

## Predictors of self-assessed physical and mental health of Icelandic nurses: Results from a national survey

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### Abstract

**Background:** Recent health care organizational changes have been associated with stress and musculoskeletal disorders in nurses. However, studies are lacking on what factors are the most important predictors of poor self-assessed health among nurses.

**Objectives:** To describe and identify the self-assessed predictors of physical and mental health of nurses.

**Participants and design:** A cross-sectional design was used with a sample of 394 nurses, drawn from the registry of the Icelandic Nurses' Association, representing 17% of the workforce of Icelandic nurses.

**Methods:** Data were collected with a self-administered questionnaire, addressing symptoms, illness and treatment, lifestyle and sleep, work and working environment, family and quality of family life. Data were analysed according to nurses' assessment of their physical and mental health (very good/good; poor/very poor) by use of analysis of variance, chi-square and stepwise multiple linear regression.

**Results:** 21.7% of participants assessed their physical health as poor or very poor and 14.3% assessed their mental health as such. Those who assess their physical or mental health poor/very poor, as compared to the others, reported more symptoms in general, less regular exercise, as well as more use of medication, more visits to physicians, trouble with sleeping, conflicts between work and family life, work absence, and they experience their work as more strenuous. Experiencing symptoms is an important predictor of both physical and mental health of nurses.

**Conclusion:** Various factors, including work-, family- and socio-cultural environment, play a role in how nurses assesses their health. During our present time of nurse shortage it is imperative that the authorities take special measures in order to improve the work environment of nurses.

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**Keywords:** Physical health; Mental health; Occupational health; Nurses

### What is already known about the topic?

- Working in health has been linked to various hazards due to, for e.g. exposures to infectious agents, anti-neoplastic drugs and needlestick injuries.

- Nurses experience various physical and mental symptoms.

### What this paper adds

- Experiencing musculoskeletal symptoms and symptoms of stress and exhaustion are important predictors of self-assessed poor physical health.

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- Experiencing symptoms of stress and exhaustion and not being content with work and family are important predictors of self-assessed poor mental health.
- Obesity is a risk factor for nurses, possibly related to shift work and stress.

## 1. Introduction

The setting of this study is Iceland in 2002, 2 years after the final merger of three major hospitals in Reykjavik into one, the University Hospital, with the primary aim of increasing efficiency. Due to financial difficulties, new nurses were not hired at that time despite the fact that nurse shortage had been a problem for some time (Sigurdardóttir et al., 1999) and is projected to continue if corrective action is not undertaken (Institute of Economic Studies, 2006). Studies have shown organizational changes to be associated with stress and musculoskeletal disorders in nurses (Pettersson and Arnetz, 1998; Lipscomb et al., 2004; Bourbonnais et al., 2005; McNeely, 2005). One of the key goals in organizational management is healthy and satisfied staff. In order to meet that goal and to ascertain proper action if problems are detected, it is important for nurse managers to know what predicts poor health among nurses. The major aim of the present study is describing and identifying the self-assessed predictors of physical health (PH) and mental health (MH) of nurses.

### 1.1. Health

Health is a very elusive concept which members of various disciplines, e.g. nursing, medicine, philosophy and psychology, have attempted to define (Thorsteinsdóttir, 2006). The definitions range from the idealistic definition set forth by the World Health Organization (WHO, 1948) as “a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity” to the more traditional, but limited, biomedical definition of health as absence of disease (Árnason, 1993).

The various definitions of the concept of health are acknowledged in this study; as well as the fact that individual definition of health is subjective and that self-assessed “PH” versus “MH” might be different aspects of the same construct.

#### 1.1.1. Background

A number of studies from different countries have assessed the prevalence of head, neck, shoulder, arm and low back pain among nurses. In different studies the prevalence of physical pain among nurse participants has ranged from 18.6% (arm pain) to 87.5% (back pain) (Pettersson et al., 1995; Lusted et al., 1996; Ando et al., 2000; Byrns et al., 2004; Karahan and Bayraktar, 2004; Hyung-Joon et al., 2004; Smith et al., 2004, 2005; Shields and Wilkins, 2006). Manual handling of patients, periodic depression, high mental pressure, boring or tedious tasks

and limited work support have been identified as risk factors for musculoskeletal symptoms (Smith et al., 2004, 2005). Additionally, back injury might be the single largest contributor to the nursing shortage in the United States (Edlich et al., 2005).

Factors in the work situation that contribute to nurses' stress are, e.g. close contact with suffering and death, role ambiguity, understaffing, shift work, job satisfaction, burnout, depression, anxiety, violence and threats of violence. (Lee and Wang, 2002; Santos et al., 2003; Stordeur et al., 2001; Sveinsdottir et al., 2006; Lavanco, 1997; Begat et al., 2005; Gunnarsdottir et al., 2003). Findings of studies from the United States, Canada and Britain that looked at the effects of hospital wide nurse staffing levels on nurse job dissatisfaction and burnout found that nurses with higher patient load were more dissatisfied with their jobs, and showed higher burnout levels (Rafferty et al., 2007; Shields and Wilkins, 2006; Aiken et al., 2002). A study among nurses in psychiatric institutions in Taiwan found that during the past 1 month prior to the study, 17.2% of nurses reported being under significant stress often or always. Perceived occupational stress was associated with young age, widowed/divorced/separated marital status, high psychological demand, low workplace support and threat of assault at work. Lower general health score was associated with low job control, high psychological demand, and perceived occupational stress. A lower MH score was associated with low job control, high psychological demand, low workplace support and perceived occupational stress (Shen et al., 2005). Findings from a Swedish national representative sample of 3500 nurses found 20–38% of them to experience anxiety, irritability and mental exhaustion during the month prior to study (Pettersson et al., 1995). In Canada, Bourbonnais et al. (2005) examined the psychosocial work environment and the health of 2006 nurses after major restructuring in the health care system in comparison with two reference populations. Major findings were that there was a considerable increase in the prevalence of psychological distress and of adverse psychosocial work factors in comparison to the prevalence reported by a comparable group of nurses in 1994. These adverse factors were also more prevalent among nurses than among Québec working women and were independently associated with psychological distress.

A survey on work-conditions and well-being at work among Icelandic nurses showed that they work long hours and found their job physically and psychologically straining (Biering and Sveinsdóttir, 2001). Another study on the working situation of Icelandic nurses found nurse staffing to be the strongest predictor for emotional exhaustion (Gunnarsdottir, 2006). A study among women in geriatric care in Iceland showed that mental exhaustion and harassment, violence and threats were connected with symptoms from various parts of the body (Gunnarsdottir et al., 2003).

A number of studies have looked at quality of sleep among nurses, mostly in relationship with shift work (Gold et al., 1992; Schroer et al., 1993; Van Deursen et al., 1993;

Barton et al., 1995; Doi, 2005). The evidence from these studies indicates that rotating shifts, rather than working the same shift over time, has a negative effect on the quality of sleep. Another topic of interest is the food consumption and eating habits among shift workers, with the major question being whether working night-shifts contributes to obesity. The consequences of being overweight or obese have been described in a number of studies (Colditz and Coakley, 1997). Findings regarding shift work mostly indicate that night-shift workers alter their eating habits rather than calorie intake, i.e. there is higher consumption of cold rather than hot food, they eat rather by habit and time availability and less by appetite and are more likely to nibble between main meals (Waterhouse et al., 2003; Pasqua and Moreno, 2004; Rohmer et al., 2004). Due to nurses relatively easy access to medication it has been proposed that there is a higher prevalence of substance abuse among them than among the general population. Studies have not confirmed this (Trinkoff et al., 1991; Bennet and O'Donovan, 2001). Their patterns of use seem to be unique, however, since they tend to use certain prescription substances more often than the general public and are more likely to have access to their drug of choice within the workplace (Storr et al., 2000).

It has been reported that a number of factors at nurses' workplaces in Iceland make them family-unfriendly. These factors mostly relate to working hours, overtime, not being able to take a lunch break during the shift and unscheduled work (Sveinsdóttir et al., 2006). A report on women's health from the Icelandic Ministry of Health and Social Security (2003) concludes that in order for society to benefit from women's participation in the work force, society needs to recognize that women are still considered responsible for the household and the welfare of the family. However, an Icelandic study on well-being and self-assessed health among different groups of female personnel in geriatric care showed that the nurses assessed work as less physically difficult and less monotonous, both physically and mentally, than practical nurses and unskilled attendants, and consequently enjoyed more physical and mental well-being than the other groups (Gunnarsdóttir et al., 2004).

Finally, working in health care has been linked to various hazards. The most important exposures include infectious agents, formaldehyde, anesthetic agents, anti-neoplastic drugs, ethylene oxide and needle stick injuries (National Institute for Occupational Safety and Health, 2002). Studies on mortality and cancer incidence among Icelandic nurses showed a moderate excess of suicides and brain tumours among those with less than 20 years on the job, and a relatively elevated incidence of breast cancer that increased with increasing lag-time before start of follow-up (Gunnarsdóttir and Rafnsson, 1995a,b).

In summary, predictors of PH and MH health among nurses might be of varied origin with workload and stressful working environment being but one of them.

## 2. The study

### 2.1. Aim

The aims of the study are to: (a) describe differences between nurses who assess their PH as very good/good versus poor/very poor, (b) describe differences between nurses who assess their MH as very good/good versus poor/very poor, and (c) identify the self-assessed predictors of PH and MH of nurses.

### 2.2. Materials and methods

In April 2002, a questionnaire was mailed to a random sample of 600 female nurses drawn from the registry of the Icelandic Nurses' Association (INA), which includes over 95% of Icelandic nurses and totalled 2.312 working female nurses at the time and 38 male nurses. It was decided not to include the male nurses. The Icelandic nation has been very homogeneous through the ages, though that might be changing due to migration of people worldwide. In Iceland the number of foreign nurses has been increasing from a total number of 57 in the year 2000 (Sveinsdóttir, 2000). Participants were required to understand written Icelandic. Readers who are interested in learning more about the setting in Iceland are referred to Sveinsdóttir et al. (2006).

The sample included nurses working in hospitals and primary health care centres, as well as those working in various other capacities within the health care sector. In June a reminding phone call was made to all non-respondents and in August the questionnaires were re-mailed to those who had not responded. Total response rate was 65.7% ( $n = 394$ ). The sample did not differ significantly from the population regarding age, with the mean age of the sample being 43.8 years (S.D. = 9.6; range 24–68 years) and of the population 44.7 years (S.D. = 10.2; range 25–74 years).

### 2.3. Ethical considerations

The study was approved of by the National Bioethics Committee (VSN 01-26) and, according to law, the Data Protection Authority was informed. Participants were given written information and informed that all participation was voluntary, that all information would be treated confidentially and they were given the option of contacting the researchers if they had any questions.

### 2.4. Instrument

Data were collected with a questionnaire that includes 87 questions and is based on a number of questionnaires that have been used in different studies in Iceland (Sveinsdóttir et al., 2007), as well as questions developed for this study specifically. Questions addressing symptoms, illness and treatment, lifestyle and sleep, work and working environ-

ment, family and quality of family life were used in the analysis and will be described.

The dependent variables in this study were measured by two questions: “How good or poor is your physical well-being?” and “How good or poor is your mental well-being?” Responses ranged from 1 to 4 (very good, good, poor and very poor).

Symptoms, illness and treatment were measured with a number of questions. Symptoms were assessed by asking the participants to mark on a list of symptoms if they had never (1), sometimes (2), often (3) or constantly (4) experienced the relative symptom during the last 12 months. The list contains five scales: musculoskeletal scale (5 symptoms), stress and exhaustion scale (11 symptoms), common cold scale (5 symptoms), gastrointestinal scale (3 symptoms) and sound perception scale (2 symptoms). The development of the scales has been described elsewhere (Sveinsdóttir et al., 2007).

Participants were asked if they had sought treatment during last year for any of their symptoms (yes/no). Use of medication was assessed by the question: “Have you, during the last 12 months, taken any of the following: anxiety medication, anti-depressants, sedatives, pain medication or medication for asthma”. Possible answers were yes and no. Subsequently the participants were asked how often they had visited a physician during the last year with possible responses being never = 1, 1–3 times = 2, 4–6 times = 3, 7–11 times = 4 and 12 times or more often = 5.

Absence from work due to illness was measured with three questions: “During the last week, how many days were you absent due to your own illness?”; “During the last year, how often were you absent from work due to your own illness?” with responses ranging from 1 to 5 with 1 = never and 5 = 12 times or more often. The third question asked: “During the last year, how long were you absent from work due to your own or others’ illness?” with responses ranging from 1 = never to 4 = more than 4 months.

Questions on lifestyle addressed use of alcohol (yes/no); smoking (never = 1, have smoked but there is more than 1 year since I quit = 2, have smoked but I quit during the last year = 3, smoke less than daily = 4, smoke daily = 5); regular exercise (almost daily = 1, 3–5 times a week = 2, 1–2 times a week = 3, less than once a week = 4, less than once a month or never = 5) and eating habits, i.e. eat at least breakfast, lunch and dinner every day (almost never = 1, few times a month = 2, 1 or 2 days per week = 3, 3 or 4 days per week = 4, 5 or 7 days per week = 5). Sleep was measured with seven questions. Participants self-perceived adequacy of length of sleep were assessed by asking if they felt they had slept too little = 1, adequately = 2 or too much = 3. Participants were asked how often, during the last 6 months, they had had trouble falling asleep at night; awakened due to heartbeat; used sleep medication; woken up too early in the morning; woken up during the night or did not feel rested upon awakening. The possible responses were never (1), less than once a week (2), one or two times per week (3), three to

five times per week (4) or daily (5). The items were combined into one variable labelled sleep trouble scale (Cronbach’s  $\alpha$  was 0.71).

Work and working environment was measured by the physical environment scale developed by Sveinsdóttir et al. (2007) and questions regarding: years of work experience, whether the nurses worked full time or part time (40 h equals 100%), hours of overtime per week, shift work, control of work-pace, job security, the degree of physical monotony at work, assistance from co-workers or patients in performing work, physical difficulty of the work, physical exhaustion after work and ability to work comfortably. Three types of shifts were assessed for; day only shift = 1, days, evening- and night-shifts = 1 and days and evening shift = 3. Control of work-pace was addressed with a five faceted question with responses ranging from rarely or never = 1 to very often or always = 5. Participants were asked how secure they were of their job with responses ranging from 1 to 4 with 1 indicating high security and 4 indicating low security. Degree of physical monotony/diversity of the work was assessed with responses being very diverse = 1, rather diverse = 2, rather monotonous = 3 and highly monotonous = 4. Assistance from co-workers or patients was addressed by the question “Do you consciously try to reduce physical strain at work by asking others, like co-workers or patients, to assist you?” Responses ranged from 1 to 4 with 1 indicating that they always ask for assistance and 4 that they never do. Ability to work comfortably was assessed by asking “Are the work arrangements such that you can work in comfortable work positions?” Responses were yes, mostly = 1, yes to some extent = 2, yes, but only to a very small extent = 3, no, in no way = 4. Questions addressing physical difficulty of the work, physical exhaustion after work and ability to work comfortably were combined into one variable labelled physically strenuous work (Cronbach’s  $\alpha$  was 0.70). Higher score on this variable indicates less strenuous work. The physical environment scale consists of the following factors: stuffy air, dry air, high temperature, uncomfortable odour, close quarters, too much cold, static electricity, noise and draft. Higher score on this scale indicates less distress caused by the environmental factors. Reliability analysis of the scale revealed a Cronbach’s  $\alpha$  of 0.83. Further, the participants were asked how content they were with their job by use of a numerical scale from 1 to 10 with 1 indicating not content at all and 10 = very content.

Family and quality of family life was measured with seven questions. Participants were asked about their marital status (single or cohabiting); children under the age of 18 in the custody of the participant (no child/number of children in care), if the participants cared for aged parents/relatives (very little or not at all = 1, rather little = 2, somewhat = 3, rather much = 4, very much = 5) and if it was easy to reconcile working life and family life (yes/no). Finally, being content with the family was measured by asking the participants to mark on a numerical scale from 1 to

10 the number that best described their satisfaction, with 1 indicating very discontent and 10 very content.

Age, height and weight were also assessed for.

### 2.5. Analysis

All calculations were done using SPSS 10.0. *t*-Test and chi-square were used in order to detect significant differences between nurses reporting their PH and MH poor versus good with regard to the study variables. Significance level was set at 0.05. Using statistical testing with a multitude of 10 or more dependent variables carries increased risk of inflated significance or higher risk of error of type I. The *t*-test comparison was used to detect differences in individual items measuring health between nurses assessing their PH/MH very good/good and those assessing it very poor/poor (Tables 1 and 3) are performed on 19 variables. The chi-square comparisons (Table 2) are performed on 20 variables. In order to prevent inflated significance a Bonferroni adjustment was made (Tabachnick and Fidell, 1983). Using this method the alpha level of each individual test is adjusted downwards based on the number of statistical tests performed. This is done by dividing the alpha level by the

number of tests performed. With this method a level of significance is set at 0.0026 (0.05/19) for *t*-test comparisons and 0.0025 (0.05/20) for chi-square comparisons should detect against inflated significant level in the above-mentioned comparisons.

A stepwise, multiple linear regression model was employed to calculate significant predictors of assessing MH and PH poor or good. Independent variables were included into the equation using the “enter method”.

## 3. Results

### 3.1. Participants

The questions that assessed the dependent variables in the study were answered by 391 nurses who are therefore included in the analysis. Their mean height was 168.1 cm (S.D. = 5.4; range 153–186) and mean weight 72.4 kg (S.D. = 14.8; range 49–175). The majority, or 84%, were cohabiting, 33% had no children under the age of 18 residing at home and 11% took much or very much care of aged relatives. Average years of work experience was 18.1 years (S.D. = 10.1; range 9 months

Table 1  
Comparison by use of *t*-test between nurses reporting physical health very good/good vs. very poor/poor

	Very good/good		Very poor/poor		Range	<i>t</i> (d.f.)	<i>p</i> <sup>*</sup>
	<i>n</i>	Mean (S.D.)	<i>n</i>	Mean (S.D.)			
Age	295	43.3 (9.5)	81	44.4 (10.0)		−0.882 (374)	0.379
Weight	297	71.1 (14.4)	84	77.1 (15.3)		−3.329 (379)	0.001
Height	302	168.2 (5.4)	84	168.0 (5.4)		0.338 (384)	0.735
Symptoms, illness and treatment							
Musculoskeletal scale	273	7.6 (2.2)	75	12.4 (3.0)	5–20	−15.172 (346)	0.000
Stress and exhaustion scale	262	15.2 (2.9)	69	19.4 (4.1)	11–44	−9.757 (329)	0.000
Common cold scale	271	7.7 (1.7)	72	8.8 (2.1)	5–20	−4.145 (341)	0.000
Gastrointestinal scale	274	4.1 (1.3)	77	5.4 (1.8)	3–12	−6.838 (349)	0.000
Sound perception scale	280	2.5 (1.1)	75	2.8 (1.0)	2–8	−2.148 (353)	0.032
Days from work due to illness last week	280	0.2 (0.9)	77	0.4 (1.4)		−1.753 (355)	0.081
Time away from work due to illness last year	300	2.2 (1.1)	85	2.9 (1.4)		−4.684 (383)	0.000
Visits to a physician last year	304	1.8 (0.7)	83	2.5 (1.0)		−7.574 (385)	0.000
Family and quality of family life							
Content with family	299	9.1 (1.2)	83	8.6 (1.5)		2.681 (380)	0.008
Work and working environment							
Years of work experience	295	17.9 (10.0)	78	18.2 (10.7)		−0.215 (371)	0.830
Working percent per week	302	83.6 (17.2)	84	78.6 (18.2)		2.339 (384)	0.020
Overtime per week (h)	44	8.7 (9.5)	11	15.1 (8.1)		−2.013 (53)	0.049
Physical environment scale	263	21.8 (4.1)	72	20.4 (3.7)	9–27	2.503 (333)	0.013
Physical strenuous work	297	8.5 (1.7)	82	7.7 (1.8)	1–12	4.812 (377)	0.000
Content with work	300	7.1 (1.4)	83	7.4 (1.8)	1–10	2.523 (381)	0.012
Sleep							
Sleep trouble scale	284	11.3 (3.4)	75	14.1 (3.9)	6–30	−6.148 (357)	0.000

\* Bonferroni adjustment was made in order to detect significance level that does not increase the possibility of making a type 1 error. The correct level of significance is  $p = 0.0026$ .

Table 2

Comparison by use of chi-square between nurses reporting physical or mental health very good/good vs. very poor/poor

	Physical health		$\chi^2$	$p^*$	Mental health		$\chi^2$	$p^*$
	Very good/good <i>n</i> (%)	Very poor/poor <i>n</i> (%)			Very good/good <i>n</i> (%)	Very poor/poor <i>n</i> (%)		
<b>Symptoms, illness and treatment</b>								
Used anxiolytics (yes)	13 (5.0)	5 (8.6)	1.131	0.288	10 (3.6)	8 (20.5)	18.183	0.000
Used depressives (yes)	20 (7.7)	10 (16.4)	4.461	0.035	18 (6.4)	12 (30.8)	24.171	0.000
Used sedatives (yes)	6 (2.4)	3 (5.3)	1.408	0.235	5 (1.8)	4 (11.1)	9.831	0.002
Used pain medication (yes)	208 (71.5)	74 (90.2)	12.215	0.000	237 (73.8)	45 (86.5)	3.917	0.048
Used asthma medication (yes)	30 (11.6)	10 (17.2)	1.350	0.245	34 (12.1)	6 (17.1)	0.716	0.397
Sought medical treatment due to symptoms (yes)	142 (47.2)	64 (79.0)	23.036	0.000	167 (81.0)	39 (69.6)	6.523	0.011
<b>Lifestyle and sleeping habits</b>								
Use of alcohol (yes)	275 (90.8)	68 (80.1)	6.277	0.012	295 (88.9)	48 (87.3)	0.117	0.732
Never smoked	177 (58.6)	39 (46.4)	5.900	0.052	190 (57.6)	26 (46.4)	3.600	0.165
Eat three meals/day more than four times a week <sup>a</sup>	226 (73.9)	51 (60.7)	7.606	0.022	242 (72.5)	35 (62.5)	3.126	0.210
Exercise three times a week or more <sup>a</sup>	152 (50.0)	23 (27.4)	15.211	0.000	160 (48.2)	15 (26.8)	8.947	0.011
Sleep adequately <sup>a</sup>	227 (75.4)	44 (53.7)	14.745	0.000	242 (74.0)	29 (51.8)	19.162	0.000
<b>Family and quality of family life</b>								
Take rather much or much care of elderly relative <sup>a</sup>	28 (9.3)	13 (15.5)	3.716	0.156	32 (9.7)	9 (16.4)	4.065	0.131
Co-habiting (yes)	276 (91.4)	78 (91.8)	0.012	0.913	304 (91.8)	50 (89.3)	0.402	0.526
No children at home <sup>a</sup>	101 (33.2)	25 (29.4)	0.448	0.799	109 (32.7)	17 (30.4)	1.197	0.550
Easy to reconcile working life and family life (yes)	249 (83.0)	59 (70.2)	6.733	0.009	276 (83.9)	32 (58.2)	19.619	0.000
<b>Work and work environment</b>								
Control work-pace: sometimes or rarely <sup>a</sup>	114 (38.0)	35 (41.7)	0.381	0.826	124 (37.8)	25 (44.6)	4.229	0.121
Job security	289 (95.4)	73 (86.9)	7.817	0.005	311 (94.0)	51 (91.1)	0.660	0.416
Physically monotonous work	63 (20.9)	12 (14.5)	1.734	0.188	66 (20.1)	9 (10.9)	0.499	0.480
Seek assistance (yes)	268 (90.8)	74 (90.2)	0.028	0.868	294 (91.6)	48 (85.7)	1.954	0.162
Work only day-shift	128 (47.4)	30 (40.0)	3.642	0.162	142 (47.5)	16 (34.8)	4.051	0.132

<sup>a</sup> d.f. = 2, otherwise d.f. = 1.\* Bonferroni adjustment was made in order to detect significance level that does not increase the possibility of making a type 1 error. The correct level of significance is  $p = 0.0025$ .

Table 3

Comparison by use of *t*-test between nurses reporting mental health very good/good vs. very poor/poor

	Very good/good		Very poor/poor physical well-being		Range	<i>t</i> (d.f.)	<i>p</i> *
	<i>n</i>	Mean (S.D.)	<i>n</i>	Mean (S.D.)			
Age	324	43.6 (9.6)	52	43.3 (9.7)		0.240 (374)	0.810
Weight (kg)	325	72.1 (14.8)	56	74.3 (14.9)		−0.994 (379)	0.321
Height (cm)	330	168.2 (5.4)	56	167.8 (5.7)		0.518 (384)	0.605
Symptoms, illness and treatment							
Musculoskeletal scale	303	8.3 (2.9)	45	10.9 (3.9)	5–20	−5.447 (346)	0.000
Stress and exhaustion scale	289	15.5 (3.3)	42	20.3 (3.3)	11–44	−8.895 (329)	0.000
Common cold scale	299	7.9 (1.8)	44	8.3 (2.1)	5–20	−1.523 (341)	0.129
Gastrointestinal scale	304	4.2 (1.4)	47	5.5 (1.6)	3–12	−5.541 (349)	0.000
Sound perception scale	309	2.5 (1.1)	46	2.7 (0.9)	2–8	−1.019 (353)	0.309
Days from work due to illness last week	307	0.2 (0.7)	50	0.8 (1.9)		−4.248 (355)	0.000
Time away from work due to illness last year	329	2.3 (1.1)	56	2.9 (1.4)		−3.415 (383)	0.001
Visits to a physician last year	332	1.9 (0.7)	55	2.4 (1.1)		−4.493 (385)	0.000
Family and quality of family life							
Content with family	327	9.1 (1.2)	55	8.3 (1.7)		4.208 (380)	0.000
Work and working environment							
Years of work experience	322	18.1 (10.0)	51	17.3 (11.0)		0.488 (371)	0.626
Working percent per week	330	82.9 (17.5)	56	80.3 (17.7)		1.032 (384)	0.303
Overtime per week (h)	47	10.0 (10.0)	8	9.9 (7.8)		0.033 (53)	0.973
Physical environment scale	294	21.7 (4.1)	41	20.0 (3.3)	9–27	2.585 (333)	0.010
Physical strenuous work	323	8.4 (1.7)	56	7.6 (1.9)	1–12	3.223 (377)	0.001
Content with work	328	8.0 (1.4)	55	6.9 (1.9)	1–10	5.210 (381)	0.000
Sleep							
Sleep trouble scale	28	11.5 (3.5)	49	14.3 (4.1)	6–30		0.011

\* Bonferroni adjustment was made in order to detect significance level that does not increase the possibility of making a type 1 error. The correct level of significance is  $p = 0.0026$ .

to 40 years) with 41% presently working only day-shifts and 71% working 32–40 h a week (40 h equals full time work). Eighty-five nurses (21.7%) assessed their PH and 56 (14.3%) their MH as poor or very poor, with 306 reporting their PH and 335 their MH very good or good. Tables 1–3 show how the participants assess their PH and MH, with Tables 1 and 3 reporting significant differences detected by use of *t*-test and Table 2 showing significant differences detected by use of chi-square.

### 3.2. Self-assessed PH

Compared to nurses who rated their PH as poor or very poor, nurses who rated their PH as very good or good scored significantly lower on four out of the five symptom scales and weighed less. During the year prior to study they also visited a physician less often. A lower proportion of them used pain medication during a 12-month period prior to the study and they were less likely to seek medical treatment for their symptoms. A higher proportion of them reported exercising three times/week or more often, stated that the length of their sleep was adequate and they scored lower on the sleep trouble scale. Finally this group, i.e. those who rated their PH as very good/good considered their work less strenuous and assessed

their physical environment as better than those who rated their PH as poor/very poor (Tables 1 and 2).

### 3.3. Self-assessed MH

Compared to nurses who rated their MH as poor or very poor nurses who rated their MH as very good or good scored significantly lower on the musculoskeletal, stress and exhaustion and gastrointestinal symptom scales. During the year prior to the study they also visited a physician less often and spent less time away from work due to illness. They were also less likely to have been away from work due to illness the week prior to the study and a lower proportion of them used anxiolytics, depressives and sedatives during a 12-month period preceding the study. This group also reported more often that it was easy to reconcile working life and family life, were more satisfied with their family, more content with their work, and considered their work less strenuous and that their length of sleep was adequate.

### 3.4. Regression analysis

Based on the above computations, a multiple regression model to predict the predictors of self-assessed MH and self-

Table 4  
Predictors of determinants of self-assessed physical health

	Unstandardized coefficients		Standardized coefficients, Beta	<i>t</i>	Sig.	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>
	Beta	S.E.					
Constant	-.649	.206		-3.155	.002		
Musculoskeletal scale	.113	.012	.462	9.477	.000	.429	.428
Stress and exhaustion scale	.025	.012	.120	2.079	.038	.467	.464
Exercise	.092	.028	.130	3.217	.001	.488	.483
Gastrointestinal scale	.064	.025	.125	2.590	.010	.501	.494
Weight	.006	.002	.108	2.694	.007	.512	.504
Sleep trouble scale	.120	.054	.106	2.227	.027	.520	.511

assessed PH was tested. Variables were entered if the analyses above had shown significant differences between those assessing their PH versus MH as very good/good with those assessing their PH versus MH as poor/very poor. However, significant variables were excluded if they were considered a possible consequence of assessing the health less favourable, i.e. visits to a physician, absence from work and use of medication. Variables entered to predict self-assessed PH were: musculoskeletal scale, stress and exhaustion scale, common cold scale, gastrointestinal scale, regular exercise, weight, self-perceived adequacy of length of sleep, sleep trouble scale and physical strenuous work. Variables entered to predict self-assessed MH were: musculoskeletal scale, stress and exhaustion scale, gastrointestinal scale, self-perceived adequacy of length of sleep, physical strenuous work, easy to reconcile working life and family life, content with family and content with work. Two models are shown, one for the predictors of self-assessed PH and the other of predictors of self-assessed MH (Tables 4 and 5). The model for PH predicts that experiencing musculoskeletal, gastrointestinal and stress and exhaustion symptoms, participating in physical exercise less frequently than three times a week, increased body weight and experiencing trouble with sleep is associated with worse PH. These variables explained 52.0% of the variance of self-assessed PH ( $R^2$  was 0.520  $R^2$  adjusted 0.511). The model for MH predicts that experiencing symptoms of stress and exhaustion, being less content with family and with work are associated with worse MH. These variables explained 39.8% of the variance of self-assessed MH ( $R^2$  was 0.398 and  $R^2$  adjusted 0.392).

Table 5  
Predictors of determinants of self-assessed mental health

Model	Unstandardized coefficients		Standardized coefficients, Beta	<i>t</i>	Sig.	<i>R</i> <sup>2</sup>	Adjusted <i>R</i> <sup>2</sup>
	Beta	S.E.					
Constant	2.133	.314		6.783	.000		
Stress and exhaustion scale	.086	.009	.463	10.102	.000	.308	.306
Content with family	-.109	.023	-.210	-4.735	.000	.361	.357
Content with work	-.090	.020	-.203	-4.417	.000	.398	.392

#### 4. Discussion

The findings of this study show that a larger proportion of nurses assess their PH poor/very poor than the proportion that assess their MH as poor/very poor. However, the predictors of poor MH and poor PH are similar or the same. It is also of interest that on the average the nurses are overweight and that heavier nurses assess their PH worse than the lighter ones. That does not apply to MH. In light of these findings it is important that nurse managers scrutinize the work environment of nurses in order to detect factors that might contribute to nurses' poor health.

Those who assessed their MH or PH bad/very bad reported a high severity score on the musculoskeletal scale. This is in accordance with the prevalence of symptoms from the musculoskeletal system found among nurses (Smith et al., 2004, 2005; Edlich et al., 2005). This group also scored high on the stress and exhaustion scale, a finding that also replicates findings from other studies (Stordeur, 2001). Trouble with sleeping was experienced by both groups experiencing poor/very poor MH and PH. Shift work is prevalent among nurses and has been found to influence their sleeping pattern (Gold et al., 1992; Doi, 2005) as well as their eating habits (Colditz and Coakley, 1997). A possible explanation of the finding that the nurses are on the average overweight is the irregular working hours that invites to irregular sleep and eating habits.

It is almost self-explanatory that symptom experience, absence from work due to illness, visits to physicians and use of medication influence self-assessment of health. These items are an epitome of the traditional biomedical views of

health that has been dominant in Western societies (Thorsteinsdóttir, 2006) and therefore of no surprise that they influence self-assessed health. The other items assessed for are more related to the cultural and social aspects of health. In Western cultures, like the Icelandic, the health promotion movement emphasizes regular patterns of life, be it work life, family life, or eating, sleeping and exercise habits (Directorate of Health, 2003). Subjectively, people might associate their regular lifestyle with health. The fact that lighter participants assess their PH as better than heavier participants is in harmony with studies describing the harms of being overweight (Holm et al., 2001) and possibly with the cultural ideal of thinness as presented through the mass media and reiterated by the family, peer group, school and workplace (Hesse-Biber et al., 2006).

Nurses reporting poor/very poor MH and PH also reported that they experienced their work as physically strenuous. In light of the fact that new nurses were not hired during the time of the merging of the major hospitals in Reykjavík, it can be assumed that physical strain increased resulting in worse PH and MH.

In addition it should be mentioned that poor health is expressed in various ways, gastrointestinal symptoms being one of them.

The two models of predictors of self-assessed PH versus MH reveal an interesting difference. The variance in predictors of PH is largely explained by musculoskeletal and stress and exhaustion symptoms. That is hardly of surprise since majority of studies on nurses' health identify these issues as important occupational hazards (Stordeur et al., 2001; Lusted et al., 1996; Karahan and Bayraktar, 2004; Shields and Wilkins, 2006). However experiencing symptoms of stress and exhaustion and dissatisfaction with family and work largely explain the variance in MH. This is an important finding that indicates the role of both family and work in predicting MH of nurses and how critical it is to identify and rectify stressful factors in the working environment. These findings from the regression analysis indicate that the predictors of self-assessed MH and PH differ and that the workplace is but one factor in determining how participants view their health.

The main weakness of this study is the well known limitation of questionnaires, e.g. exposure and outcome being measured at the same point in time so that cause and effect cannot be determined, possible bias from rating behaviour, and the possibility of recall bias. However studies indicate that the rating behaviour among subjects who rate neutral and non-affective stimuli, such as time, weight, physical exposure, pain and other symptoms does not invite bias (Toomingas et al., 1997). Individual experiences are a valid measurement in their own right, if it is kept in mind that it is a subjective assessment and the experiences in question did not occur in a distant past. Finally it should be mentioned that data were collected in 2002 and we cannot guarantee that data collected more recently would produce same results.

The strength of the study is that the sample is randomized from all working nurses in Iceland, the 66% response rate and the samples representativeness of the population under study regarding age.

## 5. Conclusion

This study shows that there are various factors, including work-, family- and socio-cultural environment, that play a role in whether nurses assess their health as good or poor. Experiencing symptoms is an important factor, with other key factors being weight, being content with family and work and lifestyle, such as regular exercise. Musculoskeletal symptoms and symptoms of stress and exhaustion are the strongest predictors of PH with symptoms of stress and exhaustion and being content with family and work being the strongest predictors of MH. These findings suggest that health authorities should scrutinize the working environment of nurses and define factors that impact on musculoskeletal symptoms and symptoms of stress and exhaustion. During our present time of nurse shortage it is imperative that the authorities take special action in order to produce healthy work environment.

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