

## Article

# The association among health behaviors, shift work and chronic morbidity: A cross-sectional study on nurses working in full-time positions

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## Abstract

**Background:** Nurses are known to work in conditions of stress and physical overload. Health behaviors are modifiable factors that may reduce the adverse effects of work on general health. The present study examined health-related behaviors and their association with current night shift work and chronic morbidity among female nurses.

**Design and Method:** Four hundred seventy-two female nurses (M ± SD = 44.28±7.14 years) self-reported their health habits, physical activity, body mass index (BMI), and chronic disorders that required current treatment. Instruments used in the study consisted of an author-developed questionnaire and the Health Behavior Inventory (HBI). Reported diagnoses were classified as cardio-vascular, gastro-intestinal, malignant neoplastic, endocrine, or other.

**Results:** The most common reported disorders were cardiovascular disorders (5.7% of nurses) followed by other (7.6%), endocrine (7.4%), gastro-intestinal (6.4%), and malignancy (0.2%). On average, health-related behaviors on the HBI were average (83.49 ± 14.33). Overweight and/or obesity (i.e., BMI ≥25 kg/m<sup>2</sup>) were reported by 41.5% of nurses, 24.2% were current smokers, and 36% reported no recreational physical activity. The remaining 64% of nurses who performed physical activity did not report activity levels that met World Health Organization recommendations. Physical activity and HBI scores (total and subscales; i.e., positive attitude, preventive behaviors, proper dietary habits, health-related practices) were not associated with current night shift work or morbidity.

**Conclusion:** Health-promoting programs are needed to support weight control and promote health-related behaviors among nurses. Future research should identify potential barriers to healthy lifestyle recommendations in the workplace.

## Introduction

Nursing, like other medical professions, is associated with increased risk of working in conditions of severe stress and physical overload worldwide.<sup>1-5</sup> In a study by Kowalczyk *et al.*, 40% of Polish nurses and 35% of midwives considered their workplace to be harmful to their health.<sup>2</sup> Night shift work was named as one potential factor associated with harmful health effects.<sup>1,6</sup> However, a study by Bilski and Sykutera<sup>1</sup> found that not following the rules of ergonomics in the workplace was due to insufficient availability of medical equipment and medical staff, and also poor knowledge about ergonomics. On the other hand, the majority of nurses who participated in the study by Juraszek *et al.* reported having knowledge about ergonomics at their workplace.<sup>7</sup> However, 38% of the nurses with this knowledge reported rarely following ergonomic rule and 7% of nurses reported never following these rules.<sup>7</sup>

International studies draw attention to the need to monitor workload among nurses, and these studies suggest that strategies are needed to prevent adverse health effects.<sup>6-10</sup> Nurses are on the first line with patients and their family members. Alongside other medical staff, nurses are often viewed by the general public as well educated in health-promoting practices and as role models for health.<sup>11</sup> A study of pre-registered nurses (M ± SD age = 23±6.29 years) also found that overall, nurses believed that they should be role models for health.<sup>11</sup> However, several studies suggest that nurses do not meet general recommendations for health-related habits, and commonly report symptoms of somatic morbidity, particularly back pain.<sup>1,4,5,7</sup>

Working night shifts have been associated with psychosocial stress, disrupted circadian rhythms, and sleep debt. Compared to day workers, individuals who work night shifts are at higher risk of cardiovascular, endocrine, cancer, metabolic disorders, and mood disorders.<sup>6,9,10,12</sup> The harmful effects of night shift work on health may be either ameliorated or exacerbated by health habits.<sup>6,9,10,12</sup> Compared to individuals who work during the day only, nurses who work night shifts report having less time for revitalization, a lower level of physical activity, poorer diet quality,

## Significance for public health

International studies suggest that strategies are needed to prevent adverse health outcomes among nurses. This study examined health behaviors and their association with current night shift work and chronic morbidity among female nurses. We found, i.e.: health behaviors were average, overweight and/or obesity were reported by 41.5% of nurses, 24.2% were current smokers, over 33% reported at least one currently treated chronic disorder, and 36% reported no recreational physical activity. Health behaviors were not associated with current shift work and chronic, currently treated, disorders. Our findings indicate that health-promoting programs are needed to support weight control and promote health-related behaviors among nurses. Although knowledge about health promotion and health behaviors does not always transfer to nurses' own behaviors, future research should also identify potential barriers to healthy lifestyle recommendations in the nurses' workplace.

and more irregular timing of eating.<sup>6,9,10,12</sup>

We hypothesize that i) nurses who work night shifts will develop poorer health habits as compared to nurses who work during the day; and ii) nurses who report chronic morbidity will develop better health habits than nurses who report no chronic morbidity.

## Design and Methods

### Materials

Nurses from the general hospital in Poland were invited in 2014 and 2015 to respond to an anonymous study questionnaire. Potential participants were informed that they have the right to withdraw their consent at any step of the study without giving any reason. The study participants were ensured about confidentiality of the delivered information. Of the 572 individuals (567 female, 5 male) who initially gave written informed consent to participate in the study, 17 subsequently withdrew their consent, predominantly due to finding the questions too intimate or time consuming. Of the remaining 555 individuals, 81 were subsequently excluded for meeting one or more of the following exclusion criteria: i) incomplete data (n=56), or ii) working  $\leq 145$  hours monthly (146 hours monthly is considered to be full-time work; n=25). The latter exclusion criterion was implemented to improve homogeneity within the study sample, according to time lasting after work and available for developing health-related behaviors. After excluding ineligible participants, only two of the five male participants were available for further analysis. Due to the prominence of females in the study sample, the two males were subsequently excluded to improve homogeneity in the study sample. The final sample therefore consisted of 472 female nurses.

### Measures

The authors developed a questionnaire that examined social and demographic variables, questions about weight and height [including body mass index (BMI), calculated as weight (kg)/height(m)<sup>2</sup>]; details about work (i.e., number of hours/month, current night shift work), current smoking, and current recreational physical activity (i.e., number of days/month and number of minutes for each type of physical activity).

The author-developed questionnaire also asked about the presence of any diagnosed currently treated chronic disorders. The responses were subsequently categorized into the following morbidity groups:

- cardiovascular: hypertension, arrhythmia, dyslipidemia, heart failure, varicose veins of the lower extremities.
- gastrointestinal: gastric ulcers/gastritis, gastroesophageal reflux disease, esophageal achalasia, ulcerative colitis.
- malignant neoplastic: cancers, neoplastic disorder.
- endocrine: hypothyroidism, hyperthyroidism, diabetes, gout.
- other: health condition not listed above. Responses in this category included hip degeneration, glaucoma, vertebral degeneration, rheumatoid arthritis, liver disorder, inhalation and/or food allergies, bronchial asthma, multiple sclerosis, sarcoidosis.

Health-related behaviors were assessed with the Health Behavior Inventory (HBI), developed by Juczyński.<sup>13</sup> Internal reliability of the total HBI scale was good (Cronbach's alpha = 0.85), and Cronbach's alpha for the four HBI subscales ranged from 0.6 to 0.65. The HBI consists of 24 statements that assess health behaviors across four subscales: (1) positive attitude (PA), (2) proper dietary habits (PDH), (3) health-related practices (HP), and (4) preventive behaviors (PB). Participants are instructed to read each statement and specify on a 5-point scale how often he/she performed a certain action over the previous year (1 = almost never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = almost always). Total

possible HBI scores range from 24–120 points and higher scores indicate greater frequency of engaging in health-oriented behaviors. For ease of interpretation, HBI scores can be converted into standardized units on a sten scale. A sten scale is a sectional scale with an average sten score of 5.5 and a standard deviation of 2, ranging from 1 to 10. The following sten ranges have been proposed for the HBI among women: sten scores 1–4 (low score; i.e., 24–77 points on the HBI), 5–6 (average score; i.e., 78–91 points on the HBI) and 7–10 (high score; 92–120 points on the HBI).<sup>13</sup>

### Statistical analysis

Statistical analyses were performed using SPSS Statistics, version 25 (IBM Corp.). Normality of data distribution was evaluated with the Shapiro-Wilk test. Between-group comparisons were made using the Mann-Whitney U test for independent samples (i.e., differences between ranks) for quantitative data, and using the chi-square test on contingency tables for qualitative data. The level of statistical significance was set at  $p < 0.05$ .

## Results

### Study group

The study analyzed data collected from 472 female nurses (M  $\pm$  SD age = 44.28 $\pm$ 7.14 years. Three hundred (63.56%) nurses were  $> 41$  years of age. The study sample resided predominantly in urban areas (69.9%), were high school graduates or university degree holders (98.8%), were married (73.3%), had children (87.9%), and lived with family member(s) or a partner (92.4%). The majority of nurses in the sample reported current night shift work (77.1%) and worked an average of 171.31 h (SD = 23.89) each month (Table 1).

### Health-related behaviors

On average, BMI was 25.08 kg/m<sup>2</sup> (Table 1) and the median BMI score was 24.17 kg/m<sup>2</sup>. One hundred ninety-six participants (41.5%) had BMI scores  $\geq 25$  kg/m<sup>2</sup>, and 55 (11.4%) had BMI scores  $\geq 30$  kg/m<sup>2</sup> (*data not shown*). Approximately one-quarter of participants were current smokers (24.2%) and 36% (n=170) of participants reported no recreational physical activity. For the remaining 64% of participants (n=302) who did report physical activity, the average number of physically active days per month was 2.67 (SD = 2.67), and about half of physically active participants (53.3%) reported the lowest possible time spent on physical activity each time ( $< 30$  min). On average, total HBI scores were 83.49 points, which is within the 5th sten score and can be interpreted as within the average range (Table 1).

### Morbidity

Seventy-four nurses (15.7%) reported cardiovascular disorders, 30 (6.4%) gastro-intestinal disorders, 1 (0.2%) malignancy, 35 (7.4%) endocrine disorders, and 36 (7.6%) reported other disorders (Table 1). Three hundred sixteen nurses (66.9%) reported having no chronic disorders, 136 (28.8%) reported one chronic disorder, 20 (4.2%) reported two disorders, and no nurses reported three or more chronic disorders (Table 1).

### Comparison of health behaviors between nurses working vs not working night shifts

There were no significant differences in HBI total or subscale scores (i.e., PA, PB, PDH, HP), between nurses who were working vs not working night shifts. There was also no difference in number of physically active days each month, or in amount of time (in min) dedicated to each physical activity, between nurses who were working vs not working night shifts (Table 2).

## Comparison of health behaviors between nurses with and without morbidity

We found no significant differences in health behaviors (i.e., HBI total and subscale scores, voluntary physical activity) between nurses who reported cardiovascular disorders vs those who reported no chronic illness (Supplementary Table A). Similar results were observed for gastrointestinal disorders (Supplementary Table B), endocrine disorders (Supplementary Table C), and other disorders (Supplementary Table D). Of note, we did not compare health behaviors in those with neoplastic malignancies vs no chronic illness given that only one participant reported neoplastic malignancy. There were also no significant differences in health behaviors when comparing individuals with two chronic disorders vs one chronic disorder, or when comparing individuals with two chronic disorders vs none (Table 3).

## Discussion

This study examined the prevalence of self-reported chronic disorders that were being treated at the time of the study, physical activity, and other health behaviors among a sample of Polish nurses. Contrary to our first hypothesis, we did not find that current night shift work is associated with a lower level of physical activity and poorer health habits as measured on the HBI, as compared to nurses who do not currently work night shifts. Similarly, contrary to our second hypothesis, none of the morbidity groups were associated with physical activity and health behaviors as assessed on the HBI, as compared to nurses who report no morbidity.

According to the Polish Chief Council of Nurses and Midwives, females are overrepresented in nursing and the average age among nurses is increasing.<sup>14</sup> Consistent with these reported rates, only five male nurses initially consented to participate in the present study and the average age among our final sample was 44.28 (SD=7.14) years. Further, 63.56% of our final sample was

**Table 1. Baseline characteristics of the study participants (n=472).**

Variable		Mean ± SD, n (%)
Age		44.28 (7.14)
BMI		25.08 (4.60)
Place of living, n (%)	Village	142 (30.1)
	Urban area	330 (69.9)
Education, n (%)	Elementary	5 (1.1)
	Vocational	1 (0.2)
	High school	232 (49.2)
	University degree	234 (49.6)
Marital status, n (%)	Single	62 (13.1)
	Married	346 (73.3)
	Divorced/separated	53 (11.2)
	Widowed	11 (2.3)
Living status, n (%)	Alone	36 (7.6)
	With a family member or partner	436 (92.4)
Current working night shifts, n (%)	No	108 (22.9)
	Yes	364 (77.1)
Number of hours worked per month		171.31 (23.89)
Having children, n (%)	No	57 (12.1)
	Yes	415 (87.9)
Number of physically active days per month		2.67 (2.67)
Number of minutes per each physical activity, n (%)	<30 min	161 (34.1)
	<50 min	64 (13.6)
	50-59 min	40 (8.5)
	≥60	37 (7.8)
	No physical activity	170 (36.0)
Current smoking, n (%)	No	358 (75.8)
	Yes	114 (24.2)
HBI	PDH subscale scoring	21.00 (4.51)
	PB subscale scoring	21.60 (4.54)
	PA subscale scoring	21.96 (4.10)
	HP subscale scoring	19.09 (4.13)
	HBI total scoring	83.49 (14.33)
Are you under treatment for any chronic illness?, n (%)	No	316 (66.9)
	Yes	156 (33.1)
Chronic, currently treated, illness, n (%)	Cardiovascular	74 (15.7)
	Gastrointestinal	30 (6.4)
	Malignant neoplastic	1 (0.2)
	Endocrine	35 (7.4)
	Others	36 (7.6)

BMI, body mass index; HBI, health behavior inventory; PA, positive attitude, HBI subscale; HP, health-related practices, HBI subscale; PB, preventive behaviors, HBI subscale; PDH, proper dietary habits, HBI subscale.

>41 years old. In our study, 302 (64.0%) nurses reported engaging in any recreational physical activity. Of the 302 nurses who reported physical activity, 161 (53.31%) reported spending <30 min on each physical activity and average number of days exercised each month was 2.67 (SD=2.67). According to the World Health Organization, adults aged 1-64 are recommended to engage in at least 150 min of moderately-intense physical activity throughout the week, at least 75 minutes of vigorous activity throughout the week, or an equivalent combination of moderate and vigorous activity.<sup>15</sup> Further, WHO recommendations suggest that each activity should be performed for at least 10 min.<sup>15</sup> Our author-developed questionnaire did not inquire about the intensity of physical activity. However, we do have data on the mean number of days/month and time spent per each physical activity. Based on these data, we can conclude that nurses who participated in our study practice less physical activity than what is recommended by the WHO.<sup>15</sup>

Current cigarette smoking was confirmed by 114 (24.2%) of

the nurses in our sample, which is lower than rates reported in the Polish general population (30%) via the NATPOL study.<sup>16</sup> Fifty-four (11.4%) nurses in our sample were categorized as obese, according self-reported BMI ( $\geq 30$  kg/m<sup>2</sup>), and overweight/obesity was reported by 196 individuals (41.5%) (BMI  $\geq 25$  kg/m<sup>2</sup>). Similar rates were reported in a prior study of 999 Polish female nurses (M age = 43 years) by Woynarowska-Soldan *et al.*, with 44% of nurses reporting overweight/obesity.<sup>17</sup> Studies on health behaviors among hospital nurses in the U.S. have found prevalence rates of obesity that range from 23% to 61.4%.<sup>18</sup> As a comparison, the estimated obesity rate in the Polish general population is 19% according to the NATPOL study.<sup>16</sup> Further, data from the NATPOL Study show that dyslipidemia affects more than half of the Polish general population, 30% are affected by hypertension, and 6% by diabetes.<sup>16,19,20</sup>

In the present sample of nurses, cardiovascular disorders, including hypertension and dyslipidemia, were reported by 15.7% and endocrine disorders – including diabetes – were reported by

**Table 2. Comparison of health-related behaviors assessed with the Health Behavior Inventory (HBI) and recreational physical activity (i.e., monthly frequency and time spent on each activity) between nurses who currently work (n=364) vs those who do not work night shifts (n=108).**

	No current night shift work (n=108)		Current night shift work (n=364)		Z/ $\chi^2$	p	$\eta^2/V$	
	Me/n	IQR/%	Me/n	IQR/%				
HBI	86.00	22.00	83.50	18.00	-1.04	0.300	<0.01	
PA	22.00	7.00	21.00	6.00	-0.70	0.482	<0.01	
PB	22.50	7.00	22.00	7.00	-1.59	0.111	0.01	
PDH	22.00	6.00	22.00	5.00	-0.33	0.739	<0.01	
HP	19.00	5.00	19.00	6.00	-0.78	0.426	<0.01	
Number of minutes per each physical activity, n (%)	<30 min	40	35.70	123	33.60	5.57*	0.234	0.11°
	<50 min	10	8.90	56	15.30			
	50-59 min	10	8.90	30	8.20			
	$\geq 60$ min	13	11.60	14	6.60			
	No physical activity	39	34.80	133	36.30			
Number of physically active days per month, mean $\pm$ SD	2.00	5.00	2.00	5.00	-1.04	0.300	<0.01	

Me, median; IQR, interquartile range; Z, Mann-Whitney test; p, level of statistical significance;  $\eta^2$ , effect size; HBI, health behavior inventory; PA, positive attitude, HBI subscale; HP, health-related practices, HBI subscale; PB, preventive behaviors, HBI subscale; PDH, proper dietary habits, HBI subscale; \* $\chi^2$ -test; °Cramer's V effect size.

**Table 3. Comparison of health behaviors assessed with the health behavior inventory (HBI) and recreational physical activity (i.e., monthly frequency and time spent on each activity) among nurses who report no chronic morbidity requiring treatment (n=316), nurses who report one chronic, currently treated, disorder (n=136), and those reporting two chronic, currently treated, disorders (n=20).**

	No chronic disorder (n=316)		One chronic disorder (n=136)		Two chronic disorders (n=20)		Z/ $\chi^2$	p	$\eta^2/V$
	Me/n	IQR/%	Me/n	IQR/%	Me/n	IQR/%			
HBI	84.5	19.75	83.00	17.00	88.50	18.00	2.15	0.341	0.01
PN	21.5	6.00	21.00	6.75	22.00	5.50	3.08	0.215	0.01
ZP	22.0	7.00	22.00	7.00	23.50	6.00	2.59	0.274	0.01
PNp	22.0	5.00	21.50	6.00	23.00	4.75	5.20	0.074	0.01
PZ	19.0	6.00	19.00	4.00	20.00	7.00	0.37	0.832	0.01
Number of minutes per each physical activity, n (%)	<30 min	100	31.60	55	40.40	6	30.00	0.558*	0.09°
	<50 min	44	13.90	17	12.5	3	15.00		
	50-59 min	29	9.20	11	8.10	0	0.00		
	$\geq 60$ min	26	8.20	8	5.90	3	15.00		
	No physical activity	117	37.0	45	33.1	8	40.0		
Number of physically active days per month, mean $\pm$ SD	2.00	5.00	2.00	4.00	2.00	5.75	0.28	0.870	0.01

Me, median; IQR, interquartile range; Z, Mann-Whitney test;  $\eta^2$ , effect size; p, level of statistical significance; HBI, health behavior inventory; PA, positive attitude, HBI subscale; HP, health-related practices, HBI subscale; PB, preventive behaviors, HBI subscale; PDH, proper dietary habits, HBI subscale; °Cramer's V effect size; \*Fisher's exact test.

7.4%. Of the latter group, 13 individuals confirmed a diabetes diagnosis (i.e., 2.7% of the whole study group). A prior study of self-reported BMI and obesity-related noncommunicable diseases among 200 health care workers in South Africa found that 73% were overweight or obese, 20% reported hypertension, and 10% reported diabetes.<sup>21</sup>

In the general population, back pain is a common symptom.<sup>22</sup> It was estimated that up to 84% of people experience lower back pain throughout life.<sup>22</sup> Back pain was also the most frequent chronic health problem reported by nurses across several studies.<sup>1,4,5,7</sup> In a study on 205 female nurses by Juraszek *et al.*, up to 92% of nurses reported back pain that started after beginning a new position as a nurse.<sup>7</sup> The prevalence of back pain among nurses may depend on the type of unit in which the nurses work. For example, operating rooms, neurological rehabilitation units, and intensive care units may be more physically demanding and cause more overload as compared to the other units. Of note, Bilski and Sykutera (2004) found that just 14.08% of female nurses in their sample (n=213) reported back pain related to congenital disorders or vertebral injuries outside the place of work.<sup>1</sup> The present study examined the presence of a diagnosed disorder rather than the prevalence of reported symptoms. It is important to note that not all individuals who suffer back pain undergo further diagnosis. In our study, declared morbidity of the hip (n=1) or vertebral degeneration (n=8) were categorized as into the “other” group, which was reported by 7.6% of nurses in the present study.

Nurses in the present sample presented average levels of health-related behaviors, as measuring using the HBI. All female samples tested with the HBI by Juczyński scored within the average level (i.e., 5-6<sup>th</sup> sten) of health related behaviors.<sup>13</sup> Similar to the sample of nurses in the present study, the 5<sup>th</sup> sten of HBI scoring was reported in a sample of 261 adult women ( $M \pm SD$  HBI scores: 84.03±14.16), a sample of female students (80.62±15.34), and a sample of 70 female primary school teachers (79.93±14.66).<sup>13</sup> However, the 6<sup>th</sup> sten of HBI scoring was reported in a prior sample of 50 menopausal women (85.98±12.70) and 61 women with complicated pregnancy (90.18±12.78).<sup>13</sup> A higher level of health-related behavior in the latter two female groups may be due to the need to maintain health and avoid health damage.

Previous studies of Polish nurses also found average levels of health behaviors.<sup>23,24</sup> These prior studies have concluded that, on average, nurses do not follow general recommendations for healthy lifestyles. We expected that nurses in the present study with current morbidity would show a higher level of health-related habits as compared to those without morbidity, which may reflect actions taken to maintain and/or improve their health. However, we did not find a higher level of health-related behavior, nor did we find more frequent physical activity among nurses with morbidity as compared those without morbidity. Our findings indicate a poor lifestyle among nurses, which is in agreement with prior studies across the globe. Indeed, studies on pre-registered nurses in the UK found that knowledge about health promotion and health behaviors does not always transfer to nurses’ own behaviors.<sup>11,25</sup> Further, almost half of the 876 registered and pre-registered nurses in the UK, failed to meet public health recommendations for physical activity levels and developed harmful eating habits.<sup>26</sup> A review by Priano *et al.*<sup>27</sup> found that the majority of hospital nurses in the U.S. reported that their diets were of poor quality (53-61%) and that they participated in inadequate levels of physical activity (60-74%).

Phiri *et al.* found that barriers to follow recommendations for a healthy lifestyle among nurses are created by the hospital environment.<sup>6</sup> Nurses frequently report being overtired from work, a lack of time to prepare healthy meals due to long working hours, and often report that hospital food services offer predominantly unhealthy foods.<sup>6</sup> As one potential strategy for maintaining nurses’ health, Phiri *et al.* suggest that it is necessary to support nurses in managing stress and transforming the work environment to facili-

tate healthy lifestyles.<sup>6</sup> Important findings come from a cross-sectional study on health professionals (i.e., doctors, residents, nurses) from seven European countries (i.e., Greece, Portugal, Bulgaria, Romania, Turkey, Croatia, and Macedonia).<sup>28</sup> In that study, burnout was significantly and positively associated with greater fast-food consumption, infrequent exercise, higher alcohol consumption, and more frequent painkiller use.<sup>28</sup> The highest levels of burnout in both domains assessed, including emotional exhaustion and depersonalization, were found among health professionals in Turkey, Greece and Bulgaria.<sup>28</sup> It is important to note that barriers to meeting general recommendations for a healthy lifestyle are reported in nurses around the world. For example, Ross *et al.* listed the following barriers on this issue among U.S. nurses: lack of time/overwork, lack of resources/facilities, fatigue, outside commitments, “unhealthy” food culture, supportive versus unsupportive individuals, and positive versus negative role models.<sup>29</sup>

Following other studies, we examined night shift work as work-related factor that may disrupt circadian rhythms, which may prompt a need for a daytime nap and a lack of time for health-promoting habits.<sup>9,10,12</sup> However, we did not find poorer health-related habits among nurses who currently work night shifts vs those who do not work night shifts. Prior research provides strong evidence of individual tolerance to shift work.<sup>30</sup> A review by Saksvik *et al.* identifies several characteristics that may be associated with a better tolerance for shift work, including: younger age, male gender, low scores on morningness, high scores on flexibility, low scores on languidity, low scores on neuroticism, high scores on extraversion, internal locus of control, and some genetic dispositions.<sup>30</sup> Our study sample consisted of female nurses, and the majority were >41 years of age. The characteristics listed by Saksvik *et al.* were not assessed in this study.<sup>30</sup> Therefore, we cannot exclude the possibility that these characteristics may influence our results. However, it is important to note that health habits and physical activity in our study sample were poor across both subgroups of nurses, including those work night shifts and those who do not. Indeed, physical activity levels did not meet WHO recommendations in either subgroup.

## Limitations

Data on diagnosed disorders that required chronic treatment were self-declared. We inquired about chronic disorders that were diagnosed and required treatment. This approach excluded self-diagnosis of suspected morbidity based on experienced symptoms, but precluded our ability to examine existing morbidity that may be undiagnosed.

Another limitation is that the study included only the nurses who were present at work at the time of the study. Therefore, it is possible that some nurses who did not participate in this study were on sick leave with potential morbidity.

## Conclusion

We found that nurses with morbidity did not report a higher level of health-related behavior as compared to nurses without morbidity. This finding was unexpected, as we expected that nurses with morbidity would engage in more health-related behaviors to maintain or improve their health. Further, current night shift work was not associated with poorer health behaviors, as compared to those who do not work night shifts. However, overall, nurses in the study sample did not meet general recommendations for a healthy lifestyle, both in the total study sample or in either subgroup (i.e., night shift workers, non-night shift workers). These results suggest that more focus is needed in nursing education to learn how to translate studied knowledge to improve nurses’ own health-related behaviors. A health-promoting program among

nurses is needed to support weight control, promote health-related behaviors, and improve health. Identifying possible barriers to following health lifestyle recommendations by nurses at the workplace is recommended.

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**Availability of data and materials:** The datasets used and analyzed in the current study are available from the corresponding author upon reasonable request. Supplementary material for this article is available for viewing.

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## References

- Bilski B, Sykutera L. [Determinants of musculoskeletal system load and their health effects among nurses from four Poznan hospitals]. [Article in Polish]. *Med Pr* 2004;55:411-6.
- Kowalczyk K, Krajewska-Kułak E, Jankowiak B, et al. [Occupational hazards for nurses, midwives and physicians]. [Article in Polish]. *Probl Hig Epidemiol* 2008;89:211-5.
- Wu H, Chi TS, Chen L, Wang L, Jin YP. Occupational stress among hospital nurses: cross-sectional survey. *J Adv Nurs* 2010;66:627-34.
- Kolcz A, Jenaszek K. Assessment of pressure pain threshold at the cervical and lumbar spine region in the group of professionally active nurses: A cross-sectional study. *J Occup Health* 2020;62:e12108.
- Tavakkol R, Karimi A, Hassanipour S, et al. A multidisciplinary focus review of musculoskeletal disorders among operating room personnel. *J Multidiscip Healthc* 2020;13:735-741.
- Phiri LP, Draper CE, Lambert EV, Kolbe-Alexander TL. Nurses' lifestyle behaviours, health priorities and barriers to living a healthy lifestyle: A qualitative descriptive study. *BMC Nurs* 2014;13:1-11.
- Juraszek K, Hagner-Derengowska M, Hoffmann M, et al. [The impact of work on the occurrence of back pains on the example of nurses in the Kujawsko-Pomorskie voievodship]. [Article in Polish]. *J Educ Health Sport* 2016;6:60944.
- Griffiths P, Ball J, Drennan J, et al. Nurse staffing and patient outcomes: Strengths and limitations of the evidence to inform policy and practice. A review and discussion paper based on evidence reviewed for the National Institute for Health and Care Excellence Safe Staffing guideline development. *Int J Nurs Stud* 2016;63:213-25.
- Atkinson G, Fullick S, Grindey C, Maclaren D. Exercise, energy balance and the shift worker. *Sport Med* 2008;38:671-85.
- Lowden A, Moreno C, Holmbäck U, et al. Eating and shift work – Effects on habits, metabolism, and performance. *Scand J Work Environ Health* 2010;36:150-62.
- Blake H, Harrison C. Health behaviours and attitudes towards being role models. *Br J Nurs* 2013;22:86-94.
- James SM, Honn KA, Gaddameedhi S, Van Dongen HPA. Shift work: Disrupted circadian rhythms and sleep— Implications for health and well-being. *Curr Sleep Med Rep* 2017;3:104-12.
- Juczyński Z. [Instruments for measurement in health promotion and health psychology]. [Book in Polish]. 2nd ed. Warsaw: Pracownia Testów Psychologicznych; 2012.
- Chief Council of Nurses and Midwives [Internet]. [Preliminary evaluation of human resources for nurses and midwives in Poland up to one year 2020]. [in Polish]. Warszawa: Chief Council of Nurses and Midwives; 2010. Accessed: December 30, 2019. Available from: <http://ww.izbapiel.org.pl/attachments/article/1782/Wstepna.ocena.zasobow.kadrowych.pdf>
- World Health Organization. Global recommendations of physical activity for health. 2010. Available from: <https://www.who.int/publications/i/item/9789241599979>
- Zdrojewski T, Rutkowski M, Bandosz P, et al. Prevalence and control of cardiovascular risk factors in Poland. Assumptions and objectives of the NATPOL 2011 Survey. *Kardiol Pol* 2013;71:381-92.
- Woynarowska-Soldan M, Panczyk M, Iwanow L, et al. Associations between overweight and obesity and health enhancing behaviours among female nurses in Poland. *Ann Agric Environ Med* 2018;25:714-9.
- Buss J. Associations between obesity and stress and shift work among nurses. *Workplace Health Saf* 2012;60:453-8; quiz 459.
- Zdrojewski T, Solnica B, Cybulska B, et al. Prevalence of lipid abnormalities in Poland. The NATPOL 2011 survey. *Kardiol Pol* 2016;74:213-23.
- Topor-Madry R, Wojtyniak B, Strojek K, et al. Prevalence of diabetes in Poland: a combined analysis of national databases. *Diabet Med* 2019;36:1209-16.
- Skaal L, Pengpid S. Obesity and health problems among South African healthcare workers: Do healthcare workers take care of themselves? *South African Fam Pract* 2011;53:563-7.
- Kassolik K, Rajkowska-Labon E, Tomasiak T, et al. Recommendations of the Polish Society of Physiotherapy, the Polish Society of Family Medicine and the College of Family Physicians in Poland in the field of physiotherapy of back pain syndromes in primary health care. *Fam Med Primary Care Rev* 2017;19:323-34.
- Rasińska R, Nowakowska I. [The perception of health for nurses in their forties]. [Article in Polish]. *Piel Pol* 2014;2:111–6.
- Jankowska-Polańska B, Wijacka K, Lomper K, Uchmanowicz I. [Health behaviors of nurses in the prevention of hypertension]. [Article in Polish]. *Współczesne Pielęgniarstwo i Ochrona Zdrowia* 2014;3:67-70.
- Blake H, Malik S, Mo PK, Pisano C. 'Do as say, but not as I

- do': are next generation nurses role models for health? *Perspect Public Health* 2011;131:231-9.
26. Malik S, Blake H, Batt M. How healthy are our nurses? New and registered nurses compared. *Br J Nurs*. 2011;20(8):489-496. doi:10.12968/bjon.2011.20.8.489
  27. Priano SM, Hong OS, Chen JL. Lifestyles and health-related outcomes of U.S. hospital nurses: A systematic review. *Nurs Outlook* 2018;66:66-76.
  28. Alexandrova-Karamanova A, Todorova I, Montgomery A, et al. Burnout and health behaviors in health professionals from seven European countries. *Int Arch Occup Environ Health* 2016;89:1059-75.
  29. Ross A, Touchton-Leonard K, Perez A, et al. Factors that influence health-promoting self-care in registered nurses: Barriers and facilitators. *ANS Adv Nurs Sci* 2019;42:358-73.
  30. Saksvik IB, Bjorvatn B, Hetland H, et al. Individual differences in tolerance to shift work--a systematic review. *Sleep Med Rev* 2011;15:221-35.