

RESEARCH

Open Access



Factors associated with health professionals' stress reactions, job satisfaction, intention to leave and health-related outcomes in acute care, rehabilitation and psychiatric hospitals, nursing homes and home care organisations

Karin Anne Peter^{1*}, Christian Voirol^{2,3,4}, Stefan Kunz⁵, Andrea Gurtner⁶, Fabienne Renggli¹, Typhaine Juvet² and Christoph Golz¹

Abstract The aim of this study is to identify (1) the extent of work-related stress and (2) stressors associated with cognitive and behavioral stress reactions, burnout symptoms, health status, quality of sleep, job satisfaction, and intention to leave the organization and the profession among health professionals working in acute care / rehabilitation hospitals, psychiatric hospitals, nursing homes, and home care organizations.

Background Health professionals are faced with various stressors at work and as a consequence are leaving their profession prematurely. This study aimed to identify the extent of work-related stress and stressors associated with stress reactions, job satisfaction, and intention to leave and health-related outcomes among health professionals working in different healthcare sectors (acute care, rehabilitation and psychiatric hospitals, nursing homes and home care organizations).

Methods This study is based on a repeated cross-sectional design, which includes three data measures between 2017 and 2020 and 19,340 participating health professionals from 26 acute care / rehabilitation hospitals, 12 psychiatric hospitals, 86 nursing homes and 41 home care organizations in Switzerland. For data analysis, hierarchical multilevel models (using AIC) were calculated separately for hospitals, nursing homes, and home care organizations, regarding health professionals' stress symptoms, job satisfaction, intention to leave the organization / profession, general health status, burnout symptoms, and quality of sleep.

Results The main findings reveal that the incompatibility of health professionals' work and private life was significantly associated ($p < 0.05$) with their stress reactions, job satisfaction, intention to leave, and health-related outcomes in all the included work areas. The direct supervisor's good leadership qualities were also associated with health professionals' job satisfaction regarding all work areas ($B \geq 0.22$, $p = 0.000$). In addition, a positive perceived bond with the organization ($B \geq 0.13$, $p < 0.01$) and better development opportunities ($B \geq 0.05$, $p < 0.05$) were

*Correspondence:
Karin Anne Peter
karin.peter@careum-hochschule.ch

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>. The Creative Commons Public Domain Dedication waiver (<http://creativecommons.org/publicdomain/zero/1.0/>) applies to the data made available in this article, unless otherwise stated in a credit line to the data.

associated with higher job satisfaction and a lower intention to leave the organization and profession among health professionals. Also, a younger age of health professionals was associated with a higher intention to leave the organization and the profession prematurely in all the included work areas. High physical ($B \geq 0.04$, $p < 0.05$) and quantitative demands ($B \geq 0.05$, $p = 0.000$) at work were also associated with negative health-related outcomes.

Keywords Work-related stress, Intention to leave, Job satisfaction, Hospital, Nursing home, Home care organization, Health professionals

Introduction

Around the globe, healthcare systems are struggling with a shortage of health professionals and a potential destabilization of the quality and availability of care provided [1]. Work-related stress and poor working conditions are among the main reasons why health professionals leave their profession prematurely [2–4]. As recent studies show, the COVID-19 pandemic has further exacerbated the problem of stress and poor working conditions among health professionals in various countries and work areas [5–7].

Work-related stress can be defined as “a pattern of reactions that occur when workers are confronted with demands or pressures that are not matched to their knowledge, abilities and skills, and which challenge their ability to cope” [8, 9]. The model of ‘causes and consequences of work-related stress’ [8, 10] is the underlying theoretical background of this study. It explains the causes of stress (stressors), stress reactions (short-term), and consequences of work-related stress (long-term) on the employee as well as their inter-reactions (stressors are associated with stress reactions and long-term consequences) [8, 10]. Stressors at work are particularly pronounced in the daily work of health professionals, such as high emotional demands due to confrontation with sickness and death, or aggression at work, or high physical demands when lifting or moving patients [11–13]. Working under time pressure, doing overtime, long working hours, and understaffing are also well-known stressors among health professionals [14–16]. In addition, they are confronted with a lack of opportunities for development, poor leadership qualities of superiors and a high exposure to infectious disease or hazardous substances in their daily work [4, 17]. Furthermore, they are strongly affected by incompatibilities of work and private life, shift work, and problems with demarcation between work and leisure time [4, 18–20]. As previous studies indicate, a high level of stressors at work is associated with health professionals’ increasing anxiety, depression, job dissatisfaction, and the intention to leave their profession prematurely [21, 22].

There are multiple studies regarding stressors, stress reactions, and long-term consequences among health professionals working in different management levels [23, 24], professional roles [2, 3, 21, 25], or work areas [14, 26, 27]. However, most studies focus on one specific work

area (e.g., acute care hospitals or nursing homes) [3, 15, 19] or on only one specific health profession (e.g., nurses) [14, 28]. Thus, studies with a focus on work-related stress among health professionals combining and comparing different work areas in the healthcare sector are rare.

Therefore, the aim of this study is to identify (1) the extent as well as differences of work-related stress in various work areas and (2) stressors associated with cognitive and behavioral stress reactions, burnout symptoms, health status, quality of sleep, job satisfaction, and intention to leave the organization and the profession among health professionals working in acute care /rehabilitation hospitals, psychiatric hospitals, nursing homes, and home care organizations.

Methods

Design

This study presents the results of the national STRAIN project ‘work-related stress among health professionals in Switzerland’ [4, 23]. These results are based on a repeated cross-sectional design, using three measurements between September 2017 – March 2018 (T^0), January – April 2019 (T^1), and March – September 2020 (T^2), conducted among Swiss health professionals working in acute care / rehabilitation hospitals, psychiatric hospitals, nursing homes, and home care organizations. Only 4% of participants took part in all three measurement points. Participating organizations were free to choose the time for data collection when it suited them best.

Recruitment and study sample

For recruitment, potential healthcare organizations were randomly selected from a register (Swiss Federal Statistical Office in 2016) of all hospitals, nursing homes, and home care organizations in Switzerland. We excluded organizations that were too small in size (average number of beds < 20 , fewer than 7 employees) or that were specialized (e.g., in neonatology) [23]. The randomization process was computer-based using randomizer.org and considered a geographically representative sample for Switzerland (69% Swiss or Standard German-speaking, 23% French-speaking, 8% Italian-speaking). Thereby, 100 hospitals, 100 nursing homes, and 100 home care organizations were randomly selected and invited to participate in the study. The invited organizations received information about the study using a study flyer and a short film.

In the end, a total of 26 acute care / rehabilitation hospitals, 12 psychiatric hospitals, 86 nursing homes, and 41 home care organizations (117 German-speaking, 39 French-speaking, 9 Italian-speaking) took part in the study.

Data collection

For the data collection, a contact person in each participating organization was responsible for distributing the questionnaire. The questionnaire was distributed to all healthcare professionals working in the organization at the time of data collection. Nurses, midwives, physicians, medical-technical professionals, medical-therapeutic professionals, and employees from the administration and research at all hierarchies and skill levels (e.g., health professionals in training) were included in the study. The questionnaire was available in German, French, and Italian in two online versions (SurveyMonkey®, UmfrageOnline®), as well as in a paper version. Participating health professionals had one month to complete the questionnaire and received a reminder after the first two weeks during the data collection period. The data collection was on a voluntary basis for all participating organizations as well as all participating health professionals within them.

STRAIN – questionnaire

The study used the STRAIN questionnaire, which is designed based on the model of ‘causes and consequences of work-related stress’ [8, 10] and, therefore, is composed of scales assessing stressors at work (e.g., demands at work, work–private life conflict), stress reactions (behavioral and cognitive stress reactions) and long-term consequences (e.g., burnout symptoms, job satisfaction, general health status, quality of sleep, intention to leave the organization or profession). The STRAIN questionnaire consists of widely used, valid, and reliable scales (e.g., on quantitative demands, influence at work, role clarity) from the Copenhagen Psychosocial Questionnaire (COPSOQ) [29, 30], which is the questionnaire used in the ‘Nurses Early Exit Study’ (NEXT) [31, 32]. The COPSOQ item responses are scored on a five-point Likert scale (to a very large extent, to a large extent, somewhat, to a small extent, to a very small extent, or always, often, sometimes, seldom, never/hardly ever). COPSOQ scale score value ranges from 0 (to a very small extent or never/hardly ever) to 100 (to a very large extent or always). In addition, the 4-item scale on physical demands from the sixth European Working Conditions Survey – EWCS [33] (7-point Likert scale) and the self-rated general health status on a range from 0 (worst health, you can imagine) to 100 (best health, you can imagine) (using EQ-5D-5L [34] were included. Further details on the STRAIN questionnaire were published previously [4, 36, 37].

Data analysis

Data were analyzed using SPSS 25° and R Studio 4.2.2 [37]. According to the original author, all items from the COPSOQ, EWCS and NEXT were transformed to a value range from 0 (minimum value) to 100 points (maximum value) [29, 33]. If less than half of the questions in a scale were answered, no average score was calculated [29].

In the first step, we calculated the descriptive statistics describing the study sample divided into the included work areas (hospitals, nursing homes, home care organization).

In the second step, we calculated the extent of stressors, stress reactions, and long-term consequences among health professionals working in acute care/ rehabilitation hospitals, psychiatric hospitals, nursing homes, and home care organizations and tested for significant differences using the Kruskal–Wallis H test (significance level of 0.05, using the Bonferroni correction for multiple tests) as well as a pairwise comparison (Dunn–Bonferroni tests), since the test of homogeneity of variance was significant. There were no equal-sized samples of data.

In the third step, we calculated separate hierarchical multiple regression models for (1) acute care /rehabilitation hospitals, (2) psychiatric hospitals, (3) nursing homes, and (4) home care organizations using health professionals’ data’ (level 1) nested in organizations (level 2). Regression models were calculated for the following outcome variables: behavioral stress symptoms; cognitive stress symptoms; job satisfaction; intention to leave the organization; intention to leave the profession; general health status; burnout symptoms; and quality of sleep. All the independent variables included in the regression models are presented in Fig. 1. A backward model selection with the MASS package was conducted with Akaike Information Criterion [38]. The models were then fitted using the lme4 package. We computed standardized and nonstandardized beta coefficients, *p*-values, standard errors, CI, and R-squared (marginal / conditional) [39, 40]. Since the assumption of heteroskedasticity was not met for the models, standard errors, *p*-values, and CI were bootstrapped (*r*=999, bias corrected and accelerated, 95% CI).

Results

Study sample description

A total of 19,340 health professionals took part in the study. Participants were mainly women (83%) and from the German-speaking part of Switzerland (83% German-speaking, 15% French-speaking, 2% Italian-speaking). The study sample included registered nurses (48%), nurse assistants (28%), midwives (1%), medical-technical (3%), medical-therapeutic professionals (9%), physicians (7%), employees in administration and research (3%), and social services (2%). Most participants had no

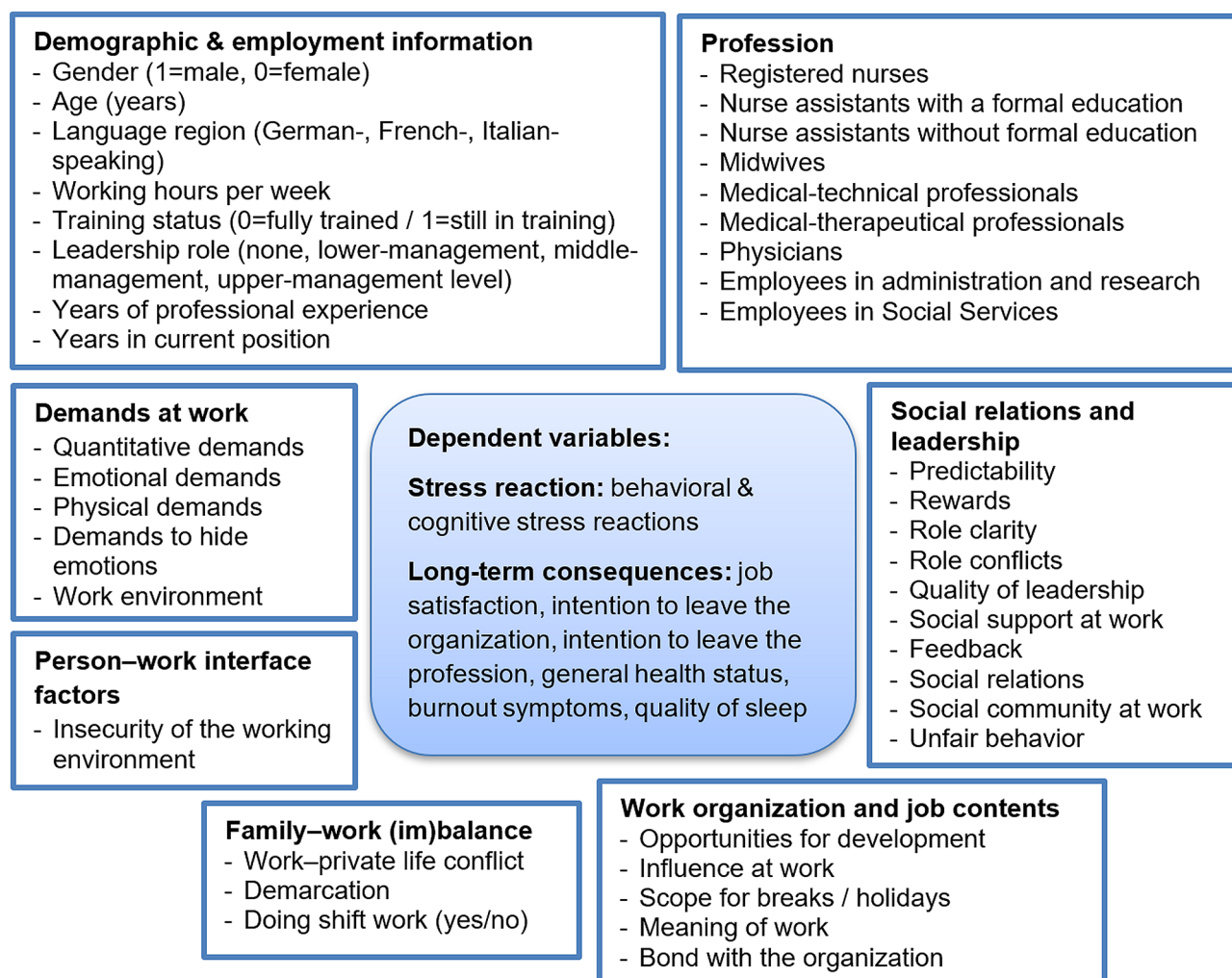


Fig. 1 Dependent and independent variables in the regression models

management responsibilities (84%), 11% worked in a lower, 4% in a middle, and 2% in an upper management position. Table 1 provides further details on the distribution of sex, language region, profession, and leadership positions of the participants working in acute care / rehabilitation hospitals, psychiatric hospitals, nursing home, and home care organizations.

Extent of work-related stress in different work areas

Table 2 shows an overview of the extent of various stressors, stress reactions, and long-term consequences among health professionals working in different work areas in the healthcare sector (hospitals, nursing homes, home care organizations).

Extent of various stressors at work

The results on various work stressors shows that health professionals working in acute care and rehabilitation hospitals reported the highest quantitative (e.g., work at a high pace, doing overtime) demands ($M=59.3$; $SD=15.5$),

and sensorial (e.g., precision, vision, attention) demands ($M=86.2$; $SD=13.5$) at work. Health professionals working in acute care and rehabilitation hospitals also reported having the most demanding work environment (e.g., being exposed to noise, cold, chemicals) ($M=38.4$; $SD=19.5$) and the lowest influence at work (e.g., the degree of influence with regard to work) ($M=48.0$; $SD=20.1$) compared to other work areas. In addition, the perceived rewards ($M=54.3$; $SD=26.3$) and the quality of leadership of the superior at work (e.g., the superior is good at work planning, solving conflicts) ($M=62.7$; $SD=22.6$) were lowest among health professionals working in acute care / rehabilitation hospitals. Social support received at work from colleagues or superiors ($M=75.6$; $SD=16.9$) and feedback ($M=49.3$, $SD=20.9$) was also lowest, while they reported the highest scores on role conflicts due to contradicting role requirements at work ($M=39.2$; $SD=20.2$). Furthermore, they showed the highest insecurity in terms of the working environment (e.g., due to changes in shift schedules) ($M=31.6$, $SD=25.7$). In

Table 1 Descriptive statistics regarding different healthcare settings

		All settings <i>n</i> = 19,340		Acute care and reha- bilitation hospitals <i>n</i> = 8179		Psychiatric hospitals <i>n</i> = 4464		Nursing homes <i>n</i> = 3860		Home care organiza- tions <i>n</i> = 3860	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Sex	Women	15,816	83%	6690	83%	3150	72%	3320	87%	2656	95%
	Men	3205	17%	1366	17%	1216	28%	485	13%	138	5%
Language region	German-speaking	14,871	83%	6301	80%	4124	93%	2361	76%	2085	82%
	French-speaking	2715	15%	1609	20%	101	2%	608	20%	397	16%
	Italian-speaking	406	2%	0	0%	213	5%	146	5%	47	2%
Profession	Registered nurses	8185	48%	4086	56%	1901	50%	929	27%	1269	52%
	Nurse assistants with a formal education	3537	21%	831	11%	348	9%	1588	46%	770	32%
	Nurse assistants without formal education	1228	7%	94	1%	47	1%	734	21%	353	14%
	Midwives	170	1%	170	2%	0	0%	0	0%	0	0%
	Medical-technical professionals	523	3%	523	7%	0	0%	0	0%	0	0%
	Medical-therapeutical professionals	1509	9%	656	9%	694	18%	159	5%	0	0%
	Physicians	1101	7%	649	9%	413	11%	39	1%	0	0%
	Employees in administration and research	440	3%	269	4%	100	3%	16	1%	55	2%
	Employees in Social Services	353	2%	31	0%	296	8%	26	1%	0	0%
Leadership position	Upper-management level	280	2%	98	1%	79	2%	30	1%	73	3%
	Middle-management level	706	4%	269	4%	266	6%	110	3%	61	2%
	Lower-management level	1945	11%	800	10%	467	11%	453	13%	225	8%
	Without management responsibilities	15,295	84%	6601	85%	3361	81%	2952	83%	2381	87%

n=number of cases

addition, this group reported the highest incompatibility between work and private life ($M=30.8$, $SD=21.4$) and difficulties with demarcation (e.g., being available in leisure time for work issues) ($M=34.7$, $SD=22.0$) compared to other work areas.

In psychiatric hospitals, health professionals revealed they have the lowest meaning of work (e.g., perceiving work as meaningful / important) ($M=79.3$; $SD=17.4$) compared to other work areas. In addition, role clarity (e.g., clear work tasks, objectives, area of responsibility) ($M=73.4$; $SD=15.2$) was lowest in psychiatric hospitals compared to health professionals working in other work areas.

In nursing homes, health professionals reported the highest emotional (e.g., confrontation with death, aggressive patients) ($M=68.3$; $SD=15.6$) and physical (e.g., lifting or moving people or heavy loads) ($M=46.8$; $SD=23.5$) demands at work. In this sector of healthcare, health professionals' feeling of unfair behavior (e.g., feeling unjustly criticized by colleagues/superior) was also highest ($M=16.9$, $SD=23.6$) among those working in a nursing home compared to other work areas.

Health professionals working in home care organizations reported receiving less feedback from colleagues / their superior ($M=49.3$, $SD=20.7$) and to have the lowest

social relations at work (e.g., the opportunity to talk to colleagues during work) ($M=36.0$; $SD=30.1$).

Extent of stress reactions and long-term consequences

Health professionals working in acute hospital or rehabilitation hospitals were most affected by cognitive stress symptoms (e.g., problems concentrating, taking decisions) ($M=28$; $SD=19.8$), showed higher burnout symptoms ($M=43.59$; $SD=20.87$), and had lower quality sleep ($M=66.81$; $SD=19.12$). They also revealed having lower job satisfaction ($M=69.2$, $SD=14.8$) and the highest intention to leave the organization ($M=17.5$; $SD=21.9$) or their profession prematurely ($M=17.5$, $SD=21.9$). Health professionals working in psychiatric hospitals also revealed a high intention to leave the organization ($M=22.5$, $SD=22.9$). Those health professionals working in nursing homes also showed lower scores regarding their job satisfaction ($M=69.9$, $SD=14.7$) and higher burnout symptoms ($M=42.8$, $SD=22.7$).

Results of the regression analysis regarding stress reactions

Results of the multiple regression models revealed that an incompatibility of work and private life was associated with increased behavioral stress symptoms ($B \geq 0.45$, $p=0.000$) among health professionals working in all the included areas (acute care, rehabilitation or psychiatric

Table 2 Extent of work stressors, stress reaction and long-term consequences among different healthcare settings

	All settings (n = 19,340)		1 = Acute care/rehabilitation hospitals (n = 8197)		2 = Psychiatric hospitals (n = 4464)		3 = Nursing homes (n = 3860)		4 = Home care organizations (n = 2837)		Kruskal–Wallis test		
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	p-value	* Significant differences (pairwise comparison)
Stressors at work													
Quantitative demands	18,098	54.5	17.3	59.3	15.5	51.7	17.1	52.0	17.8	48.4	17.8	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4
Sensorial demands	18,089	83.1	14.6	86.2	13.5	75.6	15.5	84.0	13.8	84.6	13.3	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4
Emotional demands	18,038	60.5	15.5	59.3	15.8	59.7	13.7	68.3	15.6	54.3	12.9	0.000	1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Physical demands	17,975	36.5	22.6	40.9	21.9	18.6	14.1	46.8	23.5	37.3	18.4	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Demands to hide emotions	17,239	39.6	22.7	42.2	22.4	41.4	21.6	35.6	23.7	36.0	22.4	0.000	1vs3; 1vs4; 2vs3; 2vs4
Work environment	17,947	33.3	19.4	38.4	19.5	27.7	18.9	29.8	19.0	32.4	17.0	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Opportunities for development	18,166	71.0	15.5	72.3	15.1	71.8	15.3	68.7	16.8	69.7	15.0	0.000	1vs3; 1vs4; 2vs3; 2vs4
Influence at work	17,876	51.5	20.2	48.0	20.1	58.1	17.9	51.2	21.0	51.5	20.3	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4
Scope for breaks / holidays	17,831	61.1	20.8	57.9	20.0	66.0	19.7	56.6	22.3	69.0	18.8	0.000	1vs2; 1vs4; 2vs3; 2vs4; 3vs4
Meaning of work	18,064	83.5	16.1	82.5	16.1	79.3	17.4	87.4	14.8	87.2	14.0	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4
Bond with the organization	17,250	62.7	20.6	60.6	20.0	60.2	20.2	64.1	21.8	69.8	19.2	0.000	1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Predictability	17,692	63.8	19.8	62.3	19.5	61.5	19.3	65.3	21.1	69.1	18.3	0.000	1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Rewards	17,483	58.6	26.0	54.3	26.3	56.7	26.2	62.1	25.1	68.4	22.9	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Role clarity	17,805	78.1	14.8	79.2	14.4	73.4	15.2	80.3	14.8	79.1	14.1	0.000	1vs2; 1vs3; 2vs3; 2vs4; 3vs4
Role conflicts	17,767	36.0	20.5	39.3	20.2	37.6	20.0	33.5	21.6	28.4	18.3	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Quality of leadership	17,543	64.5	22.3	62.7	22.6	64.0	22.9	65.5	22.1	68.7	19.8	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Social support at work	17,460	77.1	17.1	75.6	16.9	78.3	17.0	76.6	17.8	80.5	16.5	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Feedback	17,334	50.5	20.8	49.3	20.9	51.1	19.9	53.2	21.3	49.3	20.7	0.000	1vs2; 1vs3; 2vs3; 2vs4; 3vs4
Social relations at work	17,375	58.0	27.2	63.6	23.6	60.7	25.8	59.8	25.2	36.0	30.1	0.000	1vs2; 1vs3; 1vs4; 2vs4; 3vs4
Social community at work	17,364	79.9	14.7	79.4	14.3	80.1	14.8	78.5	15.7	82.7	13.7	0.000	1vs4; 2vs3; 2vs4; 3vs4
Unfair behavior	17,138	13.7	21.4	14.6	21.6	12.3	20.4	16.9	23.6	9.2	17.6	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Insecurity of the working environment	17,793	28.4	25.1	31.6	25.7	25.0	22.9	29.6	26.7	23.1	22.5	0.000	1vs2; 1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Work–private life conflict	17,441	28.1	20.9	30.8	21.4	27.6	20.0	27.2	21.6	22.6	18.4	0.000	1vs2; 1vs3; 1vs4; 2vs4; 3vs4
Demarcation	17,329	32.2	22.1	34.7	22.0	29.0	21.3	32.7	21.9	29.3	22.4	0.000	1vs2; 1vs3; 1vs4; 2vs4; 3vs4
Stress reactions													
Behavioral stress symptoms	17,186	29.9	21.8	31.2	22.5	30.2	20.8	29.4	22.3	26.8	20.5	0.000	1vs3; 1vs4; 2vs4; 3vs4
Cognitive stress symptoms	17,239	26.7	19.5	28.0	19.8	25.5	19.0	26.2	20.2	25.5	18.1	0.000	1vs2; 1vs3; 1vs4
Long-term consequences													
Job satisfaction	17,330	70.4	14.7	69.2	14.8	71.1	14.9	69.9	14.7	73.0	13.5	0.000	1vs2; 1vs4; 2vs3; 2vs4; 3vs4
Intention to leave the organization	17,272	20.2	22.7	22.0	23.2	22.5	22.9	17.9	22.8	15.4	20.2	0.000	1vs3; 1vs4; 2vs3; 2vs4; 3vs4
Intention to leave the profession	17,269	16.1	21.3	17.5	21.9	15.9	20.6	15.4	21.7	13.8	19.5	0.000	1vs2; 1vs3; 1vs4; 2vs4;
General health status	15,674	79.0	17.0	80.0	17.1	78.3	16.7	77.7	17.5	79.5	15.8	0.000	1vs2; 1vs3; 1vs4; 3vs4

Table 2 (continued)

	All settings (n = 19,340)		1 = Acute care/rehabilitation hospitals (n = 8197)		2 = Psychiatric hospitals (n = 4464)		3 = Nursing homes (n = 3860)		4 = Home care organizations (n = 2837)		Kruskal–Wallis test	
	N	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	p-value	*Significant differences between settings (pairwise comparison)
Burnout symptoms	17,116	42.2	20.9	43.6	20.9	40.6	19.5	42.8	22.7	40.1	0.000	1vs2; 1vs4; 2vs3; 3vs4
Quality of sleep	17,110	68.8	19.2	66.8	19.1	69.8	19.1	69.0	19.6	72.2	0.000	1vs2; 1vs3; 1vs4; 2vs4; 3vs4

All scales are scored from 0 (minimum value) to 100 (maximum value), N=number of cases in total, M=mean, SD=standard deviation, *pairwise comparison using the significance level of 0.05 (2-sided), adjusted by the Bonferroni correction for multiple tests, highest / lowest scores are highlighted

hospitals, nursing homes, or home care organizations, see Table 3). In addition, nurse assistants (with a formal education: $B \geq 0.12$, $p = 0.000$ and without a formal education: $B \geq 0.10$, $p = 0.000$) working in acute care, rehabilitation hospitals, and home care organizations seemed to be more highly affected in terms of behavioral stress symptoms. High quantitative demands at work were also associated with increased behavioral stress symptoms among health professionals working in acute care, rehabilitation hospitals, and home care organizations ($B \geq 0.13$, $p = 0.000$).

With regard to cognitive stress symptoms, the incompatibility of work and private life was also revealed as a significant predictor among health professionals working in all the included areas ($B \geq 0.31$, $p = 0.000$). In addition, a lack of role clarity at work showed a significant association with health professionals' increased cognitive stress symptoms in all the included areas ($B \leq -0.08$, $p < 0.01$).

Results of the regression analysis regarding job satisfaction and intention to leave

Further results in Table 4 indicate that good leadership qualities of the direct supervisor were associated with health professionals' job satisfaction in all the included areas ($B \geq 0.22$, $p = 0.000$). Moreover, health professionals' positive perceived bond with the organization ($B \geq 0.16$, $p = 0.000$), social community at work (e.g., atmosphere, co-operation, $B \geq 0.07$, $p = 0.000$) and opportunities for development ($B \geq 0.13$, $p = 0.000$) were associated with a higher satisfaction at work in all the included areas. The incompatibility of health professionals' work and private life was shown to be associated with a poorer satisfaction at work in all the included areas ($B \leq -0.08$, $p = 0.000$).

In addition, the results showed that a poor perceived compatibility of work and private life ($B \geq 0.17$, $p = 0.000$), bond with the organization ($B \leq -0.13$, $p < 0.01$), quality of leadership ($B \leq -0.10$, $p < 0.01$), and opportunities for development ($B \leq -0.06$, $p < 0.01$) were associated with health professionals' higher intention to leave the organization in all the included areas. Furthermore, this higher intention to leave the organization was also associated with higher role conflicts (e.g., due to contradicting role requirements at work, $B \geq 0.05$, $p < 0.05$) and a perceived unfair behavior (e.g., feeling unjustly criticized by colleagues/superior, $B \geq 0.05$, $p < 0.05$) in all the included work areas.

The incompatibility of work and private life ($B \geq 0.19$, $p = 0.000$), a poor perceived bond with the organization ($B \leq -0.11$, $p < 0.01$) and a lack of opportunities for development ($B \leq -0.05$, $p < 0.05$) were also associated with health professionals' higher intention to leave the profession prematurely in all the included work areas. For health professionals working in hospitals and home care organizations, a lower meaning of work ($B \leq -0.07$,

Table 3 Work stressors associated with health professionals' stress reactions

	Acute care/rehabilitation hospitals			Psychiatric hospitals			Nursing homes			Home care organizations					
Outcome variable: behavioral stress symptoms	Marginal R2=0.42	SE*	P*	Marginal R2=0.37, Conditional R2=0.37	Beta (std.)	SE*	P*	Marginal R2=0.46; Conditional R2=0.48	Beta (std.)	SE*	P*	Marginal R2=0.43; Conditional R2=0.45	Beta (std.)	SE*	P*
(Intercept)	0.00	4.41	0.000	0.00	0.00	0.00	0.560	0.00	6.05	0.000	0.000	0.00	4.21	0.000	0.000
Age (years)	-0.05	0.04	0.026					-0.11	0.03	0.000	0.000	-0.05	0.04	0.028	0.028
Years of professional experience				0.02	-0.07	0.02	0.001								
Employees in administration and research	-0.04	3.42	0.072		-0.04	0.02	0.049	-0.03	6.43	0.124	0.124	-0.04	3.32	0.064	0.064
Physicians															
Nurse assistants without formal education	0.10	1.49	0.000									0.10	1.44	0.000	0.000
Nurse assistants with a formal education	0.12	0.99	0.000					-0.04	1.07	0.056	0.056	0.12	1.05	0.000	0.000
Registered nurses				0.02	-0.03	0.02	0.124	-0.03	1.22	0.180	0.180				
Working hours per week				0.02	0.08	0.02	0.000								
Gender				0.02	-0.06	0.02	0.007								
Emotional demands at work								0.04	0.03	0.078	0.078				
Physical demands at work				0.02	0.08	0.02	0.000								
Quantitative demands at work	0.13	0.03	0.000	0.02	0.03	0.02	0.129	0.04	0.03	0.086	0.086	0.13	0.03	0.000	0.000
Demands to hide emotions	0.06	0.02	0.004	0.02	0.05	0.02	0.014	0.11	0.02	0.000	0.000	0.06	0.02	0.008	0.008
Meaning of work				0.02	-0.04	0.02	0.072	-0.08	0.03	0.000	0.000				
Opportunities for development	-0.05	0.03	0.038	0.03	-0.05	0.03	0.033					-0.05	0.03	0.022	0.022
Influence at work				0.02	-0.04	0.02	0.073								
Bond with the organization	-0.08	0.03	0.000	0.02	-0.07	0.02	0.001	-0.07	0.02	0.000	0.000	-0.08	0.03	0.002	0.002
Quality of leadership				0.02	0.05	0.02	0.051								
Feedback				0.02	-0.05	0.02	0.025								
Social community at work								-0.09	0.03	0.000	0.000				
Role clarity				0.02	-0.05	0.02	0.015								
Social relations at work	-0.04	0.02	0.110	0.02	0.04	0.02	0.046					-0.04	0.02	0.112	0.112
Unfair behavior				0.02	0.05	0.02	0.020								
Social support at work	-0.09	0.03	0.002					0.04	0.03	0.100	0.100	-0.09	0.03	0.000	0.000
Predictability								-0.07	0.03	0.006	0.006				
Insecurity of the working environment	0.06	0.02	0.038					0.04	0.02	0.076	0.076	0.06	0.02	0.030	0.030
Difficulties with demarcation								0.04	0.02	0.040	0.040				
Work-private life conflict	0.46	0.03	0.000	0.02	0.45	0.02	0.000	0.45	0.03	0.000	0.000	0.46	0.03	0.000	0.000
Doing shift work				0.02	-0.08	0.02	0.001	-0.04	1.21	0.070	0.070				
Language region: German-speaking								-0.06	3.21	0.268	0.268				
Language region: French-speaking								-0.11	3.51	0.040	0.040				
Outcome variable: cognitive stress symptoms	Marginal R2=0.29; Conditional R2=0.29	SE*	P*	Marginal R2=0.25; Conditional R2=0.25	Beta (std.)	SE*	P*	Marginal R2=0.32; Conditional R2=0.35	Beta (std.)	SE*	P*	Marginal R2=0.30; Conditional R2=0.30	Beta (std.)	SE*	P*

Table 3 (continued)

	Acute care/rehabilitation hospitals			Psychiatric hospitals			Nursing homes			Home care organizations		
(Intercept)	0.00	2.65	0.000	0.00	4.22	0.000	0.00	6.06	0.000	0.00	5.04	0.000
Age (years)							-0.12	0.04	0.000			
Years of professional experience	-0.12	0.02	0.000	-0.06	0.04	0.002						
Still in training	0.04	0.78	0.008	0.04	0.93	0.020						
Employees in administration and research				0.05	2.58	0.014				-0.04	3.37	0.092
Physicians	-0.08	1.07	0.000	-0.08	1.44	0.000						
Nurse assistants without formal education	-0.03	2.57	0.016									
Nurse assistants with a formal education	0.03	0.88	0.074									
Registered nurses				-0.05	0.87	0.044	-0.04	1.06	0.062	-0.07	0.90	0.004
Working hours per week							-0.04	0.02	0.092			
Gender	-0.08	0.68	0.000	-0.05	0.84	0.008				-0.04	1.93	0.116
Emotional demands at work	-0.04	0.02	0.002	-0.03	0.03	0.134						
Quantitative demands at work	0.03	0.02	0.056				0.06	0.03	0.036	0.09	0.03	0.000
Demands to hide emotions	0.08	0.01	0.000	0.05	0.02	0.018	0.10	0.02	0.000			
Meaning of work	-0.05	0.02	0.004	-0.07	0.03	0.006	-0.06	0.03	0.014	-0.05	0.04	0.078
Influence at work				-0.05	0.03	0.056						
Scope for breaks/holidays				0.06	0.02	0.004						
Bond with the organization	-0.05	0.02	0.000									
Feedback	-0.04	0.01	0.006									
Quality of leadership	0.07	0.02	0.000							0.12	0.03	0.000
Social community at work				-0.04	0.03	0.068	-0.04	0.03	0.106	-0.06	0.04	0.046
Role clarity	-0.10	0.02	0.000	-0.12	0.03	0.000	-0.10	0.03	0.000	-0.08	0.04	0.008
Role conflicts	0.06	0.02	0.000				0.08	0.02	0.004	0.05	0.03	0.086
Social relations at work				0.05	0.02	0.026						
Unfair behavior				0.04	0.02	0.048						
Social support at work	0.05	0.01	0.002				0.04	0.03	0.184	-0.04	0.03	0.150
Predictability				-0.04	0.03	0.116						
Rewards				0.05	0.02	0.054				-0.07	0.03	0.032
Insecurity of the working environment		0.01	0.000							0.05	0.02	0.056
Difficulties with demarcation	0.06						0.04	0.02	0.132			
Work-private life conflict	0.32	0.02	0.000	0.34	0.02	0.000	0.31	0.03	0.000	0.42	0.03	0.000
Demanding work environment	0.04	0.02	0.010	0.09	0.02	0.000	0.10	0.02	0.000			
Middle-management position							0.04	1.45	0.094			
Upper-management position										-0.03	2.44	0.160
Doing shift work	-0.06	0.71	0.000									
Language region: German-speaking	-0.13	0.87	0.000				-0.15	3.43	0.012			
Language region: French-speaking				0.09	2.97	0.000	-0.06	3.70	0.258			

*based on bootstrapping, Beta (std)=standardized beta coefficients, SE=standard errors

Table 4 Work stressors associated with health professionals' job satisfaction and intention to leave

	Acute care/rehabilitation hospitals				Psychiatric hospitals				Nursing homes				Home care organizations			
Outcome variable: job satisfaction	hospitals															
	Marginal R ² = 0.68; Conditional R ² = 0.68	SE*	P*	Beta (std.)	Marginal R ² = 0.69, Conditional R ² = 0.69	SE*	P*	Beta (std.)	Marginal R ² = 0.69; Conditional R ² = 0.69	SE*	P*	Beta (std.)	Marginal R ² = 0.65; Conditional R ² = 0.65	SE*	P*	Beta (std.)
(Intercept)																
Years of professional experience	0.00	1.53	0.000	0.00	0.00	0.00	0.388	0.00	0.00	2.35	0.000	0.00	0.00	2.60	0.000	0.000
Years in current position	0.03	0.02	0.004	0.04	0.04	0.02	0.004	0.03	0.03	0.02	0.052	0.10	0.02	0.02	0.000	0.000
Still in training																
Employees in administration and research								-0.04		3.23	0.004	0.03	0.56		0.080	
Physicians	0.08	0.57	0.000	0.02	0.02	0.73	0.116									
Midwives	-0.02	0.88	0.096													
Nurse assistants with a formal education																
Registered nurses	0.02	0.29	0.050									0.03	0.52		0.104	
Working hours per week																
Emotional demands at work	-0.03	0.01	0.002					-0.06	0.02	0.000	0.000	0.05	0.01	0.01	0.014	
Physical demands at work	-0.07	0.01	0.000	-0.09	0.02	0.000	0.000	-0.07	0.01	0.000	0.000	-0.08	0.02	0.02	0.000	0.000
Quantitative demands at work	-0.04	0.01	0.000	-0.03	0.01	0.066	0.000	-0.07	0.01	0.000	0.000	-0.08	0.01	0.01	0.000	0.000
Demands to hide emotions	-0.04	0.01	0.000					-0.06	0.01	0.000	0.000	-0.03	0.02	0.02	0.112	
Meaning of work	0.05	0.01	0.000	0.03	0.01	0.082	0.000	0.06	0.02	0.000	0.000					
Influence at work	0.03	0.01	0.002	0.07	0.01	0.000	0.000									
Opportunities for development	0.13	0.01	0.000	0.15	0.02	0.000	0.000	0.17	0.02	0.000	0.000	0.20	0.02	0.02	0.000	0.000
Bond with the organization	0.19	0.01	0.000	0.16	0.01	0.000	0.000	0.18	0.01	0.000	0.000	0.22	0.01	0.01	0.000	0.000
Feedback	0.04	0.01	0.000	0.04	0.01	0.006	0.000	0.06	0.01	0.000	0.000	0.05	0.01	0.01	0.016	
Quality of leadership	0.23	0.01	0.000	0.25	0.01	0.000	0.000	0.22	0.01	0.000	0.000	0.22	0.02	0.02	0.000	0.000
Social community at work	0.14	0.01	0.000	0.11	0.01	0.000	0.000	0.11	0.02	0.000	0.000	0.07	0.02	0.02	0.000	0.000
Social relations at work																
Role clarity				0.03	0.02	0.050	0.000	0.05	0.01	0.000	0.000					
Role conflicts	-0.05	0.01	0.000	-0.11	0.01	0.000	0.000	0.03	0.02	0.068	0.000	-0.03	0.01	0.01	0.130	
Social support at work	0.04	0.01	0.002	0.03	0.02	0.066	0.000	-0.05	0.01	0.006	0.006	0.05	0.02	0.02	0.012	
Unfair behavior	-0.04	0.01	0.002	-0.07	0.01	0.000	0.000	-0.06	0.01	0.000	0.000	-0.03	0.01	0.01	0.088	
Predictability	0.05	0.01	0.000	0.06	0.01	0.002	0.000	0.04	0.01	0.028	0.000	0.06	0.02	0.02	0.002	0.000
Rewards	0.06	0.01	0.000	0.07	0.01	0.000	0.000					0.06	0.01	0.01	0.006	
Insecurity of the working environment	-0.03	0.01	0.006													
Difficulties with demarcation																
Work-private life conflict	-0.13	0.01	0.000	-0.08	0.01	0.000	0.000	0.03	0.01	0.042	0.000	0.04	0.01	0.01	0.016	
Demanding work environment	-0.02	0.01	0.050					-0.14	0.01	0.000	0.000	-0.14	0.02	0.02	0.000	0.000
Middle-management position	0.03	0.43	0.000	0.05	0.56	0.000	0.000	0.06	0.66	0.002	0.002	-0.04	0.02	0.02	0.052	
Doing shift work				0.04	0.45	0.000	0.000									
Language region: German-speaking	0.03	0.49	0.022									-0.05	0.49		0.010	

Table 4 (continued)

	Acute care/rehabilitation hospitals			Psychiatric hospitals			Nursing homes			Home care organizations		
Outcome variable: intention to leave the organization	Marginal R ² = 0.36; Conditional R ² = 0.36			Marginal R ² = 0.36; Conditional R ² = 0.36			Marginal R ² = 0.39; Conditional R ² = 0.39			Marginal R ² = 0.30; Conditional R ² = 0.31		
	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*
(Intercept)	0.00	3.63	0.000	0.00	0.00	0.083	0.00	5.44	0.000	0.00	5.26	0.000
Age (years)	-0.14	0.05	0.000	-0.11	0.03	0.003	-0.08	0.05	0.008	-0.10	0.06	0.000
Years of professional experience	-0.04	0.06	0.134	-0.05	0.03	0.125	-0.06	0.06	0.030	-0.07	0.07	0.064
Years in current position				-0.05	0.02	0.022						
Still in training	-0.04	0.86	0.002	-0.04	0.02	0.045	-0.08	1.28	0.000	-0.08	1.22	0.000
Physicians	-0.05	1.26	0.000				-0.04	7.87	0.064			
Nurse assistants without formal education				-0.04	0.02	0.011	-0.08	1.58	0.002	-0.05	1.79	0.066
Nurse assistants with a formal education				-0.09	0.02	0.001	-0.06	1.16	0.002			
Registered nurses	0.05	0.65	0.000							0.05	1.19	0.064
Gender	0.05	0.83	0.000									
Emotional demands at work	0.02	0.02	0.158							0.06	0.05	0.048
Physical demands at work							0.04	0.02	0.078	0.06	0.03	0.032
Quantitative demands at work	0.05	0.02	0.002	0.03	0.02	0.163	0.04	0.03	0.130			
Demands to hide emotions	0.03	0.01	0.060				0.04	0.02	0.126			
Meaning of work	-0.04	0.02	0.006	-0.05	0.02	0.058						
Influence at work							0.03	0.03	0.092	-0.09	0.03	0.000
Opportunities for development	-0.08	0.03	0.000	-0.06	0.02	0.021	-0.09	0.04	0.000	-0.11	0.04	0.000
Bond with the organization	-0.21	0.02	0.000	-0.22	0.02	0.001	-0.25	0.03	0.000	-0.13	0.03	0.000
Quality of leadership	-0.16	0.02	0.000	-0.16	0.02	0.001	-0.14	0.03	0.000	-0.10	0.04	0.008
Social community at work	-0.03	0.02	0.014				-0.04	0.04	0.082			
Role conflicts	0.07	0.02	0.000	0.05	0.02	0.020	0.07	0.03	0.004	0.09	0.03	0.004
Social support at work							0.04	0.04	0.150			
Unfair behavior	0.05	0.02	0.002	0.06	0.02	0.010	0.07	0.02	0.004	0.07	0.03	0.000
Predictability	0.03	0.02	0.080									
Rewards	-0.04	0.02	0.038	-0.05	0.02	0.037				-0.04	0.03	0.154
Insecurity of the working environment				0.03	0.02	0.102				-0.05	0.03	0.062
Difficulties with demarcation	0.03	0.01	0.050									
Work-private life conflict	0.18	0.02	0.000	0.18	0.02	0.000	0.19	0.03	0.000	0.17	0.03	0.000
Middle-management position	0.02	0.96	0.126	0.03	0.02	0.148				0.05	1.75	0.028
Upper-management position										0.04	2.74	0.104
Doing shift work	-0.04	0.81	0.002									
Language region: German-speaking	0.04	0.89	0.006	0.07	0.02	0.000	0.06	1.41	0.012			
Outcome variable: intention to leave the profession	Marginal R ² = 0.29; Conditional R ² = 0.29			Marginal R ² = 0.27; Conditional R ² = 0.28			Marginal R ² = 0.36; Conditional R ² = 0.37			Marginal R ² = 0.26; Conditional R ² = 0.27		
	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*

Table 4 (continued)

	Acute care/rehabilitation hospitals			Psychiatric hospitals			Nursing homes			Home care organizations		
(Intercept)	0.00	3.18	0.000	0.00	5.12	0.000	0.00	6.10	0.000	0.00	6.27	0.000
Age (years)	-0.12	0.03	0.000	-0.09	0.04	0.000	-0.09	0.04	0.000	-0.13	0.05	0.000
Still in training	-0.02	0.84	0.116				-0.04	1.27	0.090	-0.10	1.25	0.000
Employees in administration and research	0.02	1.77	0.074								3.82	0.044
Physicians	-0.04	1.31	0.004	-0.04	1.65	0.096						
Nurse assistants without formal education				-0.03	3.28	0.080	-0.08	1.57	0.002			
Nurse assistants with a formal education	0.07	1.03	0.000				-0.06	1.40	0.050			
Registered nurses	0.04	0.66	0.006	0.04	1.01	0.072	-0.06	1.47	0.032	0.04	1.11	0.210
Working hours per week	-0.03	0.01	0.048				-0.04	0.02	0.106			
Physical demands at work	0.04	0.02	0.006				0.04	0.02	0.086	0.06	0.03	0.036
Emotional demands at work										0.05	0.05	0.086
Quantitative demands at work	0.04	0.02	0.008									
Demands to hide emotions	0.06	0.01	0.000	0.06	0.02	0.012	0.07	0.02	0.012	0.05	0.02	0.102
Meaning of work	-0.11	0.02	0.000	-0.11	0.03	0.000	-0.04	0.04	0.062	-0.07	0.04	0.016
Influence at work										-0.06	0.03	0.028
Opportunities for development	-0.05	0.02	0.002	-0.07	0.03	0.004	-0.05	0.04	0.024	-0.13	0.04	0.000
Scope for breaks/holidays				-0.04	0.02	0.096	0.03	0.02	0.164			
Bond with the organization	-0.18	0.02	0.000	-0.17	0.03	0.000	-0.22	0.03	0.000	-0.11	0.03	0.002
Quality of leadership	-0.03	0.02	0.106	-0.07	0.03	0.010						
Social community at work				-0.03	0.03	0.104	-0.04	0.03	0.048			
Role conflicts	0.05	0.02	0.004	0.04	0.03	0.100	0.05	0.03	0.062	0.08	0.03	0.006
Social relations at work				0.04	0.02	0.104						
Social support at work							0.04	0.03	0.086			
Unfair behavior	0.05	0.01	0.000	0.05	0.02	0.034				0.07	0.03	0.004
Predictability	0.04	0.02	0.000							0.06	0.03	0.038
Rewards	-0.05	0.01	0.008	0.03	0.02	0.168						
Insecurity of the working environment	0.03	0.01	0.048				0.08	0.02	0.000			
Work-private life conflict	0.23	0.02	0.000	0.19	0.03	0.000	0.31	0.03	0.000	0.21	0.03	0.000
Demanding work environment				0.06	0.03	0.010				0.05	0.03	0.056
Gender										0.08	2.22	0.002
Upper-management position				0.03	1.90	0.124						
Doing shift work				-0.04	1.08	0.094				-0.06	1.12	0.016
Language region: German-speaking	0.07	1.02	0.000	0.03	2.53	0.248	0.12	1.39	0.000			

*based on bootstrapping, Beta (std)=standardized beta coefficients, SE=standard errors

$p < 0.05$) was also found to be a significant predictor for a higher intention to leave their profession prematurely. Moreover, further results showed that the younger the age of the health professionals, the higher their intention to leave the organization ($B \leq -0.08$, $p < 0.01$) and their profession prematurely ($B \leq -0.09$, $p = 0.000$) in all the included work areas.

Results of the regression analysis regarding health-related outcomes

The results in Table 5 on health professionals' health-related outcomes revealed an incompatibility of work and private life ($B \leq -0.24$, $p < 0.01$) as well as increased physical demands at work (e.g., lifting or moving people or heavy loads, $B \leq -0.09$, $p < 0.01$) were associated with a poorer general health status among health professionals working in all the included areas. Physicians working in acute care, rehabilitation, and psychiatric hospitals reported a higher general health status ($B \geq 0.05$, $p < 0.05$).

In addition, incompatibility between work and private life ($B \geq 0.38$, $p = 0.000$) was associated with health professionals' increased burnout-symptoms in all the included areas. Furthermore, high quantitative ($B \geq 0.05$, $p = 0.000$) and physical ($B \geq 0.04$, $p < 0.05$) demands at work were revealed as significant predictors for increased burnout symptoms among health professionals working in various areas. Further results showed that the younger the age, the higher the burnout symptoms ($B \leq -0.10$, $p = 0.000$) for health professionals' working in hospitals and nursing homes.

The incompatibility of health professionals' work and private life was also significantly associated with a poor quality of sleep ($B \leq -0.31$, $p < 0.01$) in all the included areas. In addition, a higher insecurity of the working environment (e.g., changes in shift schedules, $B \leq -0.06$, $p < 0.05$) and difficulties with demarcation (e.g., being available in leisure time for work issues, $B \leq -0.05$, $p < 0.05$) were associated with a poorer quality of sleep for health professionals working in hospitals and home care organizations. A demanding work environment (e.g., being exposed to noise, cold, chemicals, $B \leq -0.05$, $p < 0.05$) was also significantly associated with health professionals' poorer quality of sleep among those working in hospitals and nursing homes. Health professionals' higher perceived meaning of work was associated with a better quality of sleep ($B \geq 0.06$, $p < 0.05$) among those working in psychiatric hospitals and nursing homes. Further results relating to the specific field of work of health professionals are shown in Tables 3, 4 and 5.

Figure 2 presents an overview of the top four significant predictors of health professionals' stress reactions, job satisfaction, intention to leave, and health-related outcomes for acute care / rehabilitation hospitals, psychiatric hospitals, nursing homes, and home care organizations.

Discussion

This study presents, for the first time, detailed results for health professionals working in different work areas in Switzerland and enables a direct comparison of working conditions among hospitals, nursing homes, and home care organizations. The results of this study indicate a higher extent of various stressors (e.g., higher quantitative, sensorial demands, role conflicts, and work-private life conflicts, lower influence at work, rewards, feedback, and quality of leadership), stress reactions (higher cognitive stress symptoms) and long-term consequences (e.g., lower job satisfaction and quality of sleep, higher intention to leave and burnout-symptoms) among health professionals working in acute care and rehabilitation hospitals (compared to other sectors). However, there are also relevant stressors regarding other work areas (e.g., high emotional and physical demands in nursing homes, the lower meaning of work and role clarity in psychiatric hospitals, lower feedback and social relations at work in home care organisations). This appears to be related to the specific role, job content and responsibilities of health professionals, their different working environments and the nature of patient care in these different areas of work [4, 41].

Further results of this study show that the incompatibility of work and private life is one of the most important predictors for health professionals' increased stress reactions, job dissatisfaction, higher intention to leave the organization and the profession, as well as negative health-related outcomes in acute care, rehabilitation, and psychiatric hospitals, nursing homes, and home care organizations, which is in line with prior literature [4, 16, 18, 19]. A previous literature review including various EU and non-EU studies identified job satisfaction, work-life balance and career development as the main determinants for health professionals' job retention [42]. A lack of opportunities for development was also associated with health professionals' lower job satisfaction and greater intention to leave the organization and their profession in all the included work areas in this study.

Moreover, further results of this study revealed that good leadership qualities of the direct supervisor are also significantly associated with health professionals' satisfaction at work in all the work areas included in this study. Previous studies indicate that health professional leaders have an important role regarding work-related stress among their employees [16, 43]. As the results of a previous review on leadership and health professionals' job satisfaction conclude, it is important to identify and close the gaps in leadership knowledge and for leaders to play a key role in improving health professionals' satisfaction at work [44].

Another important result of this study revealed that the intention to leave the organization and the profession

Table 5 Work stressors associated with health professionals' health-related outcomes

Outcome variable: general health status	Acute care/rehabilitation hospitals			Psychiatric hospitals			Nursing homes			Home care organizations				
	Marginal R2 = 0.22; Conditional R2 = 0.22	SE*	P*	Marginal R2 = 0.21; Conditional R2 = 0.21	SE*	P*	Marginal R2 = 0.23; Conditional R2 = 0.25	Beta (std.)	SE*	P*	Marginal R2 = 0.17; Conditional R2 = 0.20	Beta (std.)	SE*	P*
(Intercept)	0.00	3.00	0.000	0.00	0.00	0.496	0.00	0.00	3.84	0.000	0.00	4.58	0.000	
Age (years)	-0.03	0.02	0.076	-0.04	0.02	0.076					-0.09	0.05	0.012	
Years of professional experience											0.05	0.05	0.152	
Employees in administration and research				-0.06	0.02	0.004								
Physicians	0.07	1.11	0.000	0.05	0.02	0.019	0.04	0.04	6.50	0.092				
Nurse assistants with a formal education	-0.05	0.94	0.000				0.06	0.06	1.03	0.030				
Registered nurses	0.04	0.56	0.034				0.05	0.05	1.13	0.040				
Gender	0.02	0.68	0.138	-0.03	0.02	0.125								
Physical demands at work	-0.09	0.01	0.000	-0.10	0.02	0.001	-0.13	-0.13	0.02	0.000	-0.14	0.03	0.000	
Quantitative demands at work							0.07	0.07	0.03	0.016	-0.05	0.03	0.134	
Demands to hide emotions	-0.05	0.01	0.002											
Meaning of work	0.05	0.02	0.006	0.06	0.03	0.02								
Influence at work	-0.03	0.01	0.106											
Opportunities for development	0.06	0.02	0.006				0.04	0.04	0.03	0.144	0.09	0.03	0.014	
Scope for breaks/holidays	0.05	0.01	0.000								-0.05	0.02	0.120	
Bond with the organization	0.05	0.02	0.004	0.05	0.03	0.077	0.09	0.09	0.02	0.000	0.05	0.03	0.088	
Feedback				0.05	0.02	0.032					-0.04	0.03	0.196	
Quality of leadership	-0.03	0.02	0.100				-0.04	-0.04	0.03	0.176	-0.07	0.03	0.052	
Social community at work	0.03	0.02	0.094				0.09	0.09	0.03	0.000	0.05	0.04	0.050	
Role clarity				0.07	0.03	0.006	0.04	0.04	0.03	0.172				
Role conflicts				-0.04	0.03	0.103								
Social support at work	0.03	0.02	0.168											
Unfair behavior	-0.04	0.01	0.006	-0.05	0.02	0.036	0.04	0.04	0.03	0.230	0.11	0.02	0.000	
Predictability														
Rewards	0.04	0.01	0.046											
Insecurity of the working environment	-0.04	0.01	0.028								-0.07	0.02	0.046	
Difficulties with demarcation	-0.02	0.01	0.116	-0.05	0.02	0.037	-0.09	-0.09	0.02	0.004				
Work-private life conflict	-0.27	0.01	0.000	-0.28	0.03	0.001	-0.27	-0.27	0.02	0.000	-0.24	0.03	0.000	
Demanding work environment							-0.07	-0.07	0.02	0.006				
Middle-management position				0.04	0.02	0.094								
Doing shift work											0.07	0.94	0.014	
Language region: German-speaking	0.03	0.76	0.058											
Language region: French-speaking				-0.05	0.02	0.033	-0.04	-0.04	1.51	0.200				
Outcome variable: burnout symptoms	Marginal R2 = 0.40; Conditional R2 = 0.40			Marginal R2 = 0.36; Conditional R2 = 0.36			Marginal R2 = 0.40; Conditional R2 = 0.42			Marginal R2 = 0.38; Conditional R2 = 0.39				
	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*		

Table 5 (continued)

	Acute care/rehabilitation hospitals				Psychiatric hospitals				Nursing homes				Home care organizations			
(Intercept)	0.00	2.48	0.000	0.00	4.18	0.000	0.00	4.92	0.000	0.00	4.01	0.000	0.00	4.01	0.000	
Age (years)	-0.12	0.04	0.000	-0.10	0.03	0.000	-0.12	0.03	0.000	-0.12	0.04	0.000	-0.12	0.04	0.000	
Years of professional experience	-0.06	0.04	0.018										-0.03	1.12	0.266	
Still in training																
Physicians	-0.03	1.05	0.018	-0.05	1.38	0.002										
Midwives	0.03	1.53	0.014													
Nurse assistants with a formal education	0.04	0.83	0.000													
Registered nurses				-0.04	0.89	0.052	-0.04	1.24	0.014	-0.04	1.08	0.014	0.06	1.08	0.014	
Working hours per week																
Gender	-0.07	0.70	0.000	-0.07	0.80	0.000	-0.07	1.32	0.002	-0.07	0.02	0.126	-0.04	0.02	0.126	
Emotional demands at work				0.04	0.03	0.042	0.07	0.03	0.000	0.07	2.04	0.004	-0.07	2.04	0.004	
Physical demands at work	0.04	0.01	0.016	0.06	0.03	0.004					0.04	0.010	0.07	0.04	0.010	
Quantitative demands at work	0.05	0.02	0.000									0.002	0.08	0.03	0.002	
Demands to hide emotions	0.05	0.01	0.002	0.04	0.02	0.030	0.08	0.03	0.000	0.14	0.03	0.000	0.14	0.03	0.000	
Meaning of work	-0.05	0.02	0.000	-0.04	0.02	0.052	0.13	0.02	0.000	0.06	0.02	0.012	0.06	0.02	0.012	
Influence at work	-0.03	0.01	0.044													
Bond with the organization	-0.06	0.02	0.000	-0.05	0.02	0.010	-0.08	0.03	0.000	-0.06	0.03	0.004	-0.06	0.03	0.004	
Feedback	-0.02	0.01	0.114	-0.04	0.02	0.038	-0.05	0.02	0.040	-0.05	0.03	0.040	-0.05	0.03	0.040	
Social community at work																
Role clarity																
Role conflicts	0.04	0.02	0.010	0.05	0.02	0.040	-0.05	0.03	0.024	0.04	0.03	0.068	0.04	0.03	0.068	
Social support at work																
Unfair behavior	0.04	0.01	0.006				0.05	0.03	0.042							
Rewards	-0.02	0.01	0.184													
Insecurity of the working environment	0.05	0.01	0.000													
Work-private life conflict	0.39	0.02	0.000	0.46	0.02	0.000	0.38	0.02	0.000	0.04	0.02	0.128	0.04	0.02	0.128	
Demanding work environment	0.05	0.02	0.000	0.04	0.02	0.044	0.08	0.03	0.000	0.41	0.03	0.000	0.41	0.03	0.000	
Middle-management position							0.04	1.50	0.140							
Upper-management position	-0.02	1.20	0.088	0.03	1.69	0.130										
Doing shift work	-0.08	0.69	0.000	-0.06	0.90	0.008										
Language region: German-speaking	-0.10	0.83	0.000	0.07	2.47	0.016										
Language region: French-speaking				0.11	3.83	0.000	0.07	1.69	0.006							
Outcome variable: quality of sleep																
	Marginal R ² = 0.24; Conditional R ² = 0.24			Marginal R ² = 0.23; Conditional R ² = 0.23			Marginal R ² = 0.29; Conditional R ² = 0.30			Marginal R ² = 0.20; Conditional R ² = 0.25						
	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	Beta (std.)	SE*	P*	
(Intercept)	0.00	2.56	0.000	0.00	0.00	0.390	0.00	5.62	0.000	0.00	5.14	0.000	0.00	5.14	0.000	
Age (years)							0.12	0.04	0.000							
Years in current position	0.03	0.03	0.056				-0.10	0.05	0.000	0.04	0.07	0.106	0.04	0.07	0.106	
Years of professional experience																

Table 5 (continued)

	Acute care/rehabilitation hospitals		Psychiatric hospitals		Nursing homes		Home care organizations	
Midwives	-0.02	1.68	0.174					
Employees in administration and research					0.05	6.54	0.048	
Physicians	0.04	1.06	0.002	0.04				
Nurse assistants without formal education	0.02	2.53	0.160					
Nurse assistants with a formal education	-0.03	0.84	0.034	-0.06	0.05	0.94	0.042	1.06
Working hours per week	0.11	0.01	0.000	0.11	0.04	0.02	0.098	0.02
Emotional demands at work	-0.04	0.02	0.000		-0.07	0.03	0.000	0.04
Physical demands at work					-0.05	0.02	0.046	0.03
Quantitative demands at work				0.03				
Demands to hide emotions					0.119			
Meaning of work				0.06	0.06	0.03	0.022	0.02
Opportunities for development	0.07	0.02	0.000					0.04
Bond with the organization	0.05	0.01	0.002		0.05	0.03	0.056	0.04
Quality of leadership	-0.04	0.02	0.038					0.04
Social community at work	0.04	0.02	0.016	0.05				0.03
Social relations at work				-0.05	0.019			
Role clarity					0.02			
Role conflicts	-0.04	0.02	0.008					0.354
Social support at work	0.04	0.02	0.034		0.05	0.03	0.032	0.134
Predictability								0.278
Rewards				0.04				
Insecurity of the working environment	-0.06	0.01	0.000	-0.07	0.100			
Difficulties with demarcation	-0.05	0.01	0.000	-0.05	0.007	0.02	0.050	0.036
Work-private life conflict	-0.31	0.02	0.000	-0.36	0.015			0.042
Demanding work environment	-0.05	0.02	0.004	0.06	0.001	0.02	0.000	0.000
Middle-management position					-0.05	0.03	0.042	
Upper-management position					0.08	1.43	0.004	
Language region: German-speaking	0.15	0.75	0.000	0.10	-0.03	2.98	0.182	
Language region: French-speaking					0.21	2.76	0.000	
					0.09	2.89	0.052	

*based on bootstrapping, Beta (std)=standardized beta coefficients, SE= standard errors

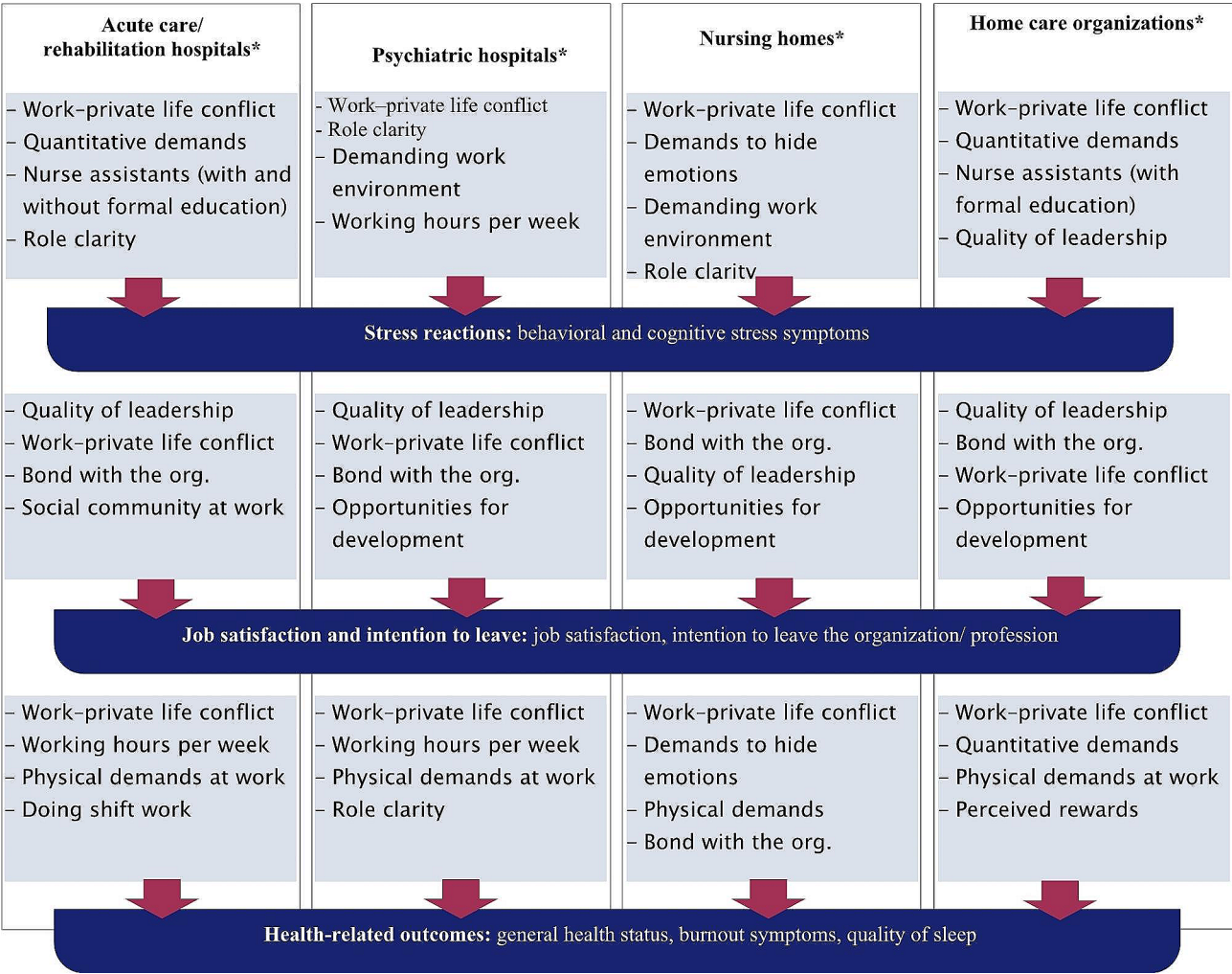


Fig. 2 Stressors at work associated with health professionals' stress symptoms, job satisfaction, intention to leave and health-related outcomes working in various areas (top 4 significant predictors regarding standardized Beta coefficients)

prematurely was associated with a younger age of health professionals working in all of the included work areas. In addition, a younger age was also significantly associated with increased burnout symptoms for those working in acute care, rehabilitation, and psychiatric hospitals, and nursing homes. These results are essential regarding the shortage of health professionals in the future [1, 45]. Previous study results indicate that newly graduated health professionals are at risk of leaving their profession prematurely and also determined increased burnout symptoms [46, 47]. Especially during their first year of practice, 60–74% of newly graduated nurses showed the intention to leave their profession right away [48–50]. Several studies identified stressors at work (high quantitative demands, working overtime, work–private life conflicts), insufficient induction and support from colleagues and leaders, unfulfilled expectations along with a lack of support in finding one's own role as possible causes [46, 47, 50, 51]. However, for an effective job retention

of health professionals and an adequate future staffing in the healthcare sector, better support of young health professionals is essential. Therefore, evidence-based and effective programs to support newly graduated health professionals during their transition phase into daily practice are important in order to retain them for the long-term in the healthcare sector [52, 53].

Strengths and limitations

These results differ mainly from those of other studies because they are based on a large sample of health professionals (including nurses, midwives, physicians, medical-technical, and medical-therapeutic professionals) working in different work areas (acute care, rehabilitation, psychiatric hospitals, nursing homes, home care organizations) among different language regions (German, French, Italian). Moreover, the results of this study rely on several data measurements, using well

established, valid, and reliable scales to assess work stressors, stress reactions, and long-term consequences.

However, participation in the study was on a voluntary basis for all the invited organizations and health professionals, and so a selection bias cannot be excluded (e.g., whether health professionals with higher levels of work-related stress did not participate due to restricted time resources). Also, nurses dominated the study sample in nursing homes and home care organizations, while in acute care, rehabilitation, and psychiatric hospitals a greater variation of health professions was represented. In addition, the third data measurement (T2) was conducted during the coronavirus pandemic, which could have had a negative impact on the willingness to participate by health professionals and also on their self-reports with regard to stressors and consequences at work. The generalisability of the results may be limited, as nurses and midwives are slightly overrepresented in the study sample.

Conclusions

Strategies for practice organisations, shaped to their specific working conditions regarding salient stressors in their area of work, are important (e.g., reducing workload and work-private life conflicts among health professionals in acute care and rehabilitation hospitals, stronger emotional support and use of patient lifter to reduce physical demands in nursing homes, improving role clarity in psychiatric hospitals and improving information transfer and team communication in home care organisations).

In addition, the importance of a good work–life balance, actively managing staff career development, and fostering staff commitment to their organization have emerged as key topics for healthcare organizations in all sectors to keep their staff healthy and satisfied in the long term. Furthermore, as the results of this study indicate, leaders should be aware of the most relevant stressors in their work area. While there are common stressors (e.g. work–private life conflicts, lack of opportunities for development), there are also differences across settings (as presented in Fig. 2). As our results show, it is also important to pay special attention to young health professionals in order to keep them in the healthcare system long-term and are not lost as soon as they enter the workforce. Therefore, evidence-based, effective, and interprofessional programs are important in order to better support young health professionals in dealing with stressors at work and finding their role during their transition phase. On the one hand, health organizations as employers are in demand, and on the other hand, the educational organizations that train future health professionals.

Acknowledgements

We are very grateful to all the organizations and health professionals who participated in this study, for sharing their experience and their time.

Author contributions

KAP, CV, SK, AG, FR, TJ, and CG designed the questionnaire and recruited the participating health organizations. KAP, CV, SK, FR, TJ, CG collected and analyzed the data. KAP and CG made substantial contributions to the interpretation of data and in writing the manuscript. All authors read and approved the final manuscript.

Funding

This study was financially supported by the University of Applied Sciences, Health Division, Bern, Switzerland (50% of the costs, and the State Secretariat for Education and Research (SER) of Switzerland (50% of the costs). The funders had no influence or control on the planning, conduct, or reporting of the study.

Data availability

The raw data set analyzed in the current study is available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The responsible Swiss ethical board in Bern (Kantonale Ethikkommission Bern) confirmed that the 'strain' study is deemed unnecessary according national legislation and does not fall under the Swiss Federal Act on Research Involving Human Beings (reference number: Req-2016-00616). The study was conducted in accordance with the Declaration of Helsinki. All health employees of the participating organizations were informed about the aim, procedures, risks, benefits, anonymity of data, and alternatives for participating in the study via online announcement / paper flyer and a short explanatory video so that they could make an informed decision about participation. Informed consent was obtained and participants were again informed on the first page of the questionnaire about the aim, procedure, and possible risks and had to actively give their consent (written, using a checkbox) to continue the questionnaire. The study was carried out on a voluntary basis for all organisations and health professionals participating; all participants were free to stop filling out the questionnaire at any time. The study was carried out on a voluntary basis for all participating organizations and health professionals; all participants were free to stop filling out the questionnaire at any time and had the opportunity to contact the research team via hotline if they had any questions. Data were anonymized and analysed only in units of analysis of at least 6 participants (e.g. per occupational group or ward).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹Department of Health Professions, Bern University of Applied Sciences, Bern, Switzerland

²Haute Ecole Arc Santé, University of Applied Sciences and Arts Western Switzerland, Neuchâtel, Switzerland

³Department of Psychology, University of Montreal, Montreal, Canada

⁴Department of Medicine, University of Montreal, Montreal, Canada

⁵Department of Business Economics, Health and Social Care, University of Applied Sciences and Arts of Southern Switzerland, Lugano, Switzerland

⁶Institute New Work, Department of Business School, Bern University of Applied Sciences, Bern, Switzerland

Received: 5 July 2023 / Accepted: 14 February 2024

Published online: 02 March 2024

References

1. WHO. Global strategy on human resources for health: workforce 2030. Geneva: World Health Organization; 2016.
2. Addor V, Schwendimann R, Gauthier JA, Wernli B, Jäckel D, Paignon A. «Nurses at work» – studie zu den Laufbahnen im Pflegeberuf über die letzten 40 Jahre in Der Schweiz. Neuchâtel: Schweizerisches Gesundheitsobservatorium; 2016.
3. Hämmig O. Explaining burnout and the intention to leave the profession among health professionals - a cross-sectional study in a hospital setting in Switzerland. *BMC Health Service Res*. 2018;18:785. <https://doi.org/10.1186/s12913-018-3556-1>.
4. Peter KA, Hahn S, Schols J, Halfens R. Work-related stress among health professionals in Swiss acute care and rehabilitation hospitals-A cross-sectional study. *J Clin Nurs*. 2020;29:3064–81. <https://doi.org/10.1111/jocn.15340>.
5. Martínez-López JA, Lázaro-Pérez C, Gómez-Galán J. Burnout among direct-care workers in nursing homes during the COVID-19 pandemic in Spain: A Preventive and Educational Focus for sustainable workplaces. *Sustainability*. 2021;13:2782.
6. Mattila E, Peltokoski J, Neva MH, Kaunonen M, Helminen M, Parkkila A-K. COVID-19: anxiety among hospital staff and associated factors. *Ann Med*. 2021;53:237–46. <https://doi.org/10.1080/07853890.2020.1862905>.
7. Pniak B, Leszczak J, Adamczyk M, Rusek W, Matłosz P, Guzik A. Occupational burnout among active physiotherapists working in clinical hospitals during the COVID-19 pandemic in south-eastern Poland. *Work*. 2021;68:285–95. <https://doi.org/10.3233/WOR-203375>.
8. Eurofound. Work-related stress. Dublin: Eurofound; 2005.
9. Leka S, Jain A. Health impact of psychosocial hazards at work: an overview. Geneva: World Health Organization; 2010.
10. Kompier M, Marcelissen F. Handbook of work stress: a systematic Approach for Organizational Practice. Amsterdam: NIA; 1990.
11. Hahn S, Hantikainen V, Needham I, Kok G, Dassen T, Halfens RJ. Patient and visitor violence in the general hospital, occurrence, staff interventions and consequences: a cross-sectional survey. *J Adv Nurs*. 2012;68:2685–99. <https://doi.org/10.1111/j.1365-2648.2012.05967.x>.
12. Lim J, Bogossian F, Ahern K. Stress and coping in Australian nurses: a systematic review. *Int Nurs Rev*. 2010;57:22–31. <https://doi.org/10.1111/j.1466-7657.2009.00765.x>.
13. Long MH, Johnston V, Bogossian F. Work-related upper quadrant musculoskeletal disorders in midwives, nurses and physicians: a systematic review of risk factors and functional consequences. *Appl Ergon*. 2012;43:455–67. <https://doi.org/10.1016/j.apergo.2011.07.002>.
14. Aiken LH, Sloane DM, Bruyneel L, van den Heede K, Sermeus W, Consortium RC. Nurses' reports of working conditions and hospital quality of care in 12 countries in Europe. *Int J Nurs Stud*. 2013;50:143–53. <https://doi.org/10.1016/j.ijnurstu.2012.11.009>.
15. Dhaini SR, Zuniga F, Ausserhofer D, Simon M, Kunz R, de Geest S, Schwendimann R. Care workers health in Swiss nursing homes and its association with psychosocial work environment: a cross-sectional study. *Int J Nurs Stud*. 2016;53:105–15. <https://doi.org/10.1016/j.ijnurstu.2015.08.011>.
16. Peter KA, Halfens R, Hahn S, Schols J. Factors associated with work-private life conflict and leadership qualities among line managers of health professionals in Swiss acute and rehabilitation hospitals – a cross-sectional study. *BMC Health Serv Res*. 2021;21:81. <https://doi.org/10.1186/s12913-021-06092-1>.
17. NIOSH. Exposure to Stress: National Institute for Occupational Safety and Health; 2008.
18. Albertsen K, Rafnsdóttir GL, Grimsø A, Tomasson K, Kauppinen K. Work-hours and work-life balance. *Scand J Work Env Hea*. 2008;5:14–21.
19. Hausler N, Bopp M, Hammig O. Effort-Reward, Imbalance. Work-privacy conflict, and Burnout among Hospital employees. *J Occup Environ Med*. 2018;60:e183–7. <https://doi.org/10.1097/JOM.0000000000001287>.
20. Peter KA, Meier-Kaepfeli B, Pehlike-Milde J, Grylka-Baeschlin S. Work-related stress and intention to leave among midwives working in Swiss maternity hospitals – a cross-sectional study. *BMC Health Serv Res*. 2021. <https://doi.org/10.1186/s12913-021-06706-8>.
21. Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA*. 2002;288:1987–93. <https://doi.org/10.1001/jama.288.16.1987>.
22. Weibelzahl S, Reiter J, Duden G. Depression and anxiety in healthcare professionals during the COVID-19 pandemic. *Epidemiol Infect*. 2021;149:e46. <https://doi.org/10.1017/S0950268821000303>.
23. Peter KA, Schols J, Halfens R, Hahn S. Investigating work-related stress among health professionals at different hierarchical levels: a cross-sectional study. *Nurs Open*. 2020;7:969–79. <https://doi.org/10.1002/nop.2469>.
24. Skakon J, Kristensen TS, Christensen KB, Lund T, Labriola M. Do managers experience more stress than employees? Results from the intervention project on absence and well-being (IPAW) study among Danish managers and their employees. *Work* (Reading Mass). 2011;38:103–9. <https://doi.org/10.3233/wor-2011-1112>.
25. Streit S, Da Costa BR, Christensen S, Tal K, Tandjung R, Juni P. One in seven Swiss physicians has left patient care - results from a national cohort study from 1980–2009. *Swiss Med Wkly*. 2019;149:w20116. <https://doi.org/10.4414/smw.2019.20116>.
26. Peter K, Hahn S, Schols J, Halfens RJ. Work-related stress among health professionals in Swiss acute and rehabilitation hospitals – results of a cross-sectional study. In: 18th European Doctoral Conference in Nursing Science; Graz; 2019.
27. Vogel B, de Geest S, Fierz K, Beckmann S, Zuniga F. Dementia care worker stress associations with unit type, resident, and work environment characteristics: a cross-sectional secondary data analysis of the Swiss nursing Homes Human resources Project (SHURP). *Int Psychogeriatr*. 2017;29:441–54. <https://doi.org/10.1017/S1041610216002027>.
28. Aronsson G, Gustafsson K, Dallner M. Sick but yet at work. An empirical study of sickness presenteeism. *J Epidemiol Community Health*. 2000;54:502–9. <https://doi.org/10.1136/jech.54.7.502>.
29. Kristensen TS, Hannerz H, Høgh A, Borg V. The Copenhagen Psychosocial Questionnaire-a tool for the assessment and improvement of the psychosocial work environment. *Scand J Work Environ Health*. 2005;31:438–49.
30. Nübling M, Vomstein M, Nolle I, Lindner A, Haug A, Lincke HJ. Deutsche Standard-Version Des COPSOQ 2017. Freiburg: FFAW-Freiburger Forschungsstelle für Arbeitswissenschaften GmbH; 2017.
31. Hasselhorn HM, Tackenberg P, Müller H. Working conditions and intent to leave the profession among nursing staff in Europe. Sweden: National Institute for Working Life; 2003.
32. de Jonge J, Mulder MJ, Nijhuis FJ. The incorporation of different demand concepts in the job demand-control model: effects on health care professionals. *Soc Sci Med*. 1999;48:1149–60. [https://doi.org/10.1016/S0277-9536\(98\)00429-8](https://doi.org/10.1016/S0277-9536(98)00429-8).
33. Eurofound. Sixth European Working conditions Survey - Questionnaire. Luxembourg: Publications Office of the European Union; 2015.
34. Herdman M, Gudex C, Lloyd A, Janssen M, Kind P, Parkin D, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Qual life Research: Int J Qual life Aspects Treat care Rehabilitation*. 2011;20:1727–36. <https://doi.org/10.1007/s11136-011-9903-x>.
35. Golz C, Peter KA, Hahn S. Cognitive pretesting and pretest of the STRAIN questionnaire to elaborate work-related stress of health care staff in Switzerland. *Int J Health Professions*. 2018;5:109–20. <https://doi.org/10.2478/ijhp-2018-0011>.
36. Peter K, Golz C, Bürgin RA, Nübling M, Voirol C, Zürcher SJ, Hahn S. Assessing the psychosocial work environment in the health care setting: translation and psychometric testing of the French and Italian Copenhagen Psychosocial questionnaires (COPSOQ) in a large sample of health professionals in Switzerland. *BMC Health Serv Res*. 2022;22.
37. R Core Team. R: a Language and Environment for Statistical Computing. Vienna: R Foundation for Statistical Computing; 2022.
38. Venables WN, Ripley BD. Modern Applied statistics with S. 4th ed. New York: Springer; 2002.
39. Bates D, Mächler M, Bolker B, Walker S. Fitting Linear mixed-effects models using lme4. *J Stat Soft*. 2015;67:1–48. <https://doi.org/10.18637/jss.v067.i01>.
40. Nakagawa S, Johnson PCD, Schielzeth H. The coefficient of determination R² and intra-class correlation coefficient from generalized linear mixed-effects models revisited and expanded. *J Royal Soc Interface*. 2017;14:20170213. <https://doi.org/10.1098/rsif.2017.0213>.
41. Gilles I, Burnand B, Peytremann-Bridevaux I. Factors associated with healthcare professionals' intent to stay in hospital: a comparison across five occupational categories. *Int J Qual Health care: J Int Soc Qual Health Care*. 2014;26:158–66. <https://doi.org/10.1093/intqhc/mzu006>.
42. de Vries N, Boone A, Godderis L, Bouman J, Szemik S, Matrangola D, de Winter P. The race to Retain Healthcare Workers: a systematic review on factors that Impact Retention of Nurses and Physicians in hospitals. *Inquiry*. 2023;60:469580231159318. <https://doi.org/10.1177/00469580231159318>.

43. Donaldson-Feilder E, Yarker J, Lewis R. Line management competence: the key to preventing and reducing stress at work. *Strategic HR Rev.* 2008;7:11–6. <https://doi.org/10.1108/14754390810853110>.
44. Specchia ML, Cozzolino MR, Carini E, Di Pilla A, Galletti C, Ricciardi W, Damiani G. Leadership styles and nurses' job satisfaction. Results of a systematic review. *Int J Environ Res Public Health.* 2021;18:1552.
45. Lobsiger M, Liechti D. Berufsaustritte Und Bestand Von Gesundheitspersonal in Der Schweiz - Eine Analyse auf basis Der Strukturhebungen 2016–2018. Neuchatel: Swiss Health Observatory (OBSAN); 2021.
46. Çamveren H, Arslan Yürümezoğlu H, Kocaman G. Why do young nurses leave their organization? A qualitative descriptive study. *Int Nurs Rev.* 2020;67:519–28. <https://doi.org/10.1111/inr.12633>.
47. Flinkman M, Laine M, Leino-Kilpi H, Hasselhorn HM, Salanterä S. Explaining young registered Finnish nurses' intention to leave the profession: a questionnaire survey. *Int J Nurs Stud.* 2008;45:727–39. <https://doi.org/10.1016/j.ijnurstu.2006.12.006>.
48. Labrague LJ, de los Santos JAA. Transition shock and newly graduated nurses' job outcomes and select patient outcomes: a cross-sectional study. *J Nurs Adm Manag.* 2020;28:1070–9. <https://doi.org/10.1111/jonm.13033>.
49. Rudman A, Gustavsson P, Hultell D. A prospective study of nurses' intentions to leave the profession during their first five years of practice in Sweden. *Int J Nurs Stud.* 2014;51:612–24.
50. Zhang Y, Wu J, Fang Z, Zhang Y, Wong FKY. Newly graduated nurses' intention to leave in their first year of practice in Shanghai: a longitudinal study. *Nurs Outlook.* 2017;65:202–11. <https://doi.org/10.1016/j.outlook.2016.10.007>.
51. Dwyer PA, Hunter Revell SM. Multilevel influences on New Graduate Nurse Transition: A literature review. *J Nurses Prof Dev.* 2016;32:112–21. <https://doi.org/10.1097/NND.0000000000000265>.
52. Çamveren H, Kocaman G, Vatan F. The effects of a preceptorship program on newcomer nurses' turnover intention, commitment and job satisfaction: quasi-experimental study. *Nurse Educ Pract.* 2022;63:103358. <https://doi.org/10.1016/j.nepr.2022.103358>.
53. Lin Y-E, Tseng C-N, Wang M-F, Wu S-FV, Jane S-W, Chien L-Y. Anxiety and work stress among newly employed nurses during the first year of a residency programme: a longitudinal study. *J Nurs Adm Manag.* 2020;28:1598–606. <https://doi.org/10.1111/jonm.13114>.

Publisher's Note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.