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## Differences between day and nonday workers in exposure to physical and psychosocial work factors in the Danish eldercare sector

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**Objective** The possible interaction between individual and occupational risk factors, the need for meaningful intervention, and the demand for valid shift work research make the accumulation of adverse exposures at certain times of the day of special relevance with respect to occupational health. The aim of the present study was therefore to examine whether there was a clustering of detrimental work factors among female eldercare workers in fixed evening or fixed night shifts when they are compared with workers in fixed day shifts.

**Methods** This cross-sectional, questionnaire-based study was conducted among 4590 female health care workers in the Danish eldercare sector. The participants worked in nursing homes, in home care, or in both. They answered questions on job demands, job control, and social support, together with questions on physical and psychological violence, physical workload, and passive smoking.

**Results** We found that—compared with day workers—fixed nonday workers were more exposed to low job control, low support from leaders, physical and psychological violence, and high physical demands. Nonday workers were, however, less exposed to high demands. These differences remained after control for age, job title, and workplace.

**Conclusions** Exposures in the work environment of Danish eldercare workers varied between shifts. In a research perspective these findings stress the importance of adequate adjustment for work factors when the health effects of shift work are studied. Moreover, the results underscore the need for an increased awareness of work factors of special importance among nonday workers when interventions against shiftwork-related occupational disorders are designed.

**Key terms** clustering; confounding; health care worker; home care; nursing; shift work.

In the Danish eldercare sector, 41% of the health care personnel work evening or night shifts in order to provide care for the elderly (1). Thus nonday workhours are an indispensable condition for many employees. Compared with day workers, shift workers more often report high physical load, occupational noise, high work pressure, lack of autonomy, low decision latitude, or control, emotionally demanding work, common work conflicts, and harassment by a supervisor, colleagues or customers (2–4). Therefore, it appears that there is a potential clustering of hazardous exposures among shift workers. Such a clustering would mean that a subgroup of workers might be exposed to a range of potentially detrimental work factors. These former studies, however, are

all based on rather heterogeneous populations representing different social classes and job categories. Some of the differences in work environment characteristics among fixed day workers and shift workers (including employees in rotating shifts, as well as fixed evening workers or fixed night workers) could therefore potentially be due to confounding by occupational group or job title.

Several studies have shown a complex interaction between individual and occupational risk factors. Lifestyle factors, for instance, physical activity and alcohol consumption, have been found to interact with shift schedule when it comes to cardiovascular diseases (5). In addition, individual factors such as sleeping habits, coping mechanisms, physical fitness, and age influence

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tolerance to shift work (6). Traditional risk factors for cardiovascular diseases, as well as work-related cardiovascular risk factors such as high job demands and low job control, display interacting effects (7, 8). The latter interaction, however, is still questioned (9). One Swedish study has shown that the association between effort–reward imbalance and hypertension or atherogenic lipids varies between day and shift workers, and therefore indicates an interacting effect (10). Finally, in the Finish 10-Town Study, long total workhours predicted increased rates of self-certified sickness absence among workers with low worktime control but not among those with high worktime control (11). The results are not consistent, however, since Parkes did not find an interacting effect between shift work and work environment on health-related outcomes in a sample of 1320 males working in the oil industry (12).

In light of a possible interaction between various individual and occupational exposures, a clustering of risk factors in the work environment at certain times of the day is of special relevance with respect to occupational health. Theoretically, intervention against one target exposure will have a stronger effect in an occupational group exposed to several interacting exposures—explicitly, because the direct effect, as well as the effect from the interaction between the target exposure and other exposures, will be diminished or eliminated (13). In addition, since day workers often constitute the majority at the workplace and because settings in which the work environment is discussed often occur during the day, interventions are likely to focus primarily on problems the most relevant for daytime workers, and hence there is a need for an increased awareness of work factors of special importance among nonday workers. Finally, differences in work factors among day and nonday workers could also introduce serious bias in studies of the relation between shift work and health if not sufficiently adjusted for.

On the basis of data from the Danish eldercare sector, the aim of our study was to investigate whether there was a clustering of detrimental work factors among female eldercare workers in fixed evening or fixed night shifts when they were compared with fixed day workers. The work environment was characterized in terms of (i) demands, control and support, (ii) exposure to physical and psychological violence, and (iii) physical workload and passive smoking.

## **Study population and methods**

### *Study design and study population*

In our present study, we used cross-sectional self-reported questionnaire data from a follow-up study in the Danish eldercare sector. The data collection took place

from October 2006 until September 2007. The study population was comprised of all employees working in eldercare in 40 municipalities (275 work units). The 40 municipalities were chosen with the purpose of reflecting the variation in a range of factors [organization of eldercare, productivity, number of care-needing elderly people, economy, labor market factors, and whether the municipality was facing a merge with other municipalities in the near future (14)].

The questionnaires were mailed to the contacts in each work unit, who distributed the questionnaires, and 9162 persons (70%) filled out and returned the questionnaire. According to the aim of the study, we included only those who worked fixed day, fixed evening, or fixed night shifts. Thus those who worked two or three shifts (combinations of day, evening, or night work) were excluded since their reports of the work environment were likely to describe a mixture of exposures in different shifts.

To ensure the comparability of the participants, this study included only female health care workers with the following job titles: social and health care assistant, social and health care helper, nursing home assistant, nursing aide, and home care helper. All of these job titles reflect formal health care training during less than or around 3 years. We excluded registered nurses, administrative staff, leaders, janitors, cleaning personnel, kitchen personnel, and therapists. Furthermore, we only included those working either in nursing homes, in home care, or in both. This step was taken because only a few persons in other types of workplaces or in other job functions worked evenings or nights.

One person was excluded because of missing age information, and 28 persons were excluded because of missing job title. The final sample consisted of 4590 women. The distributions of job title, workplace, age, and indicators of physical and psychosocial health among the participants are presented in table 1.

### *Work demands, control and support*

Quantitative demands and demands related to social interactions (emotional demands and demands for hiding emotions), influence at work, possibilities for development, and social support from leaders and colleagues were assessed using the Copenhagen Psychosocial Questionnaire (COPSOQ) (15, 16). We also asked about involvement in planning one's own work schedule, team autonomy, and team participation. For each participant a score between 0 and 100 was calculated for each of the scales. For the three demand scales, a high score equaled high demands. For the seven latter variables, a high score reflected high resources. All of these measures of psychosocial exposures were treated as continuous variables in the statistical analyses.

**Table 1.** Distribution of job titles, workplace, age, and indicators of physical and mental health among the participants working fixed day, fixed evening, and fixed night shifts.

	Day work				Evening work				Night work			
	N	%	Mean	SD	N	%	Mean	SD	N	%	Mean	SD
Job title												
Social and health care assistant	566	18.9	.	.	173	14.4	.	.	68	17.3	.	.
Social and health care helper	1828	61.0	.	.	690	57.5	.	.	177	44.9	.	.
Nursing home assistant	47	1.6	.	.	24	2	.	.	7	1.8	.	.
Nursing aides	333	11.1	.	.	237	19.8	.	.	99	25.1	.	.
Home care helper	223	7.4	.	.	75	6.3	.	.	43	10.9	.	.
Workplace												
Nursing home	1208	40.3	.	.	757	63.1	.	.	259	65.7	.	.
Home care	1676	55.9	.	.	404	33.7	.	.	84	21.3	.	.
Nursing home and home care	113	3.8	.	.	38	3.2	.	.	51	12.9	.	.
Age (years)	–	.	44.8	9.8	–	.	47.3	10.1	–	.	47.8	9.7
Living with partner	2419	81.2	.	.	909	76.3	.	.	322	81.9	.	.
Children living in the home	1650	55.6	.	.	434	36.9	.	.	166	42.8	.	.
General health												
Excellent	1145	38.4	.	.	448	37.6	.	.	195	49.9	.	.
Good	1349	45.3	.	.	563	47.3	.	.	154	39.4	.	.
Poor	487	16.3	.	.	180	15.1	.	.	42	10.7	.	.
Low-back pain during the last 12 months												
0 days of low-back pain	859	29.0	.	.	320	26.8	.	.	158	40.5	.	.
≥1 days of low-back pain	2101	71.0	.	.	872	73.2	.	.	232	59.5	.	.
Vitality	–	.	65.7 <sup>a</sup>	17.8	–	.	66.1 <sup>a</sup>	17.8	–	.	70.6 <sup>a</sup>	16.3
Patient-related burnout	–	.	32.4 <sup>a</sup>	20.6	–	.	34.1 <sup>a</sup>	21.3	–	.	30.7 <sup>a</sup>	20.3
All	2997	65.3			1199	26.1			394	8.6		

<sup>a</sup> Mean score.

### *Physical and psychological violence from clients, colleagues and leaders*

The participants were asked whether they had experienced bullying, threats, or violence during the preceding 12 months and by whom they were offended. Clients, colleagues, and leaders could all be the perpetrators. The response categories were daily or almost daily, weekly, monthly, sometimes, or never. All three variables were dichotomized into exposed (daily to sometimes) and unexposed (never).

### *Physical workload and passive smoking*

The participants were asked about the number of patient-handling tasks that they performed during a normal workday, categorized as never, seldom, 1–2 times per day, 3–10 times per day, and >10 times per day. The responses were subsequently divided into the three categories 0–2 per day, 3–10 per day, and >10 per day.

Smoking was rather common in this occupational group (38.9% of the participants were smokers). Moreover, eldercare workers often perform their worktasks in the clients' homes, where the prohibition of smoking may be difficult. Therefore, the prevalence of passive smoking caused by colleagues or clients was also

relevant for inclusion as a work environment exposure. Hence the participants were asked about exposure to passive smoking (response categories: almost all of the time, three-fourths of the time, one-half of the time, one-fourth of the time, seldom, never, or almost never). Exposure to passive smoking was dichotomized into exposed (almost all of the time to one-fourth of the time) and unexposed (seldom to never).

### *Covariates*

In this study, age, job title, and workplace were included as potential confounders of the association between shift work and other work environment exposures.

In order to characterize the population, we also present the distribution of cohabitation (living with partner or children), self-reported general health, the 1-year prevalence of low-back pain, vitality, and signs of burnout related to patient contact (table 1). When compared with fixed day workers, the fixed night workers had a higher mean vitality score [estimated difference in the means 4.78, 95% confidence interval (95% CI) 2.19–6.65], a lower frequency of poor general health [odds ratio (OR) 0.51, 95% CI 0.36–0.72], as well as low-back pain (OR 0.60, 95% CI 0.48–0.75). Compared with fixed day workers, fixed evening workers

experienced more signs of burnout (estimated difference in the means 1.62, 95% CI 0.20–3.03). In addition, the evening workers were more often living alone (OR 1.34, 95% CI 1.14–1.58), and nonday workers less often had children living in the home (evening: OR 0.47, 95% CI 0.41–0.54; night: OR 0.60, 95% CI 0.48–0.74). Regarding most of the variables, the absolute differences in the frequencies and means were small (table 1).

### Statistical analysis

The associations between the continuous measures of work environment factors (scales) and type of shift were tested using general linear models. The associations between categorical outcomes and type of shift were tested by binary logistic regression. In all of the models, shift schedule was included as the exposure variable, and the other physical and psychosocial work factors were the outcomes.

The mean score of the scales, together with their 95% confidence intervals (table 2), and percentages (tables 3 and 4) were calculated. In model I, the mean score differences and their 95% confidence intervals (table 2) and the odds ratios and their 95% confidence intervals (table 3 and 4) were estimated. In this model no adjustment for confounding was undertaken. Model

II presents the estimated differences for the psychosocial work factors between type of shifts (table 2) and the odds ratios for the increased or decreased prevalence of physical and psychological violence (table 3), as well as physical workload and passive smoking (table 4), adjusted for job title, age, and workplace.

## Results

### Demand, control and support

As can be seen from table 2, the work environment in the evening was characterized by less quantitative demands as regards both work speed and amount of work. On the other hand, there were slightly higher demands for hiding emotions and less job control as measured by decision latitude and skill discretion. The fixed evening workers were also less often involved in the planning of their own work schedule. At the same time, these workers experienced less support from their leaders.

In night work, the quantitative demands for work speed and the amount of work were also lower than during the day. Furthermore, the emotional demands were lower than in day work. On the other hand, the night

**Table 2.** Exposure to demands, control, and support (all measured as scales from 0–100) among fixed evening and night workers in a comparison with fixed day workers. An increase in the score refers to an increase in demands, job control, support, and teamwork autonomy or participation. Significant results are presented in boldface. (M = mean, 95% CI = 95% confidence interval; Diff = difference in the means)

	Model 0 <sup>a</sup>									Model I <sup>b</sup>				Model II <sup>c</sup>			
	Day			Evening			Night			Evening		Night		Evening		Night	
	N	M	95% CI	N	M	95% CI	N	M	95% CI	Diff	95% CI	Diff	95% CI	Diff	95% CI	Diff	95% CI
Quantitative demands for work speed	2971	65.4	64.7–66.1	1191	62.1	60.9–63.3	392	50.8	49.0–52.5	-3.3	-4.6–-2.0	-14.6	-16.7–-12.6	-2.9	-4.3–-1.6	-14.5	-16.6–-12.4
Quantitative demands for amount of work	2976	34.1	33.2–35.0	1189	24.8	23.6–26.1	389	21.6	19.6–23.6	<b>-9.3</b>	<b>-10.8–-7.7</b>	<b>-12.5</b>	<b>-15.0–-10.0</b>	<b>-11.8</b>	<b>-13.4–-10.2</b>	<b>-16.1</b>	<b>-18.5–-13.6</b>
Emotional demands	2959	49.7	49.1–50.4	1191	50.4	49.4–51.4	387	44.3	42.6–46.1	0.7	-0.5–1.9	<b>-5.4</b>	<b>-7.3–-3.5</b>	-0.2	-1.5–1.0	<b>-6.8</b>	<b>-8.7–-4.9</b>
Demands for hiding emotions	2986	40.3	39.6–41.0	1196	42.6	41.4–43.7	392	39.2	37.2–41.2	<b>2.3</b>	<b>1.0–3.6</b>	-1.0	-3.1–1.0	<b>2.3</b>	<b>1.0–3.7</b>	-0.8	-2.9–1.3
Decision latitude	2978	45.6	44.8–46.3	1190	38.6	37.5–39.8	391	39.6	37.5–41.7	<b>-6.9</b>	<b>-8.3–-5.6</b>	<b>-6.0</b>	<b>-8.1–-3.8</b>	<b>-8.0</b>	<b>-9.4–-6.6</b>	<b>-7.3</b>	<b>-9.5–-5.1</b>
Skill discretion	2959	72.5	72.0–72.9	1190	69.9	69.1–70.7	386	67.9	66.4–69.3	<b>-2.6</b>	<b>-3.5–-1.7</b>	<b>-4.6</b>	<b>-6.0–-3.2</b>	<b>-2.9</b>	<b>-3.8–-1.9</b>	<b>-5.0</b>	<b>-6.4–-3.5</b>
Involvement in work schedule	2912	38.5	37.3–39.6	1151	32.0	30.0–34.0	375	32.0	28.3–35.7	<b>-6.5</b>	<b>-8.8–-4.2</b>	<b>-6.5</b>	<b>-10.1–-2.8</b>	<b>-7.1</b>	<b>-9.4–-4.7</b>	<b>-8.1</b>	<b>-11.8–-4.4</b>
Support (leaders)	2951	57.8	56.9–58.6	1177	49.9	48.5–51.2	391	48.2	45.8–50.5	<b>-7.9</b>	<b>-9.4–-6.3</b>	<b>-9.6</b>	<b>-12.0–-7.2</b>	<b>-7.6</b>	<b>-9.2–-6.0</b>	<b>-9.1</b>	<b>-11.5–-6.6</b>
Support (colleagues)	2968	67.9	67.3–68.5	1189	66.9	65.9–68.0	392	67.7	65.8–69.5	-0.9	-2.1–0.2	-0.2	-2.1–1.6	-0.9	-2.1–0.3	-0.3	-2.2–1.5
Teamwork (autonomy)	2800	59.4	58.8–60.0	1116	61.6	60.6–62.5	352	63.3	61.8–64.8	<b>2.2</b>	<b>1.1–3.3</b>	<b>3.9</b>	<b>2.1–5.6</b>	0.5	-0.6–1.9	1.7	-0.02–3.5
Teamwork (participation)	2807	69.7	69.1–70.3	1118	69.3	68.2–70.3	353	70.8	68.9–72.8	-0.4	-1.7–0.8	1.1	-0.9–3.1	-0.6	-1.8–0.7	1.0	-1.0–3.0

<sup>a</sup> Sample sizes and mean scores with 95% confidence intervals.

<sup>b</sup> Unadjusted analysis.

<sup>c</sup> Adjusted for age, workplace, and job title.

**Table 3.** Exposure to physical and psychological violence from clients, colleagues, and leaders among fixed evening and night workers compared with fixed day workers. Significant results are presented in boldface.

	Model 0 (frequencies) <sup>a</sup>						Model I <sup>b</sup>					Model II <sup>c</sup>				
	Day		Evening		Night		Day	Evening		Night		Day	Evening		Night	
	N	%	N	%	N	%	OR	OR	95% CI	OR	95% CI	OR	OR	95% CI	OR	95% CI
Bullying	259	8.7	133	11.2	33	8.4	1.00	<b>1.31</b>	<b>1.05–1.64</b>	0.96	0.66–1.41	1.00	<b>1.26</b>	<b>1.01–1.57</b>	0.92	0.62–1.36
Threats	805	27.3	508	43.1	185	47.6	1.00	<b>2.02</b>	<b>1.75–2.33</b>	<b>2.42</b>	<b>1.95–3.00</b>	1.00	<b>1.67</b>	<b>1.44–1.95</b>	<b>1.82</b>	<b>1.45–2.29</b>
Violence	578	19.7	413	35.3	144	37.3	1.00	<b>2.22</b>	<b>1.91–2.58</b>	<b>2.42</b>	<b>1.93–3.04</b>	1.00	<b>1.78</b>	<b>1.51–2.10</b>	<b>1.72</b>	<b>1.35–2.19</b>

<sup>a</sup> Prevalence of physical and psychological harassment.<sup>b</sup> Unadjusted analysis.<sup>c</sup> Adjusted for age, workplace, and job title.**Table 4.** Exposure to patient-handling tasks and passive smoking among fixed evening and night workers compared with fixed day workers. Significant results are presented in boldface.

	Model 0 (frequencies) <sup>a</sup>						Model I <sup>b</sup>					Model II <sup>c</sup>				
	Day		Evening		Night		Day	Evening		Night		Day	Evening		Night	
	N	%	N	%	N	%	OR	OR	95% CI	OR	95% CI	OR	OR	95% CI	OR	95% CI
Daily patient transfers																
3–10 times per day	1294	44.7	571	48.8	163	42.9	1.00	<b>2.35</b>	<b>1.98–2.79</b>	<b>1.64</b>	<b>1.26–2.13</b>	1.00	<b>2.06</b>	<b>1.72–2.46</b>	1.24	0.94–1.63
>10 times per day	351	12.1	366	31.3	121	31.8	1.00	<b>5.56</b>	<b>4.54–6.81</b>	<b>4.48</b>	<b>3.34–6.01</b>	1.00	<b>4.51</b>	<b>3.63–5.60</b>	<b>2.78</b>	<b>2.03–3.82</b>
Transfers alone <sup>d</sup>	802	28.3	477	41.1	163	42.9	1.00	<b>1.77</b>	<b>1.53–2.04</b>	<b>1.90</b>	<b>1.53–2.37</b>	1.00	<b>1.61</b>	<b>1.39–1.87</b>	<b>1.69</b>	<b>1.35–2.12</b>
Use of technical equipment <sup>e</sup>	508	18.0	113	9.8	111	29.4	1.00	<b>0.49</b>	<b>0.40–0.61</b>	<b>1.90</b>	<b>1.49–2.42</b>	1.00	<b>0.59</b>	<b>0.47–0.74</b>	<b>2.57</b>	<b>1.98–3.33</b>
Exposure to passive smoking	925	31.2	334	28.1	93	24.0	1.00	<b>0.86</b>	<b>0.74–1.00</b>	<b>0.69</b>	<b>0.54–0.89</b>	1.00	<b>0.77</b>	<b>0.60–0.99</b>	0.97	0.83–1.13

<sup>a</sup> Prevalence of physical exposure.<sup>b</sup> Unadjusted analysis.<sup>c</sup> Adjusted for age, workplace, and job title.<sup>d</sup> Sometimes or often.<sup>e</sup> Never or seldom.

workers reported less decision latitude, skill discretion, and influence on their work schedule than the day workers did. Moreover, they experienced less support from leaders than the day workers did.

#### *Physical and psychological violence from clients, colleagues and leaders*

When analyzing the association between work schedule and exposure to physical and psychological violence from clients, colleagues, and leaders, we found that the fixed evening workers were more exposed to bullying, threats, and violence than the fixed day workers were (table 3). The fixed night workers were more often exposed to threats and violence, while there was no difference in the odds of exposure to bullying in a comparison with fixed day workers. Bullying was mostly performed by colleagues (64.0%), clients (16.9%), or leaders (15.1%). Threats most often came from clients (89.7%) or the relatives of clients (8.7%). Violence was the most often carried out by clients (91.7%).

#### *Physical work environment*

Table 4 shows that both the fixed evening and fixed night workers were more exposed to patient transfers than the fixed day workers were. The nonday workers also more often performed patient transfers alone in situations in which two persons ought to have performed the task. On the other hand, the evening workers more often reported using technical equipment, while the night workers less often used this type of equipment. Finally, the fixed evening workers were less often exposed to passive smoking than the day workers were.

#### *Discussion*

The results of our study showed that—compared with fixed day workers—there was an accumulation of hazardous exposures when working evening or night shifts, especially in terms of low job control, low social support

from leaders, exposure to physical and psychological violence, and physical workload. The fixed evening and night workers were, however, less exposed to high demands (quantitative and emotional). Furthermore, the night workers less often used technical equipment, while the evening workers more often used technical equipment when performing patient-handling tasks. In addition, the evening workers were more likely to be exposed to passive smoking.

As regards the psychosocial exposure, the fixed evening or night workers "move towards" the passive quadrant in the demand-control model (low demands and low control) combined with less social support (17, 18). The reduced level of social support from leaders is not surprising since leaders usually work during the day. Our results are in accordance with those of other studies as regards physical load, job control, and physical and psychological violence. In contrast, we did not replicate the finding that evening and night workers have a higher work pressure and higher emotional demands than day workers (2-4). Thus, although there seems to be some work factors that, in general, are more common among nonday workers, the exposure to other work factors and differences between shifts may, to a higher degree, depend on occupational group.

The methodological difficulties of our present study were related to residual confounding and information bias due to the use of self-reported questionnaire data as a measure of actual exposure. These sources of bias are intertwined since some variables could have influenced the results through more than one mechanism and in more than one direction.

The differences in work environment factors between shifts could not be explained by confounding by gender, age, job title, or workplace. Still, residual confounding could be present, for example, caused by unmeasured individual factors predicting both the choice of work schedule [selection into and out of different shifts (19-21)] and influencing the experience and reporting of exposures leading to a differential misclassification of exposure. Such individual factors could be unmeasured personality factors (22, 23) or health-related factors, for example, low-back pain (24-26). In this case, such factors should be controlled for. On the other hand, mental and physical health are also consequences of adverse exposures in the work environment, including odd workhours, and thus should not be controlled for since it would underestimate the association between nonday work and, for example, high workload.

It seems unlikely that our findings were a result of evening or night workers being more unhealthy or having more family obligations, in general, than day workers and thus tended to over-report exposures in their work environment.

We cannot rule out the possibility that workhours potentially influenced the experience of the work environment and thereby caused a spurious association between work schedule and demanding work factors. Workplace observations could be an alternative approach to the data collection. This strategy, in turn, would not be sensitive to differences in the experience of a given exposure at different times of the day. One should also bear in mind that Danish nonday workers in the eldercare sector generally work fewer hours per week than day workers (1); thus the cumulative exposure would then be lower than that of day workers.

On the psychosocial scales, the significant estimated differences between shifts varied between 2.2 and 16.1 points in absolute numbers. These measures of differences do not, however, offer a direct interpretation in terms of importance, since it would depend both on scale or item properties and construction and on the health outcome of interest. A 5-point difference in the mean score is recommended as the rule-of-thumb by the inventors of the COPSOQ (27). The inventors of the COPSOQ acknowledge, however, the difficulties in determining "what is good or bad" when levels of exposures measured by the scales in the questionnaire are compared (15).

Looking at the relative differences in risk, we found that significant odds ratios between 1.26 and 1.82 expressed the increased odds of physical and psychological violence in evening or night work. We suggest that any increase in these exposures is of importance. Regarding the different aspects of physical workload, the elevated odds (1.61 to 4.51) could have been associated with an increased risk of low-back pain. Among hospital personnel, for instance, performing more than 10 daily patient-handling tasks was associated with an increased 1-year prevalence of low-back pain (odds ratio 5.38) in a comparison with personnel performing 0-2 patient-handling tasks per day (28). The daily number of patient-handling tasks is, however, a very broad measure that could imply a diverse array of movements and loads on the spine. Our study does not reveal whether patient handling during day or night differs qualitatively.

There are several limitations of the generalizability of our study. First of all, we were not able to determine whether eldercare workers in two or three shifts are exposed to the same risk factors during, for instance, an evening shift than fixed evening workers are. Second, the generalization of the findings was restricted to Danish eldercare workers. With the results of this study, we have, however, shown the variability in exposures between shifts, even in a rather homogeneous group. As regards the exposure to, for example, social support from leaders, passive smoking, and the use of technical equipment, even western countries may differ as regards practices, legislation, and the organization of work.

We conclude that female health care personnel working either fixed evening or night shifts in the Danish eldercare sector report less quantitative and emotional demands, but they also perceive less job control and less social support from leaders than do their day working counterparts. At the same time, nonday work was associated with an increased exposure to physical and psychological violence in social encounters. Moreover, patient-handling tasks were more common and were more often performed alone.

These findings underscore the importance of adequate adjustment for work factors when the effect of shift work on a range of adverse health outcomes is investigated. The findings also serve as input when interventions against occupational disorders among nonday workers are designed by focusing on modifiable risk factors and thereby ensuring physical and mental health among female evening or night workers in the eldercare sector.

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