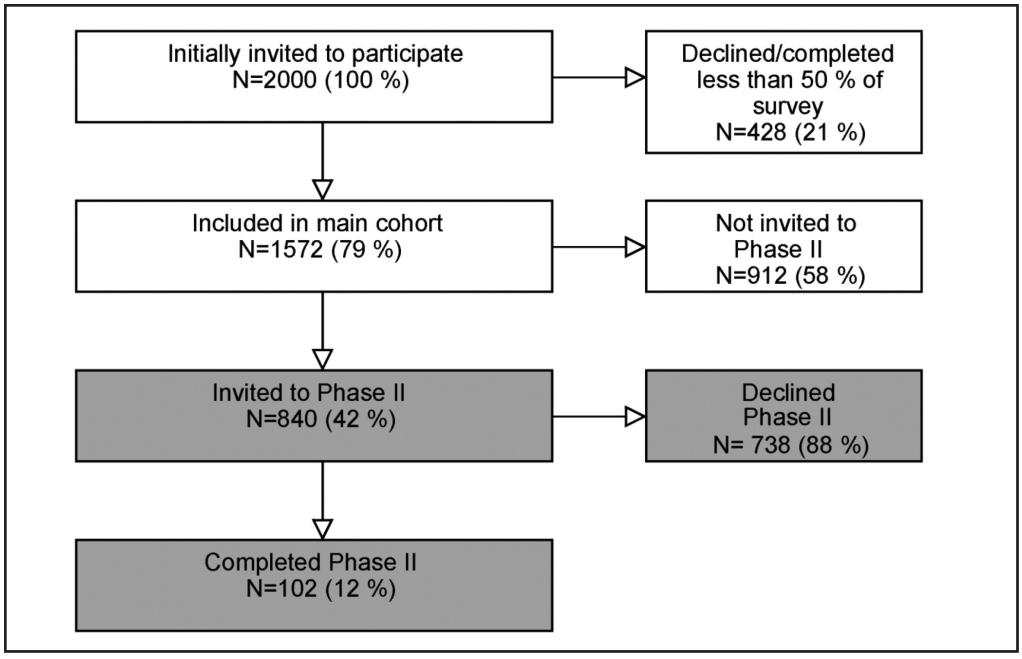

Figure 1. The flow of study participants from main cohort to Phase Two 2 years later.

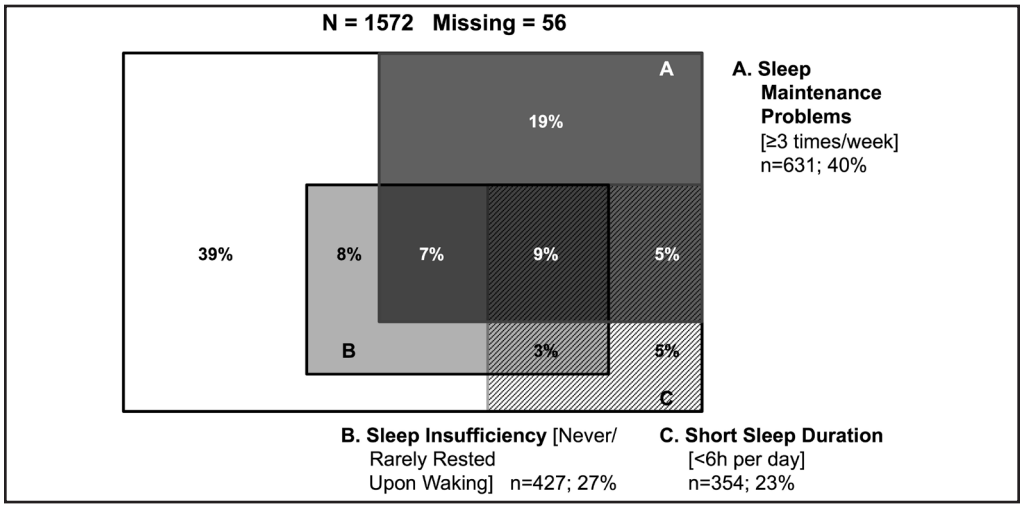

Figure 2. Number of participants with each sleep outcome (*n* = 896; 57%).

supervisor support. A modified version of the Job Content Questionnaire (Karasek, 1979; Karasek et al., 1998) measured these variables. Job demands were assessed using five weighted items and the answer scores summed, yielding a scale from 12 to 48 (Karasek et al., 1998). Decision latitude was assessed using nine items created as a weighted sum of decision authority and skill discretion from the Job Content Questionnaire. Coworker support was assessed via two items with five response categories summed, yielding a scale from 2 to 10 (Karasek et al., 1998). Supervisor support was assessed via three items with five response categories summed, providing a total score from 3 to 15 (Karasek et al., 1998).

Iso-strain, high job demands, low decision latitude, and low social support were composite variables (Bhui et al., 2012). Social support was defined as the total support from coworkers and supervisors. These variables were dichotomized at the median into low and high categories (Bhui et al., 2012).

Severe psychological distress was measured with the K-6 Nonspecific Distress Scale.

A summative six-item scale with responses ranging from 0 ("no distress") to 4 ("distress all of the time") yielded a range of scores between 0 and 24 (Kessler et al., 2003).

Night work was quantified from administrative payroll data and calculated as an average of night hours between 10 p.m. and 6 a.m. worked per month calculated from October 2008 until August 2009. Excluding shifts shorter than 4 hours, the variable was trichotomized into 0 to 6 hours, 6 to 72 hours, or more than 72 hours per month.

Data Collection

Twelve hundred patient care workers employed at two New England hospitals for more than 20 hours per week during 2008 were invited by e-mail to complete an online survey. The researchers sent two e-mail reminders during the 4 weeks following initial contact and then mailed a paper version of the questionnaire to those who had not com-

TABLE 1

Frequency (%) or Mean (SD) of Respondent Characteristics[a]

	Sleep Deficiency			*Short Sleep Duration*			*Sleep Maintenance Problems*			*Sleep Insufficiency*		
Characteristics	***Yes (N = 896)***	***No (N = 620)***	***p[b]***	***Yes (N = 354)***	***No (N = 1,115)***	***p[b]***	***Yes (N = 631)***	***No (N = 872)***	***p[b]***	***Yes (N = 428)***	***No (N = 1,075)***	***p[b]***
Work–Family conflict												
0: Low	378 (51.6%)	355 (48.4%)		143 (20.2%)	564 (79.8%)		269 (37.0%)	459 (63.0%)		144 (19.9%)	580 (80.1%)	
1: Medium	310 (65.1%)	166 (34.9%)	**< .0001**	115 (24.7%)	351 (75.3%)	**.0003**	222 (47.1%)	249 (52.9%)	**.0004**	158 (33.5%)	314 (66.5%)	**< .0001**
2: High	196 (68.5%)	90 (31.5%)		89 (32.2%)	187 (67.8%)		133 (46.8%)	151 (53.2%)		123 (43.0%)	163 (57.0%)	
Psychological distress	3.0 (± 3.67)	1.9 (± 2.66)	**< .0001**	3.2 (± 3.68)	2.3 (± 3.21)	**.0002**	3.1 (± 3.69)	2.2 (± 3.02)	**< .0001**	3.7 (± 4.11)	2.1 (± 2.83)	< .0001
Night work												
0: 0 to 6 hrs monthly	523 (60.3%)	344 (39.7%)		188 (22.48%)	651 (77.6%)		379 (44.2%)	479 (55.8%)		228 (26.6%)	629 (73.4%)	.18
1: > 6 hrs but < 72	221 (55.7%)	176 (44.3%)	.27	99 (25.4%)	291 (74.6%)	.17	160 (40.6%)	234 (59.4%)	.09	121 (30.6%)	274 (69.4%)	
2: 72+	152 (60.3%)	100 (39.7%)		67 (27.9%)	173 (72.1%)		92 (36.7%)	159 (63.3%)		79 (31.5%)	172 (68.5%)	
Age (yrs)	41.9 (± 11.48)	40.5 (± 11.95)	**.03**	42.3 (± 11.45)	40.9 (± 11.77)	.06	42.9 (± 11.56)	40.1 (± 11.60)	**< .0001**	39.6 (± 10.88)	42.0 (± 11.93)	**.0003**
BMI (kg/m^2)	26.6 (± 5.48)	25.9 (± 4.95)	**.01**	27.3 (± 5.84)	26.0 (± 5.04)	**.0004**	26.5 (± 5.37)	26.1 (± 5.22)		26.4 (± 5.45)	26.3 (± 5.22)	.77
Gender												
1: Male	81 (57.0%)	61 (43.0%)	.60	29 (21.2%)	108 (78.8%)	.39	60 (42.6%)	81 (57.4%)	.92	41 (29.3%)	99 (70.7%)	.77
2: Female	806 (59.3%)	553 (40.7%)		323 (24.5%)	998 (75.5%)		567 (42.1%)	780 (57.9%)		379 (28.1%)	969 (71.9%)	
Marital status												
0: Single/living alone	303 (59.8%)	204 (40.2%)	.70	134 (26.9%)	364 (73.1%)	.07	198 (39.5%)	303 (60.5%)	.16	141 (28.1%)	360 (71.9%)	.91
1: Married/living with partner	572 (58.7%)	402 (41.3%)		213 (22.6%)	730 (77.4%)		419 (43.4%)	547 (56.6%)		275 (28.4%)	692 (71.6%)	
Race												
1: Hispanic	35 (54.7%)	29 (45.3%)		13 (21.0%)	49 (79.0%)	**.001**	18 (28.6%)	45 (71.4%)	**.0006**	20 (31.7%)	43 (68.3%)	.92
2: White	703 (59.4%)	481 (40.6%)	.89	261 (22.4%)	905 (77.6%)		528 (44.8%)	650 (55.2%)		330 (28.1%)	845 (71.9%)	
3: Black	92 (58.6%)	65 (41.4%)		50 (35.2%)	92 (64.8%)		48 (31.8%)	103 (68.2%)		45 (29.4%)	108 (70.6%)	
4: Mixed race/other	53 (60.2%)	35 (39.8%)		27 (33.3%)	54 (66.7%)		30 (34.1%)	58 (65.9%)		24 (27.3%)	64 (72.7%)	
Occupation												
1: Staff Nurse	610 (57.2%)	457 (42.8%)		238 (22.7%)	812 (77.3%)		447 (42.2%)	612 (57.8%)		291 (27.5%)	768 (72.5%)	
2: Patient Care Associate	67 (57.8%)	49 (42.2%)	**.02**	31 (31.3%)	68 (68.7%)	.07	35 (30.7%)	79 (69.3%)	**.02**	32 (28.1%)	82 (71.9%)	.38
3: Other, please specify	216 (66.1%)	111 (33.9%)		84 (26.8%)	230 (73.2%)		147 (45.4%)	177 (54.6%)		102 (31.5%)	222 (68.5%)	
Iso-strain												
0: No	697 (57.3%)	520 (42.7%)	**.005**	274 (23.0%)	915 (77.0%)	.20	504 (41.7%)	705 (58.3%)	.48	334 (27.7%)	872 (72.3%)	.02
1: Yes	119 (68.4%)	55 (31.6%)		46 (27.5%)	121 (72.5%)		77 (44.5%)	96 (55.5%)		63 (36.4%)	110 (63.6%)	
Difficulty paying bills?												
0: Little difficulty w/ bills	619 (56.8%)	471 (43.2%)	**.002**	242 (22.6%)	827 (77.4%)	**.02**	455 (42.1%)	625 (57.9%)	.81	262 (24.3%)	817 (75.7%)	**< .0001**
1: At least some difficulty w/ bills	229 (66.2%)	117 (33.8%)		96 (28.9%)	236 (71.1%)		142 (41.4%)	201 (58.6%)		144 (41.9%)	200 (58.1%)	

SD = standard deviation; BMI = body mass index

[a]*The figures are listed by the presence or absence of sleep deficiency, short sleep duration, sleep maintenance and sleep insufficiency, with* p *value for associations with outcomes.*

[b]p *values for continuous variables were based on* t *tests;* p *values for categorical variables were based on chi-square. Significant* p *values are bolded.*

TABLE 2

Cross-sectional Multivariate Associations Between Selected Variables ($p < .2$) from Bivariate Analyses[a]

	Sleep Deficiency			*Short Sleep Duration*			*Sleep Maintenance Problems*			*Sleep Insufficiency*		
Independent Variables	***OR***	***95% CI***	***p***	***OR***	***95% CI***	***p***	***OR***	***95% CI***	***p***	***OR***	***95% CI***	***p***
Work-Family conflict												
1: Medium vs. 0: low	1.57	1.19–2.07	.0008	1.23	0.88–1.72	**.04**	1.34	1.03–1.74	.08	**1.68**	**1.25–2.27**	< .0001
2: High vs. 0: low	**1.70**	**1.20–2.40**		**1.64**	**1.11–2.41**		1.26	0.91–1.74		**2.36**	**1.67–3.34**	
Psychological distress	**1.11**	**1.06–1.16**	**< .0001**	**1.06**	**1.02–1.11**	**.004**	**1.10**	**1.06–1.14**	**< .0001**	**1.10**	**1.05–1.14**	**< .0001**
Night-Work category												
1: > 6 hrs but < 72 vs. 0: 0 to 6 hrs monthly				**1.67**	**1.16–2.40**	**.02**	0.93	0.69–1.25	.11	0.90	0.65–1.24	.72
2: 72+ vs. 0: 0 to 6 hrs monthly				**1.47**	**0.98–2.20**		0.70	0.50–0.98		1.04	0.73–1.49	
Age (years)	**1.01**	**1.00–1.02**	**.01**	**1.02**	**1.01–1.03**	**.003**	**1.02**	**1.01–1.03**	**< .0001**	0.99	0.98–1.00	.11
BMI (kg/m^2)	1.02	0.99–1.04	.20	1.03	1.00–1.05	.06	1.01	0.99–1.04	.23			
Marital status												
1: Married/living with partner vs. 0: Single/living alone				0.76	0.57–1.03	.08	1.18	0.92–1.50	.20			
Race/Ethnicity												
2: White vs. 1: Hispanic				**1.80**	**0.68–4.80**		**1.65**	**0.86–3.17**				
3: Black vs. 1: Hispanic				**4.35**	**1.52–12.5**	**.0008**	**0.94**	**0.45–1.96**	**.03**			
4: Mixed race/other vs. 1: Hispanic				**3.56**	**1.16–10.9**		**1.07**	**0.48–2.39**				
Occupation												
2: Patient Care Associate vs. 1: Staff Nurse	0.94	0.56–1.59	.13	0.61	0.29–1.27	.34	1.02	0.59–1.74	.83			
3: Other, please specify vs. 1: Staff Nurse	1.36	1.00–1.85		1.07	0.73–1.56		1.10	0.81–1.49				
Iso-strain												
1: Yes vs. 0: no	1.33	0.90–1.97	.15	1.17	0.76–1.79	.48				1.06	0.72–1.56	.76
Difficulty paying bills?												
1: At least some difficulty w/ bills vs 0: little difficulty w/ bills	1.24	0.92–1.66	.16	1.09	0.78–1.53	.60				**1.80**	**1.35–2.39**	**< .001**

OR = odds ratio; 95% CI = 95% confidence interval; BMI = body mass index

[a]*Significant* p *values are bolded. All variables are not tested for all outcomes because of the selection criteria* (p < .2).

TABLE 3

Longitudinal Associations Between Baseline Outcome, Work–Family Conflict, and Sleep Outcomes at Follow-Up[a]

	Sleep Deficiency		*Short Sleep Duration*		*Sleep Maintenance Problems*		*Insufficient Sleep*	
Independent Variables	***Odds Ratio (95% CI)***	***p***	***Odds Ratio (95% CI)***	***p***	***Odds Ratio (95% CI)***	***p***	***Odds Ratio (95% CI)***	***p***
Baseline outcome	**5.57 (2.14 to 14.5)**	**.0004**	**12.0 (4.14 to 34.7)**	**< .0001**	**6.67 (2.50 to 17.8)**	**.0001**	**13.4 (4.59 to 39.4)**	**< .0001**
Work–family conflict								
1: Medium vs 0: low	2.37 (0.64 to 8.75)	.43	2.81 (0.81 to 9.76)	.27	0.67 (0.21 to 2.10)	.31	**5.10 (1.47 to 17.7)**	**.04**
2: High vs 0: low	1.15 (0.39 to 3.45)		1.58 (0.43 to 5.85)		0.45 (0.15 to 1.33)		**2.15 (0.61 to 7.52)**	

95% CI = 95% confidence interval
[a]*Significant values are bolded.*

pleted the survey online. After 2 more weeks, the researchers sent a third e-mail reminder and a second paper survey to all nonrespondents. A total of 1,572 (79%) patient care workers completed at least 50% of the survey.

All patient care workers employed at one of the two hospitals and who had completed the initial survey were contacted via e-mail, reminded of their participation in the original survey, and asked to participate in an ancillary study. Of the 840 employees who were re-contacted, 102 (12.1%) completed the second phase of the study, including a face-to-face meeting and a blood draw. Study flow is illustrated in **Figure 1**.

Data Analysis

Using baseline data from the larger sample, the characteristics of workers who had sleep deficiency, sleep maintenance problems, sleep insufficiency, or short sleep duration were compared to those who did not. The researchers used the independent sample *t* test for continuously measured characteristics and the Pearson's chi-square test or Fisher exact chi-square test for categorical measures. To assess multivariable associations of work–family conflict and sleep, controlling for the potential confounders, the researchers used multiple logistic regression analysis. Covariates that had a *p* value less than .20 in the bivariate analyses were included in the multivariate models, ensuring variables were relevant without too stringent exclusion criteria.

To assess the second aim of the study, the longitudinal relationship between work–family conflict on subsequent sleep, the authors computed multiple logistic regression analyses using the subsample. Sleep outcomes were regressed at time 2 on work–family conflict at baseline; the researchers controlled for baseline sleep measures and covariates determined to be associated with sleep at baseline. All analyses used SAS version 9.3 software (SAS Institute, Inc., Cary, NC).

RESULTS

The participants (n = 1,572) were 90% women with a mean age of 41.4 ± 11.7 years. The majority were white (79%), married or living with a partner (66%), and staff nurses (70%) with a college degree (53%). In the initial sample, 57% (n = 896) reported sleep deficiency, 23% (n = 354) reported short sleep duration, 27% (n = 428) reported sleep insufficiency, and 40% (n = 631) reported sleep maintenance problems. **Figure 2** illustrates the number of participants with each sleep outcome and the overlap between outcomes and missing data.

Cross-sectional Analyses of Overall Sample

Sleep deficiency and its components were all significantly associated with work–family conflict, such that greater work–family conflict was associated with a higher prevalence of sleep deficiency (**Table 1**). Similarly for each of the components of sleep deficiency, greater work–family conflict was associated with greater prevalence of sleep disturbance. Covariates associated with greater prevalence of sleep deficiency included higher body mass index, having an occupation other than staff nurse or patient care associate, reporting iso-strain, or having at least some difficulty paying bills. Results were similar for the components of sleep deficiency, although only higher work–family conflict and more psychological distress were negatively associated with all sleep outcomes (**Table 1**).

For multivariable analysis of work–family conflict and sleep deficiency, the researchers included variables from the bivariate analyses with *p* values less than .20 to select relevant variables without excluding potentially significant covariates (**Table 2**).

After adjusting for covariates, higher work–family conflict was significantly associated with sleep deficiency ("medium" vs "low" odds ratio [OR]: 1.57, 95% confidence interval [CI]: 1.19 to 2.07, "high" vs "low" OR: 1.70, 95% CI: 1.20 to 2.40; p = .0008). An increase in severe psychological distress and older age were also significantly associated with sleep deficiency in the multivariable analysis.

Looking at the components of sleep deficiency, higher work–family conflict was associated with sleep insufficiency ("medium" vs "low" OR: 1.68, 95% CI: 1.25 to 2.27; "high" vs "low" OR: 2.36, 95% CI: 1.67 to 3.34; p < .0001) and short sleep duration ("medium" vs "low" OR: 1.23, 95% CI: 0.88 to 1.72; "high" vs. "low" OR: 1.64, 95% CI, 1.11 to 2.41; p = .04) when controlling for covariates. Also, clear trends were noted between higher work–family conflict and increased risk of sleep maintenance problems (**Table 2**).

Cross-sectional Analyses of the Subsample (n = 102)

The subsample was similar to the overall sample on sociodemographic characteristics and outcomes, with the exception of race/ethnicity. The subsample had a higher percentage of white patient care workers than the initial sample. The subsample was predominantly white (91%), female (97%) nurses (68%) with a college degree (65%) and a mean age of 40.8 ± 11.9 years. Sleep deficiency was reported by 64 (63%) of these participants at baseline. With similar distributions in the variables, it was assumed that the baseline multivariable models could be replicated in the biomarker subsample.

Longitudinal Analysis of Subsample (n = 102)

After controlling for baseline scores in sleep outcomes, work–family conflict was no longer significantly associated with sleep deficiency. When the components were investigated separately, higher work–family conflict was significantly associated with perceived sleep insufficiency (**Table 3**).

Psychological distress, iso-strain, and sociodemographic factors did not predict sleep outcomes in the subsample. No significant interactions between work–family conflict and sleep outcomes were found at baseline or at the 2-year Phase Two study.

DISCUSSION

The goals of the current study were to assess whether work–family conflict was cross-sectionally associated with sleep deficiency (sleep maintenance problems, short sleep duration, and/or sleep insufficiency) when controlling for psychological distress, other work stress variables, and sociodemographic factors. Furthermore, the current study assessed whether work–family conflict at baseline predicted sleep outcomes in a subsample 2 years later. In baseline cross-sectional analyses, the researchers found significant associations between higher levels of work–family conflict and increased risk of composite sleep deficiency. Increased psychological distress and older age also significantly increased the risk for sleep deficiency. All associations remained significant when controlling for sociodemographic and occupational covariates.

In the subsample (n = 102) that participated in the later study, higher levels of work–family conflict were not associated with sleep deficiency. However, higher levels of work–family conflict significantly predicted sleep insufficiency and showed a negative trend in short sleep duration. The effect of work–family conflict on subsequent sleep outcomes, when controlling for psychological distress and iso-strain, suggests that sleep and work stress studies should include a measure of conflict in the work–family interface. Work–family conflict was also the only significant predictor in the later study, making role conflict and scheduling prime subjects for both future longitudinal studies and interventions targeting sleep deficiency and work stress.

A diary study of 91 employees studied for 14 consecutive days highlighted work–family conflict as a separate, salient construct in the work stress paradigm (Butler et al., 2005). Work–family conflict in this study was strongly associated with sleep deficiency, controlling for job strain; this is consistent with previous work (Lallukka et al., 2010). In this study, the researchers also controlled for coworker and supervisor support, severe psychological distress, and sociodemographic factors; the influence of work–family conflict remained. Univariate analyses showed a significant relationship between iso-strain and sleep deficiency. However, this association disappeared when work–family conflict, among other covariates, was controlled. The relationship between iso-strain components and sleep deficiency is well established (Äkerstedt, 2006); however, it could be argued that work–family conflict is the salient factor in the relationship between work stress and sleep deficiency. It is at least a strong argument to include this variable in future studies.

Study results showed a predictive and associative relationship between high work–family conflict and not feeling rested upon awakening, which may have several possible explanations. One possible mechanism is that work and family duties cause rumination and worry, two cognitive processes linked to increased arousal (Denson, Spanovic, & Miller, 2009). Arousal from cognitive processes has been found to both cause disturbed sleep and influence individuals' perceptions of their sleep (Tang & Harvey, 2004). Another possible explanation is a previous finding demonstrating that sleep can be negatively impacted when individuals try to prioritize work, family, and sleep (Barnes, Wagner, & Ghumman, 2012). The conservation of resources theory is frequently cited in the work–family conflict field. This theory claims that work–family stress is often caused by the threat of losing resources, a loss of resources, or a lack of expected gain in resources (Grandey & Cropanzano, 1999). Resources that apply to a work–life setting could be threats to one's image as a good wife or husband, personal characteristics such as work-related confidence and self-esteem, or material resources such as time, knowledge, or money (Grandey & Cropanzano, 1999).

Similar to the principles of conservation of resources theory, the trend in short sleep duration could also partly explain the link between work–family conflict and sleep insufficiency. The results from the subsample do not have the power or time points to properly describe causal mechanisms. However, the many demands of work and home life can restrict the actual hours available for sleeping, voluntary or not, which would explain reported sleep insufficiency. The results in this study and previous work indicate that sleep is lost when individuals try to increase or protect other resources. Sleep should therefore be highlighted as an important part of the work–life domain and encouraged in organizational health promotion programs (Barnes et al., 2012).

Psychological distress was strongly associated with all sleep outcomes at baseline, but it was not associated with any outcomes longitudinally. The cross-sectional associations were supported by many other studies showing a link between psychological distress and sleep (Baglioni & Riemann, 2012; Vandeputte & de Weerd, 2003). One

possible explanation for the lack of association in the second study is that psychological distress has a more temporary effect on sleep outcomes than work–family conflict. Earlier studies have claimed that sleep maintenance problems are most likely an intermediate phenotype in depression (Buysse et al., 2008), but the two are still separate co-occurring disorders influencing each other. This hypothesis is supported by other studies reporting a bi-directional relationship between insomnia and depression (Baglioni & Riemann, 2012). The natural course of unipolar depression will often lead to recovery within 6 months, even without treatment (Posternak et al., 2006) and, in a small sample such as this one, a change in depressive disorders could very well influence the effects after 2 years. The concept of sleep deficiency as a comorbid condition to psychiatric disorders is evident when looking at the *Diagnostic and Statistical Manual of Mental Disorders*, Fourth Edition (DSM-IV). Sleep maintenance problems are part of the criteria for 19 DSM-IV diagnoses; it has been suggested that sleep deficiency is a trans-diagnostic mechanism contributing to the development and continuance of mental disorders (Harvey, Murray, Chandler, & Soehner, 2011). The sample size in the second study did not allow for an investigation of the cross-sectional relationship between sleep outcomes and psychological distress at time 2, a potential significant factor that may have influenced the sleep outcomes in this study.

Limitations

This study had some limitations. The cross-sectional approach in the initial analyses did not allow for any causal inferences in terms of directionality or mechanisms regarding the effect of work–family conflict and psychological distress on sleep. The second study sample was small, but two time points are better than one; however, mediating mechanisms cannot be described with this approach. Also, the small sample was only collected from one of the two hospitals, with a low response rate, making the selection more vulnerable to bias. However, the low response rate was expected because the ancillary study required a face-to-face meeting and a blood sample from participants.

Another limitation of this study was no measure of the amount of extra work shifts or overtime that workers may have done. Patient care associates and other staff, which consisted mainly of support staff, were lower wage earners than their staff nurse counterparts. These lower wage earners may have overtime pay or other jobs that also may contribute to more work–family conflict and sleep deficiency.

The second phase of this study was limited to a small number of participants. The effects of a small sample are evident from the odds ratios of higher work–family conflict on sleep deficiency in the small and large samples. The odds ratios in the small sample are actually higher than in the large sample, but are still not significant. Several longitudinal and intervention studies on larger samples will be needed to understand how work–family conflict affects sleep. However, this study is the first to examine this relationship using a two-phase study. Furthermore, all variables were self-reported; future studies on work–family conflict and sleep outcomes would benefit from sleep deficiency measures such as actigraphy or polysomnography.

IMPLICATIONS FOR PRACTICE

This study is the first to investigate the effects of work–family conflict on sleep deficiency in patient care workers, controlling for several covariates and using data from a second sample. Work–family conflict was the only variable that predicted sleep problems 2 years later, controlling for baseline sleep outcomes. Patient care workers are an occupational group with a high prevalence of sleep deficiency, and the deficiency has been reported to be associated with musculoskeletal pain, functional limitations, and psychological distress (Buxton et al., 2012). The results from this study indicate that future studies and interventions on sleep deficiency and occupational health should include a specific focus on work–family conflict. Preventive actions by the employer should focus on increasing job flexibility and urging employees to prioritize sleep by explaining the negative health effects from sleep deficiency.

REFERENCES

American Academy of Sleep Medicine. (2001*). International classification of sleep disorders, revised: Diagnostic and coding manual.* Chicago: Author.

Baglioni, C., & Riemann, D. (2012). Is chronic insomnia a precursor to major depression? Epidemiological and biological findings. *Current Psychiatry Reports, 14*, 511-518. doi: 10.1007/s11920-012-0308-5

Barnes, C. M., Wagner, D. T., & Ghumman, S. (2012). Borrowing from sleep to pay work and family: Expanding time-based conflict to the broader nonwork domain. *Personnel Psychology, 65*, 789-819.

Bellavia, G. M., & Frone, M. R. (2005). Work-family conflict. In J. Barling, E. K. Kelloway, & M. R. Frone (Eds.), *Handbook of work stress* (pp. 113-147). Thousand Oaks, CA: SAGE.

Bhui, K. S., Dinos, S., Stansfeld, S. A., & White, P. D. (2012). A synthesis of the evidence for managing stress at work: A review of the reviews reporting on anxiety, depression, and absenteeism. *Journal of Environmental and Public Health, 2012*, 515874.

Britt, T. W., & Dawson, C. R. (2005). Predicting work-family conflict from workload, job attitudes, group attributes, and health: A longitudinal study. *Military Psychology, 17*, 203.

Butler, A., Grzywacz, J., Bass, B., & Linney, K. (2005). Extending the demands-control model: A daily diary study of job characteristics, work-family conflict and work-family facilitation. *Journal of Occupational and Organizational Psychology, 78*, 155-169.

Butts, M., Eby, L., Allen, T., & Muillenburg, J. (2013, April). *Sleep, exercise, and the work-nonwork interface: Disentangling causal direction.* Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology, Houston, TX.

Buxton, O. M., Hopcia, K., Sembajwe, G., Porter, J. H., Dennerlein, J. T., Kenwood, C., . . . Sorensen, G. (2012). Relationship of sleep deficiency to perceived pain and functional limitations in hospital patient care workers. *Journal of Occupational and Environmental Medicine, 54*, 851-858.

Buxton, O. M., & Marcelli, E. (2010). Short and long sleep are positively associated with obesity, diabetes, hypertension, and cardiovascular disease among adults in the United States. *Social Science and Medicine, 71*, 1027-1036.

Buysse, D. J., Angst, J., Gamma, A., Ajdacic, V., Eich, D., & Rössler, W. (2008). Prevalence, course, and comorbidity of insomnia and depression in young adults. *Sleep, 31*, 473-480.

Byron, K. (2005). A meta-analytic review of work-family conflict and its antecedents. *Journal of Vocational Behavior, 67*, 169-198.

Daley, M., Morin, C. M., LeBlanc, M., Grégoire, J. P., & Savard, J. (2009). The economic burden of insomnia: Direct and indirect costs for individuals with insomnia syndrome, insomnia symptoms, and good sleepers. *Sleep, 32*, 55-64.

Denson, T. F., Spanovic, M., & Miller, N. (2009). Cognitive appraisals and emotions predict cortisol and immune responses: A meta-analysis of acute laboratory social stressors and emotion inductions. *Psychological Bulletin, 135*, 823-853.

Dew, M. A., Hoch, C. C., Buysse, D. J., Monk, T. H., Begley, A. E., Houck, P. R., . . . Reynolds, C. F., III. (2003). Healthy older adults' sleep predicts all-cause mortality at 4 to 19 years of follow-up. *Psychosomatic Medicine, 65*, 63-73.

Eaton, S. C. (2003). If you can use them: Flexibility policies, organizational commitment, and perceived performance. *Industrial Relations: A Journal of Economy and Society, 42*, 145-167.

Grandey, A. A., & Cropanzano, R. (1999). The conservation of resources model applied to work-family conflict and strain. *Journal of Vocational Behavior, 54*, 350-370.

Grzywacz, J. G., Frone, M. R., Brewer, C. S., & Kovner, C. T. (2006). Quantifying work-family conflict among registered nurses. *Research in Nursing & Health, 29,* 414-426.

Harvey, A. G., Murray, G., Chandler, R. A., & Soehner, A. (2011). Sleep disturbance as transdiagnostic: Consideration of neurobiological mechanisms. *Clinical Psychology Review, 31*, 225-235.

Havlovic, S. J., Lau, D. C., & Pinfield, L. T. (2002). Repercussions of work schedule congruence among full-time, part-time, and contingent nurses. *Health Care Management Review, 27*, 30.

Hill, H. D. (2013). Paid sick leave and job stability. *Work and Occupations, 40*, 143-173.

Johnson, J. V., & Hall, E. M. (1988). Job strain, work place social support, and cardiovascular disease: A cross-sectional study of a random sample of the Swedish working population. *American Journal of Public Health, 78*, 1336-1342.

Karasek, R. A., Jr. (1979). Job demands, job decision latitude, and mental strain: Implications for job redesign. *Administrative Science Quarterly, 24*, 285-308.

Karasek, R., Brisson, C., Kawakami, N., Houtman, I., Bongers, P., & Amick, B. (1998). The Job Content Questionnaire (JCQ): An instrument for internationally comparative assessments of psychosocial job characteristics. *Journal of Occupational Health Psychology, 3*, 322-355.

Kessler, R. C., Barker, P. R., Colpe, L. J., Epstein, J. F., Gfroerer, J. C., Hiripi, E., . . . Walters, E. E. (2003). Screening for serious mental illness in the general population. *Archives of General Psychiatry, 60*, 184-189.

Kessler, R. C., Berglund, P. A., Coulouvrat, C., Hajak, G., Roth, T., Shahly, V., . . . Walsh, J. K. (2011). Insomnia and the performance of US workers: Results from the America Insomnia Survey. *Sleep, 34*, 1161-1171.

Kim, S. S., Okechukwu, C. A., Buxton, O. M., Dennerlein, J. T., Boden, L. I., Hashimoto, D. M., & Sorensen, G. (2013). Association between work-family conflict and musculoskeletal pain among hospital patient care workers. *American Journal of Industrial Medicine, 56*, 488-495.

Knutson, K. L. (2012). Sociodemographic and cultural determinants of sleep deficiency: Implications for cardiometabolic disease risk. *Social Science & Medicine, 79*, 7-15.

Lallukka, T., Rahkonen, O., Lahelma, E., & Arber, S. (2010). Sleep complaints in middle-aged women and men: The contribution of working conditions and work-family conflicts. *Journal of Sleep Research, 19*, 466-477.

Lapierre, L. M., & Allen, T. D. (2006). Work-supportive family, family-supportive supervision, use of organizational benefits, and problem-focused coping: Implications for work-family conflict and employee well-being. *Journal of Occupational Health Psychology, 11*, 169-181.

Léger, D., & Bayon, V. (2010). Societal costs of insomnia. *Sleep Medicine Reviews, 14*, 379-389.

Lindfors, P., Berntsson, L., & Lundberg, U. (2006). Total workload as related to psychological well-being and symptoms in full-time employed female and male white-collar workers. *International Journal of Behavioral Medicine, 13*, 131-137.

Lundberg, U., & Frankenhaeuser, M. (1999). Stress and workload of men and women in high-ranking positions. *Journal of Occupational Health Psychology, 4*, 142.

Morin, C. M., Rodrigue, S., & Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine, 65*, 259-267.

Netemeyer, R. G., Boles, J. S., & McMurrian, R. (1996). Development and validation of work-family conflict and family-work conflict scales. *Journal of Applied Psychology, 81*, 400.

Nylén, L., Melin, B., & Laflamme, L. (2007). Interference between work and outside-work demands relative to health: Unwinding possibilities among full-time and part-time employees. *International Journal of Behavioral Medicine, 14*, 229-236.

Posternak, M. A., Solomon, D. A., Leon, A. C., Mueller, T. I., Shea, M. T., Endicott, J., & Keller, M. B. (2006). The naturalistic course of unipolar major depression in the absence of somatic therapy. *The Journal of Nervous and Mental Disease, 194*, 324-329.

Rogers, B., & Ostendorf, J. (2001). *Occupational health nursing.* New York: John Wiley & Sons.

Sekine, M., Chandola, T., Martikainen, P., Marmot, M., & Kagamimori, S. (2006). Work and family characteristics as determinants of socioeconomic and sex inequalities in sleep: The Japanese Civil Servants Study. *Sleep, 29*, 206-216.

Strine, T. W., & Chapman, D. P. (2005). Associations of frequent sleep insufficiency with health-related quality of life and health behaviors. *Sleep Medicine, 6*, 23-27.

Tang, N. K. Y., & Harvey, A. G. (2004). Effects of cognitive arousal and physiological arousal on sleep perception. *Sleep, 27*, 69-78.

Vandeputte, M., & de Weerd, A. (2003). Sleep disorders and depressive feelings: A global survey with the Beck depression scale. *Sleep Medicine, 4*, 343-345.

Wall, T. D., Jackson, P. R., Mullarkey, S., & Parker, S. K. (2011). The demands-control model of job strain: A more specific test. *Journal of Occupational and Organizational Psychology, 69*, 153-166.

Williams, A., Franche, R. L., Ibrahim, S., Mustard, C. A., & Layton, F. R. (2006). Examining the relationship between work-family spillover and sleep quality. *Journal of Occupational Health Psychology, 11*, 27-37.

Äkerstedt, T. (2006). Psychosocial stress and impaired sleep. *Scandinavian Journal of Work, Environment & Health, 32*, 493-501.

Äkerstedt, T., & Wright, K. P., Jr. (2009). Sleep loss and fatigue in shift work and shift work disorder. *Sleep Medicine Clinics, 4*, 257-271.