

BMJ Open Physicians' occupational stress, depressive symptoms and work ability in relation to their working environment: a cross-sectional study of differences among medical residents with various specialties working in German hospitals

Monika Bernburg,¹ Karin Vitzthum,¹ David A Groneberg,² Stefanie Mache³

To cite: Bernburg M, Vitzthum K, Groneberg DA, *et al.* Physicians' occupational stress, depressive symptoms and work ability in relation to their working environment: a cross-sectional study of differences among medical residents with various specialties working in German hospitals. *BMJ Open* 2016;**6**:e011369. doi:10.1136/bmjopen-2016-011369

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2016-011369>).

Received 1 February 2016
Revised 9 May 2016
Accepted 19 May 2016



CrossMark

For numbered affiliations see end of article.

Correspondence to
Dr Stefanie Mache;
s.mache@uke.de

ABSTRACT

Objectives: This study aimed to analyse and compare differences in occupational stress, depressive symptoms, work ability and working environment among residents working in various medical specialties.

Methods: 435 German hospital residents in medical training working in 6 different medical specialties participated in a cross-sectional survey study. Physicians were asked about their working conditions and aspects of mental health and work ability. The Copenhagen Psychosocial Questionnaire, the Work Ability Index, the ICD-10 Symptom Rating and the Perceived Stress Questionnaire were used to measure working conditions, mental health and work ability.

Results: Results show that up to 17% of the physicians reported high levels of occupational distress and 9% reported high levels of depressive symptoms. 11% of the hospital physicians scored low in work ability. Significant differences between medical specialties were demonstrated for occupational distress, depressive symptoms, work ability, job demands and job resources. Surgeons showed consistently the highest levels of perceived distress but also the highest levels of work ability and lowest scores for depression. Depressive symptoms were rated with the highest levels by anaesthesiologists. Significant associations between physicians' working conditions, occupational distress and mental health-related aspects are illustrated.

Conclusions: Study results demonstrated significant differences in specific job stressors, demands and resources. Relevant relations between work factors and physicians' health and work ability are discussed. These findings should be reinvestigated in further studies, especially with a longitudinal study design. This work suggests that to ensure physicians' health, hospital management should plan and implement suitable mental health promotion strategies. In addition, operational efficiency through resource planning

Strengths and limitations of this study

- This is one of the first studies to analyse and compare differences in mental health outcomes, perceived distress and working conditions among medical specialties.
- The main predictors for work ability and depressive symptoms within the work domain of physicians are illustrated.
- The relatively large sample of physicians, together with few missing data, strengthens the study.
- The cross-sectional design limits the value in supporting causal effects.
- Data were assessed by self-report measures that limit the objectivity of the study results.

optimisation and work process improvements should be focused by hospital management.

BACKGROUND

German physicians' working environment

The working situation for German hospital physicians is changing constantly: currently, all German doctors are confronted with cost-effective medicine, increasing legal regulations and clinical job demands, combined with a decrease in time for individual-oriented patient care.¹ The pressure to balance budgets with less financial resources add extra burden on the hospital personnel.² As a result, physicians experience growing demands and pressure to perform at work.^{3 4}

Although there has been growing interest in horizontal comparisons of hospital doctors' working environment in different medical specialties and their job outcomes, only few studies focused on these assessments in German hospitals.

Tanner *et al*⁵ demonstrated significant differences between medical specialties for time pressure, uncertainty and social stressors with patients. Mache *et al*⁶⁻¹⁰ published several observational studies including work task analysis in different medical settings showing different workloads and working demands.¹¹ In addition, von dem Knesebeck *et al*¹² analysed psychosocial stress in the workplace among hospital doctors working in surgical fields in Germany showing that this group suffers from more severe stress at work than other occupational groups.

Associations between physicians' mental health, work ability and working environment

Physicians' mental health condition is a result of a complex and simultaneous interaction of individual constraints, individual resources and social and environmental factors.¹³ The relationship between mental health and physicians' working conditions has been previously demonstrated in several theoretical models such as in the job demands-resources model (JD-R model) and the demand-control-support model.¹⁴⁻¹⁶ These models build the rationale for this study.

According to the JD-R model, effects of certain job demands (ie, organisational job factors that require sustained physical and/or psychological efforts) are strongly associated with mental health outcomes. For example, when high levels of job demands and low levels of control and reward are combined, employees are at an increased risk of anxiety and depression.¹⁷ In addition, high levels of job demands are linked to the experience of fatigue.¹⁸

A key proposition of the JD-R model is that interactions between job demands and resources are important by the way that certain job resources can buffer negative effects of psychological distress.¹⁵ Research supports this assumption, and a number of cross-sectional studies have shown negative associations of job resources with depression and occupational distress. These job resources include job control,¹⁹ social support at work,²¹ reward, feedback and supervisory coaching.²³

The demand-control-support model²⁴ presumes that working situations have negative psychological or physical consequences in particular when high demands coincide with limited decision latitude and low social support at the workplace.²⁴ Several studies showed that increased job demands are associated with depressive symptoms and distress.²⁵⁻²⁸

Tanner *et al*⁵ focused on analyses of hospital working environment and demonstrated that working conditions in hospital settings have an influence on physicians' health and their job performance. The authors stated that to keep healthcare availability in Germany at the desired level, it is important to prioritise and organise

responsibilities, resources and job demands to keep hospital physicians healthy in their job and to prevent diseases or even absenteeism. Particularly in healthcare jobs, work ability is a precondition to cope with demanding tasks in different work conditions (eg, high patient loads, working under pressure). Work ability is defined as 'the sum of factors enabling an employed person in a certain situation to manage his/her working demands successfully'.²⁹

Decreased work ability is associated with diminished productivity at work,³⁰ increased risk of long-term sickness absence³¹ and early retirement.³² Particularly in healthcare jobs, work ability is a precondition to cope with demanding tasks in different work conditions (eg, high patient loads, working under pressure).

Physicians' mental health has been investigated in several studies. A current review demonstrated the prevalence of depression or depressive symptoms being 29% among physicians.³³ A study by Ruitenburg *et al*³⁴ showed that a quarter of the physicians in their study were found to have high depression (29%) and anxiety (24%) symptoms, and one out of every six (15%) physicians had a high prevalence of post traumatic stress disorder (PTSD) symptoms.

There is some indication to suggest differences in mental health and work ability between clinicians working in different medical specialties. Only few studies already exist focusing on physicians' general health and differences between medical specialties. For example, a study by Hughes *et al*³⁵ demonstrated higher rates of substance use by emergency physicians and psychiatrists compared to other medical specialties. Buddeberg-Fischer *et al*³⁶ showed that surgeons have been shown to have a higher risk of cardiovascular diseases compared to other medical specialists.

Despite these research studies, we found no study comparing mental health issues and work ability among German medical specialties.

Study aim

To our knowledge, no study has evaluated differences in working conditions and mental health issues as well as work ability among hospital physicians working in different medical specialties. Therefore, this study aimed to examine physicians' working conditions as well as levels of physicians' occupational distress, depressive symptoms and work ability. Findings are compared for different medical specialties. A better understanding in this research field will become central for designing strategies and health promotion programmes to support their mental health and maintain physicians' productivity.

Research questions and hypotheses

In summary of the outlined frame and the cited empirical results, we work on the following questions and hypotheses:

Question I: How do German hospital physicians evaluate their working conditions across medical specialties?

Hypothesis I: Working conditions differ significantly among hospital physicians working in different medical specialties.

Question IIa: How do German hospital physicians evaluate their levels of occupational distress, depressive symptoms and work ability?

Question IIb: Do these levels of occupational distress, depressive symptoms and work ability differ across medical specialties?

Hypothesis II: Levels of physicians' occupational distress, depressive symptoms and work ability differ significantly across medical specialties.

Question III: Are there relations between working conditions and occupational distress, depressive symptoms and work ability?

Hypothesis IIIa: Perceptions of workplace demands (eg, quantitative demands) will be positively related to occupational distress and depressive symptoms and negatively related to physicians' work ability.

Hypothesis IIIb: Perceptions of workplace resources (eg, social support) will be negatively related to occupational distress and depressive symptoms and positively related to physicians' work ability.

METHODS

Study design and setting

The study was designed as a cross-sectional questionnaire evaluation. Data collection took place between 2011 and 2014 in 12 hospital departments in the northern and eastern parts of Germany. Based on information from the German Federal Office of Statistics in 2012, the chosen hospitals are representative of other German hospitals.³⁷ The hospitals included in the study were similar in the following variables: size, number of patients/beds as well as employed medical staff. As an inclusion criterion, physicians had to have a minimum score of 1-year working experience. Focus of this study was to study on residents in medical training. Attending physicians and chief physicians were not included in the study.

We asked full-time working physicians to fill out the questionnaire within 3 weeks and to return them to boxes placed in doctors' rooms. Reminders were sent by email after 3 weeks to increase the response rate. Seven hundred and three physicians were invited to participate in the study. In total, 435 questionnaires were evaluated in the analyses—split into six different medical specialties (Internal Medicine, Neurology, Surgery, Paediatrics, Anaesthesiology and Gynaecology & Obstetrics) (the response rate was 61.8%).

Dependent variables and instruments

Dependent variables were (1) depressive symptoms and (2) work ability.

Depressive symptoms are measured with the ICD-10 Symptom Rating.³⁸ Items can be answered on a 5-point

rating scale (range: 0–4). Higher scores are indicative of greater symptom dominance. The scale for depressive symptoms showed a satisfactory internal consistency (Cronbach's $\alpha=0.73$).

Physicians' work ability was measured using a single item of the Work Ability Index.³⁴ Participating physicians were asked to rate their current work ability against their work ability in their own best period on an 11-point scale from 0 to 10. Ten stands for their best work ability in their own best period of life. The cut-off value for work ability was six: lower scores are considered as deficient work ability. This cut-off point was defined by Ruitenburg *et al.*^{34 39}

Independent variables included physicians' working conditions and occupational distress

The German version of the Copenhagen Psychosocial Questionnaire (COPSOQ) was used to evaluate job-related and psychosocial factors at work.^{40 41} The questionnaire includes 12 subscales, which measured job demands (emotional and quantitative demands), job resources (quality of leadership, opportunities for development and social support) and job-related outcome factors (cognitive stress symptoms and burnout). Items are scored on a 5-point Likert scale, where the first category represents the maximal value (ie, 'always') and the last the minimal value (ie, 'never'). Item values were transformed into point values ranging from 0 (minimum) to 100 points (maximum).

The COPSOQ is a well-validated and internationally recognised survey instrument. Previous investigations proved quality criteria of the COPSOQ (reliability, validity).⁴¹

Distress was measured with the Perceived Stress Questionnaire including seven scales with 30 items (scales: Harassment, Overload, Irritability, Lack of Joy, Fatigue, Worries and Tension).⁴² These items can be answered on a 4-point rating scale (1=almost never, 2=sometimes, 3=often and 4=usually) and refer to the period of the last 4 weeks. According to Levenstein *et al.*⁴² the resulting total score was linearly transformed between 0 and 1. The Cronbach's α value of the Perceived Stress Questionnaire is high ($\alpha=0.89$).

Sociodemographic factors

Sociodemographic variables were included in the questionnaire: age, gender, years of working experience, marital status and presence of children.

Marital status was differentiated between physicians who are married or living in a partnership and others. In addition, the presence of children in the household was measured.

Statistical data analysis

Data analysis included descriptive analyses, parametric analyses and regression analyses. Data were adjusted for age, gender, years of working experience, marital status and presence of children.

One-way analyses of variance (ANOVAs) were conducted to compare medical specialties. Post hoc tests were used to identify significant group differences. In the end, all p values were corrected for multiple testing (Bonferroni corrections). p Values of <0.05 were considered significant, and all p values given were two tailed.⁴³ In addition, Cohen's d effect size was analysed and described.

We checked for violations of the assumptions (eg, normality, equality of variances, data homoscedasticity and removal of the outliers).

Two regression analyses were conducted to analyse associations between working conditions and the dependent outcome variables: (1) depressive symptoms and (2) work ability.

In the first step, control variables were included, to determine whether, independently of these variables, there are associations between the working conditions, occupational distress, depressive symptoms and work ability. In the next step, physicians' working conditions were included.

Data were calculated using the SPSS (V.21.0) software package for social sciences.

RESULTS

Descriptive statistics of the study sample

Physicians' sociodemographic characteristics are given in table 1. Fifty-one per cent of the respondents were female physicians (49% men). The ages ranged from 27 to 57 years, with the vast majority aged 26–35 years. Of the respondents, 63% were married or cohabiting and 46% had children. On average, physicians had been working 4 years (SD=2 years). Significantly more female physicians had children ($p<0.05$) and were married

($p<0.05$) compared to their male colleagues. The number of physicians per medical specialty included in this study is shown in table 2. No significant group differences have been found with regard to the sociodemographic variables.

Comparison of physicians' working conditions, occupational distress, depressive symptoms and work ability across medical specialties

Several differences were found between the examined job demands and job resources (see table 2). As shown, quantitative job demands were rated highest by physicians in Surgery and Internal Medicine compared to the other disciplines ($p<0.01$). Emotional demands were rated highest by paediatricians, gynaecologists and neurologists ($p<0.01$).

Significant differences in job resources have also been found among medical specialties: social support and social relationships have been scored highest in Paediatrics. Getting feedback and quality of leadership were scored with the lowest scores in Surgery Medicine compared to their colleagues (see table 2).

An overview of the prevalence rates of the examined outcome variables (psychosocial distress, depressive symptoms and work ability) are presented in table 3. Mean score for psychosocial distress was 0.48 (SD=0.18). Cut-off score for moderate level of distress was estimated to be >0.40 to ≤ 0.60 . The prevalence of perceived psychosocial distress at a moderate level was 39.5%. The prevalence of perceived psychosocial distress at high levels was 17.1%.

The mean score for depressive symptoms was 0.43 (SD=0.19). Nine per cent of physicians indicated high levels of depressive symptoms. Physicians had a mean work ability score of 7.9 (SD=1.4) although 11% of physicians rated their work ability as insufficient ($n=48$).

Significant differences among medical specialties were found for occupational distress symptoms ($F=11.65$, $p<0.001$, $\eta^2=0.035$) and depressive symptoms ($F=8.57$, $p<0.001$, $\eta^2=0.026$). Bonferroni post hoc tests showed that physicians in Surgery Medicine reported the highest levels of occupational distress compared with internal medicine ($p=0.003$, $d=0.30$), obstetrics and gynaecology ($p=0.001$, $d=0.43$), paediatrics ($p=0.001$, $d=0.54$), neurology ($p=0.001$, $d=0.42$) and anaesthesiology ($p=0.001$, $d=0.56$). According to Bonferroni post hoc tests, surgical physicians reported the lowest scores of depressive symptoms. Physicians of other medical specialties scored higher on depressive symptoms: internal medicine ($p=0.003$, $d=0.39$), obstetrics and gynaecology ($p=0.003$, $d=0.35$), paediatrics ($p<0.001$, $d=0.63$), neurology ($p<0.001$, $d=0.48$) or anaesthesiology ($p<0.001$, $d=0.64$).

An ANOVA revealed an effect of medical specialty on work ability ($F=11.65$, $p<0.001$, $\eta^2=0.032$). Post hoc Bonferroni tests showed that surgeons reported higher work ability scores than physicians in internal medicine ($p=0.001$, $d=0.39$), paediatrics ($p<0.001$, $d=0.61$) ($p<0.001$, $d=0.65$) and obstetrics and gynaecology ($p<0.001$,

Table 1 Demographic characteristics of the participants ($n=435$)

	N	Percent
Gender		
Female	222	51
Male	213	49
Age		
<25	0	0
26–30	109	25
31–35	131	30
36–40	83	19
41–45	52	12
46–50	43	10
>50	17	4
Marital status		
Single	161	37
Married/partnership	274	63
Children		
Child/children	200	46
Without children	235	54

Table 2 Mean values and analyses of variance for the working conditions by medical specialty

	Surgery (n=78)	Internal medicine (n=83)	Paediatrics (n=61)	Neurology (n=65)	Gynaecology (n=78)	Anaesthesiology (n=70)	F
Quantitative demands	77.21	74.62	65.28	69.39	70.18	68.47	4.31**
Emotional demands	61.15	65.39	69.38	66.72	68.62	55.82	3.13**
Influence at work	51.24	56.33	51.53	57.38	55.46	50.02	1.98
Possibilities for development	66.63	65.42	63.79	65.18	64.37	63.25	1.85
Degree of freedom at work	48.25	48.82	50.33	49.16	50.29	51.72	1.74
Sense of community	58.18	57.50	64.61	61.73	58.56	59.65	1.91
Feedback	34.35	43.17	45.63	37.85	44.62	39.29	3.58**
Quality of leadership	46.72	50.72	52.44	57.39	49.13	48.51	4.01**
Social support	59.48	62.85	65.73	57.92	59.98	55.36	3.91**
Social relationships	61.27	63.51	67.39	58.43	60.25	57.12	3.85**

N=435.

**p<0.01.

d=0.41). Surgeons scored significantly higher than anaesthesiologists ($p=0.001$, $d=0.42$) and neurologists ($p<0.001$, $d=0.38$).

Relations between working conditions, depressive symptoms and work ability

Bivariate analyses revealed several significant correlations between working conditions and depressive symptoms and work ability (see table 4). We performed regression analyses in which depressive symptoms and work ability were set as the dependent variables. For both analyses, the variables age, work experience, cohabitation with a partner, professional position and medical specialty were statistically controlled. The final model of the regression analyses is illustrated in table 4.

After adjustment for the sociodemographic variables, the job demands and resources were added in step 2, before occupational distress was entered into step 3 of the model.

The included sociodemographic and the work-related factors explained 26% of the variance for depressive symptoms and 22% of the variance for work ability.

As illustrated in table 4, occupational distress was positively associated with depressive symptoms but negatively with work ability. Occupational distress accounted for an additional 9.3% of the variance for depressive symptoms

and an additional 6.1% of the variance for work ability ($p<0.05$).

DISCUSSION

The aim of the current study was to investigate on possible differences in the working environment of resident hospital physicians as well as levels of physicians' occupational distress, depressive symptoms and work ability. This study demonstrated significant differences in working conditions, occupational distress, depressive symptoms and work ability among resident physicians. In addition, relations between physicians' working conditions and their perceived distress, depression and work ability have been analysed and illustrated.

In sum, all residents showed high rates for quantitative working demands. Comparable findings have been reported in former study reports focusing on residents in various medical specialties.^{12 44 45} Facing differences in medical specialties, our results show that physicians working in Surgery and Internal Medicine rated quantitative job demands more highly than their colleagues in other medical specialties. Ruitenburg *et al*⁴⁶ found a comparable result: in this study, job demands of residents and specialists in Surgery were quantified for an

Table 3 Perceived occupational distress, depressive symptoms and work ability among hospital doctors

Medical specialty	n (%)	Occupational distress M (SD) (range: 0–1)	Depressive symptoms M (SD) (range: 0–1)	Work ability M (SD) (range: 1–10)
Internal medicine	83 (19%)	0.42 (0.16)	0.43 (0.23)	7.8 (1.2)
Surgery	78 (18%)	0.56 (0.19)	0.29 (0.19)	8.9 (1.5)
Paediatrics	61 (14%)	0.49 (0.17)	0.31 (0.18)	8.2 (1.3)
Neurology	65 (15%)	0.52 (0.15)	0.45 (0.20)	7.5 (1.6)
Gynaecology	78 (18%)	0.41 (0.18)	0.35 (0.18)	7.9 (1.4)
Anaesthesiology	70 (16%)	0.45 (0.17)	0.49 (0.20)	7.4 (1.3)
Sum score	435 (100%)	0.48 (0.18)	0.43 (0.19)	7.9 (1.4)

M, mean; SD, standard deviation.

Table 4 Regression analyses for depressive symptoms and work ability

Independent variables	DV: depressive symptoms			DV: work ability		
	r	β	ΔR^2	r	β	ΔR^2
Step 1: Control variables			0.05			0.06
Age	0.15	0.08		-0.19**	-0.12*	
Gender	0.10**	0.07		0.05	0.03	
Marital status	0.11*	0.09		0.04	0.02	
Presence of children	0.09	0.06		0.06	0.04	
Medical specialty	0.04	0.02		0.07	0.05	
Years of experience	0.11	0.07		-0.14*	-0.10*	
Step 2: Working conditions			0.21			0.16
Quantitative demands	0.26**	0.20**		-0.28**	-0.22**	
Emotional demands	0.25**	0.20**		-0.20**	-0.17**	
Influence at work	-0.21**	-0.18**		0.15*	0.07	
Possibilities for development	-0.17**	-0.14**		0.14*	0.06	
Degree of freedom at work	-0.15**	-0.09		0.10*	0.08	
Sense of community	-0.18*	-0.15**		0.09	0.05	
Feedback	-0.11*	-0.08		0.12*	0.08	
Quality of leadership	-0.13*	-0.11*		0.09	0.06	
Social support	-0.18**	-0.15**		0.15**	0.12*	
Social relationships	-0.12*	-0.10*		0.11**	0.06	
Step 3			0.09			0.06
Occupational distress	0.31**	0.25**		-0.19**	-0.15**	
Total R ²			0.35			0.28

β , standardised β -coefficients from the final step of the model; ΔR^2 , change in explanation rate in each step; DV, dependent variable; R², explanation rate.

* $p < 0.05$; ** $p < 0.01$.

average workday and compared with other hospital physicians, showing that surgeons perform significantly more job tasks than their colleagues working in other disciplines.

The highest levels for emotional demands have been rated by paediatricians. This result can be explained by the fact that paediatricians have to face children's illness that is very strainful and emotionally drained. Weigl *et al*⁴⁷ also demonstrated that emotional work stressors are prevalent among residents working in Paediatric Medicine. Especially paediatricians have to develop adequate emotional strategies to deal with daily work demands and young patients and their families.

In addition, emotional demands have also been evaluated with high scores by physicians working in Neurology, Internal medicine and Gynaecology. Working in these specialties involves more communication, emotional support and direct patient care (ie, diagnosis talks) than, for example, in Anaesthesiology. A study performed by Tanner *et al*⁵ showed comparable findings for emotional stressors in these disciplines.

All physicians reported comparable low levels of receiving supportive feedback and quality of leadership (no significant differences). Former studies also reported low reward, work support and lack of feedback in the medical profession.⁴⁸ As studies demonstrated, most employees suffer from a lack of feedback.⁴⁹ However, getting feedback is essential for effective change and to develop and improve performance.⁵⁰ So, as our study results illustrate, giving feedback and

support should be improved by supervisors and colleagues in the clinical setting.

Our results also demonstrated moderate values for depressive symptoms, perceived occupational distress and work ability among the included physicians. The findings for depressive symptoms and distress are in line with former study results.^{44 51–53} Ruitenburt *et al*³⁴ performed a study showing a comparable mean score for self-reported work ability of 8.1 but higher levels of mental health problems. They concluded that these findings should be a major concern and it is very important keeping physicians healthy at the job; so more attention should be given to the mental health of hospital physicians by the hospital management. As seen in previous studies, reduced self-reported work ability and mental health problems have been strongly associated with an increased risk of long-term sickness absence,⁵⁴ workplace failure and reduced job performance.^{55–58}

The results also showed significant differences in occupational distress, depressive symptoms, work ability and mental health between medical specialties.

We found that physicians working in Surgery Medicine rated occupational distress more highly than do physicians in other specialties. No comparable study has been found for German residents focusing on mental health differences between medical disciplines. However, these results support the findings of studies performed by Park *et al*⁵⁹ showing comparable differences in burnout and exhaustion between residents with various specialties.

Surgeons reported the highest levels of quantitative working demands and occupational distress but reported the lowest levels of depressive symptoms and the highest levels of work ability. No comparable study has been found that focused on the identical topic. However, several studies demonstrated similar levels of job demands and distress among surgeons.⁴⁴

Differences in the working environment that contribute to differential consequences in terms of perceived distress and mental health perceptions are argued in research findings as possible reasons.⁶⁰

As demonstrated in this study, how physicians' evaluate their working conditions proved to have an impact on how they rate their work ability and depressive symptoms. In particular, our results showed that high levels of job demands are associated with high levels of depressive symptoms. This result is consistent with a former study showing relations between high job demands, low work control and heavy on-call-duty with poor mental health of hospital physicians.⁶¹

Anagnostopoulos *et al*⁶² also demonstrated associations between job demands (eg, workload, emotional demands), job resources (eg, supervisor support, job autonomy) and residents' mental health outcomes. The authors also conclude that residency is a stressful period in a physician's development, characterised by long work hours, time pressure and excessive work load, which can exert negative effects on residents' mental health.⁶²

In addition, several studies performed in other occupational settings confirmed relations between working conditions and mental health problems.^{63 64}

In addition, relations between perceived influence at work, collegial support and depressive symptoms as well as work ability have been analysed. According to previous research, influence at work and autonomy at work are important factors for productivity, general job performance and well-being at work.^{65 66} As research demonstrated, residents perceive significantly less influence and control over their own work than specialists. Residents often report that they actually have little autonomous power in the clinical setting.⁶⁷ Lack of power, few influence and control over work are associated with feelings of frustration, anger and helplessness. As possible long-term consequences, depressive symptoms and further mental issues can arise.⁶⁸ In addition, residents often complain about insufficient support from supervisors and experienced colleagues. As research stated, perceived support is another important factor on job performance, work ability and mental health in the long term.⁶⁹ These study results indicate that improving job autonomy and establishing a support system may be useful to increase job performance and job satisfaction. Appropriate suggestions on how to improve these working resources are listed in the Practical implication section.

The study result further supports the suggestion that perceived distress is a negative psychological factor for depressive symptoms. Consistent with this finding, occupational stress has been identified in several studies as a

risk factor for depressive symptoms as it may influence general mental health and work ability.⁷⁰⁻⁷²

LIMITATIONS

Some limitations of this study should be addressed. First, the study's cross-sectional design limits the value in supporting causal effects and generalisability of the findings. Since data were assessed by self-report measures and no observers' data are available to cross-validate the data of participants, we can only claim limited objectivity of our results. The results might be influenced by common method bias. In addition, we did not include and ask for stressors perceived outside work that may have an influence on the study results. Furthermore, due to logistic and pragmatic reasons, our study sample includes only physicians working in clinic departments of the northern and eastern parts of Germany, which may also limit the generalisability of the study findings. Since we included only residents, age and clinical experience should be acknowledged as limiting factors for the external validity of the study results. In addition, the participating physicians worked in different hospitals may cause potential bias. A selection bias cannot be excluded.

PRACTICAL IMPLICATIONS

Practical implications can be drawn to increase hospital physicians' mental health and work ability and subsequently the quality of treatment and patient satisfaction.

At the individual level, more health prevention programmes should be implemented in German hospitals. Hospitals should implement individual and/or group trainings and programmes including supervisory support and counselling for physicians. Such programmes may include elements to improve physicians' self-care and to develop coping strategies.

Moreover, a specific mental health support programme could be used to monitor physicians' mental health conditions and to provide interventions to avoid productivity loss and to increase quality of care.¹³ In addition, participative interventions on psychosocial work factors to prevent mental health problems in hospital settings should be implemented.

We also suggest organisational and work-design interventions that address the high working demands and the low levels of reward, feedback and quality of leadership.

At the organisational level, it would be useful to improve organisational procedures such as staff planning and/or by delegation of documentation, administrative work and duties to other professions. In addition, trainings for attending physicians and chief physicians may improve perceived quality of leadership and may create a culture of effective feedback.

In general, hospital organisation should create a climate for constant learning and exchange of knowledge. There are a number of individual and/or setting-based strategies and interventions to support residents in this way: for example, mentoring programmes and

individual training. Three forms of support measures could be used: (1) emotional (verbal and nonverbal communication of support), (2) informational (provision of information used to guide or advice) and (3) instrumental (provision of material goods, physical assistance).⁷³ Moreover, the improvement of job autonomy during residency could be established via implementing structured work schedules during medical training for residents in order to achieve anticipated performance and training goals. In addition, job task rotation, job enlargement and job enrichment could improve perceived job autonomy and individual development. All three forms give employees the opportunity to perform various tasks and to develop skills in more than one area of expertise.^{74 75}

CONCLUSION

In this study, we presented differences in working conditions, occupational distress, depressive symptoms and work ability among physicians working in different medical specialties. In addition, the meaning of working conditions for aspects of work ability and mental health was described. Improving working conditions and mental health promotion, particularly reducing stressful working demands and organisation of work schedules, may have beneficial effects on physicians' mental health, job performance and quality of care.

Longitudinal studies are necessary to confirm our results. In addition, more empirical studies including other work, social and individual factors are needed to reach a better understanding of work-related mental health problems.

Author affiliations

¹Institute of Occupational Medicine, Charité-Universitätsmedizin Berlin, Free University and Humboldt University, Berlin, Germany

²Institute of Occupational Medicine, Social Medicine and Environmental Medicine, Goethe-University, Frankfurt am Main, Germany

³Institute for Occupational and Maritime Medicine (ZfAM), University Medical Center Hamburg-Eppendorf, Hamburg, Germany

Acknowledgements The authors thank Averil Harrison-Thümmel for language editing.

Contributors MB and SM designed the study. SM and MB performed the investigation. SM and MB analysed the data. MB, KV and SM wrote the manuscript. MB, SM, KV, BK and DAG interpreted the data and contributed substantially to its revision.

Funding This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Ethics approval The ethical aspects were in full agreement with the Helsinki declaration. This study was approved by the local Institutional Review Board (EK-08-2011-83).

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement No additional data are available.

Open Access This is an Open Access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided

the original work is properly cited and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>

REFERENCES

1. Janus K, Amelung VE, Baker LC, *et al.* Job satisfaction and motivation among physicians in academic medical centers: insights from a cross-national study. *J Health Polit Policy Law* 2008;33:1133–67.
2. Montgomery A, Spănu F, Băban A, *et al.* Job demands, burnout, and engagement among nurses: a multi-level analysis of ORCAB data investigating the moderating effect of teamwork. *Burn Res* 2015;2:71–9.
3. Siegrist J. [The changing role of physicians]. *Bundesgesundheitsblatt Gesundheitsforschung Gesundheitsschutz* 2012;55:1100–5.
4. Weigl M, Muller A, Sevdalis N, *et al.* Relationships of multitasking, physicians' strain, and performance: an observational study in ward physicians. *J Patient Saf* 2013;9:18–23.
5. Tanner G, Bamberg E, Kozak A, *et al.* Hospital physicians' work stressors in different medical specialties: a statistical group comparison. *J Occup Med Toxicol* 2015;10:7.
6. Mache S, Bernburg M, Scutaru C, *et al.* An observational real-time study to analyze junior physicians' working hours in the field of gastroenterology. *Z Gastroenterol* 2009;47:814–18.
7. Mache S, Vitzthum K, Kusma B, *et al.* Pediatricians' working conditions in German hospitals: a real-time task analysis. *Eur J Pediatr* 2010;169:551–5.
8. Mache S, Vitzthum K, Nienhaus A, *et al.* Physicians' working conditions and job satisfaction: does hospital ownership in Germany make a difference? *BMC Health Serv Res* 2009;13:148.
9. Mache S, Kelm R, Bauer H, *et al.* General and visceral surgery practice in German hospitals: a real-time work analysis on surgeons' work flow. *Langenbecks Arch Surg* 2010;395:81–7.
10. Mache S, Busch D, Vitzthum K, *et al.* Cardiologists' workflow in small to medium-sized German hospitals: an observational work analysis. *J Cardiovasc Med* 2011;12:475–81.
11. Kloss L, Musial-Bright L, Klapp BF, *et al.* Observation and analysis of junior OB/GYNs' workflow in German hospitals. *Arch Gynecol Obstet* 2010;281:871–8.
12. von dem Knesebeck O, Klein J, Grosse Frie K, *et al.* Psychosocial stress among hospital doctors in surgical fields: results of a nationwide survey in Germany. *Dtsch Arztebl Int* 2010;107:248–53.
13. Marchand A, Durand P, Haines V, *et al.* The multilevel determinants of workers' mental health: results from the SALVEO study. *Soc Psychiatry Psychiatr Epidemiol* 2015;50:445–59.
14. Demerouti E, Bakker AB, Nachreiner F, *et al.* The Job Demands-Resources model of burnout. *J Appl Psychol* 2001;86:499–512.
15. Karasek RA. Job demands, job decision latitude and mental strain: implications for job redesign. *Adm Sci Q* 1979;24:285–308.
16. Siegrist J. Effort-reward imbalance at work and depression: current research evidence. *Nervenarzt* 2013;84:33–7.
17. Strazdins L, D'Souza RM, Lim LL, *et al.* Job strain, job insecurity, and health: rethinking the relationship. *J Occup Health Psychol* 2004;9:296–305.
18. Åkerstedt T, Knutsson A, Westerholm P, *et al.* Sleep disturbances, work-stress and work hours: a cross-sectional study. *J Psychosom Res* 2002;53:741–8.
19. Demerouti E, Shimazu A, Bakker AB, *et al.* Work-self balance: a longitudinal study on the effects of job demands and resources on personal functioning in Japanese working parents. *Work Stress* 2013;27:223–43.
20. Demerouti E, Peeters MC, van der Heijden BI. Work-family interface from a life and career stage perspective: the role of demands and resources. *Int J Psychol* 2012;47:241–58.
21. Ford MT, Heinen BA, Langkamer KL. Work and family satisfaction and conflict: a metaanalysis of cross-domain relations. *J Appl Psychol* 2007;92:57–80.
22. Hammer LB, Kossek EE, Anger WK, *et al.* Clarifying work-family intervention processes: the roles of work-family conflict and family-supportive supervisor behaviors. *J Appl Psychol* 2011;96:134–50.
23. Schaufeli WB, Bakker AB. Job demands, job resources, and their relationship with burnout and engagement. *J Organ Behav* 2004;25:293–315.
24. Johnson JV, Hall EM. Job strain, work place social support and cardio-vascular disease: a cross-sectional study of a random sample of the Swedish population. *Am J Public Health* 1988;78:1336–42.
25. Thomas LT, Ganster DC. Impact of family-supportive work variables on work-family conflict and strain: a control perspective. *J Appl Psychol* 1995;80:6–15.

26. Duxbury L, Higgins C, Lee C. Work-family conflict: a comparison by gender, family type, and perceived control. *J Fam Issues* 1994;15:449–66.
27. Wallace JE. Job stress, depression and work-to-family conflict: a test of the strain and buffer hypotheses. *Rel Ind/Ind Relat* 2005;60:510–15.
28. Grönlund A. More control, less conflict? Job demand-control, gender and work-family conflict. *Gender Work Organ* 2007;14:476–97.
29. Ilmarinen J, Tempel J. *Arbeitsfähigkeit 2010: Was können wir tun, damit Sie gesund bleiben?* Hamburg: VSA-Verlag, 2002.
30. van den Berg TI, Elders LA, de Zwart BC, et al. The effects of work-related and individual factors on the Work Ability Index: a systematic review. *Occup Environ Med* 2009;66:211–20.
31. Kujala V, Tammelin T, Remes J, et al. Work ability index of young employees and their sickness absence during the following year. *Scand J Work Environ Health* 2006;32:75–84.
32. Feldt T, Hyvonen K, Makikangas A, et al. Development trajectories of Finnish managers' work ability over a 10-year follow-up period. *Scand J Work Environ Health* 2009;35:37–47.
33. Mata DA, Ramos MA, Bansal N, et al. Prevalence of depression and depressive symptoms among resident physicians: a systematic review and meta-analysis. *JAMA* 2015;314:2373–83.
34. Ruitenburt MM, Frings-Dresen MH, Sluiter JK. The prevalence of common mental disorders among hospital physicians and their association with self-reported work ability: a cross-sectional study. *BMC Health Serv Res* 2012;12:292–8.
35. Hughes PH, Storr CL, Brandenburg NA, et al. Physician substance use by medical specialty. *J Addict Dis* 1999;18:23–37.
36. Buddeberg-Fischer B, Klaghofer R, Stamm M, et al. Work stress and reduced health in young physicians: prospective evidence from Swiss residents. *Int Arch Occup Environ Health* 2008;82:31–8.
37. Bundesamt S. Gesundheit. Grunddaten der Krankenhäuser. Im Internet. https://www.destatis.de/DE/Publikationen/Qualitaetsberichte/Gesundheitswesen/Grunddatenkrankenhaeuser.pdf?__blob=publicationFile
38. Tritt K, von Heymann F, Zaudig M, et al. Development of the "ICD-10-Symptom-Rating" (ISR) questionnaire. *Z Psychosom Med Psychother* 2008;54:409–18.
39. Bungard W, Kohnke O. *Zielvereinbarungen erfolgreich umsetzen-Konzepte, Ideen und Praxisbeispiele auf Gruppen- und Organisationsebene*. Wiesbaden: Gabler, 2002.
40. Kristensen TS, Hannerz H, Hogh A, et al. 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.
41. Nuebling M, Hasselhorn HM. The Copenhagen Psychosocial Questionnaire in Germany: from the validation of the instrument to the formation of a job-specific database of psychosocial factors at work. *Scand J Public Health* 2010;38:120–4.
42. Levenstein S, Prantera C, Varvo V, et al. Development of the perceived stress questionnaire: a new tool for psychosomatic research. *J Psychosom Res* 1993;37:19–32.
43. Bortz J, Döring N. *Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler*. Berlin, Heidelberg, New York: Springer, 2002.
44. Bauer J, Groneberg D. Distress among surgeons—a study in German Hospitals. *Zentralbl Chir* Published Online First: 7 Jan 2014. doi:10.1055/s-0033-1350893
45. Angerer P, Petru R, Weigl M, et al. Arbeitsbedingungen und Befinden von Ärztinnen und Ärzten. In: Fuchs C, Kurth BM, Scriba PC, eds. *Report Versorgungsforschung*. Köln: Deutscher Ärzte Verlag, 2009:175–84.
46. Ruitenburt MM, Frings-Dresen MH, Sluiter JK. Physical job demands and related health complaints among surgeons. *Int Arch Occup Environ Health* 2013;86:271–9.
47. Weigl M, Schneider A, Hoffmann F, et al. Work stress, burnout, and perceived quality of care: a cross-sectional study among hospital pediatricians. *Eur J Pediatr* 2015;174:1237–46.
48. Ohlander J, Weigl M, Petru R, et al. Working conditions and effort-reward imbalance of German physicians in Sweden respective Germany: a comparative study. *Int Arch Occup Environ Health* 2015;88:511–19.
49. Arvey RD, Murphy KR. Performance evaluation in work settings. *Annu Rev Psychol* 1998;49:141–68.
50. Smithers JW, London M, Reilly R. Does performance improve following multisource feedback? A theoretical model, meta-analysis and review of empirical findings. *Personnel Psychol* 2005;58:33–66.
51. West CP, Halvorsen AJ, Swenson SL, et al. Burnout and distress among internal medicine program directors: results of a national survey. *J Gen Intern Med* 2013;28:1056–63.
52. Peisah C, Latif E, Wilhelm K, et al. Secrets to psychological success: why older doctors might have lower psychological distress and burnout than younger doctors. *Aging Ment Health* 2009;13:300–7.
53. Arruda A, Portela L, Griep R, et al. The relationship between night work and mental health among hospital workers. *Occup Environ Med* 2014;71(Suppl 1):A87–8.
54. Sell L, Bültmann U, Ruguliesm R, et al. Predicting long-term sickness absence and early retirement pension from self-reported work ability. *Int Arch Occup Environ Health* 2009;82:1133–8.
55. Mache S, Danzer G, Klapp BF, et al. Surgeons' work ability and performance in surgical care: relations between organisational predictors, work engagement and work ability. *Langenbecks Arch Surg* 2013;398:317–25.
56. Kokkinen L, Konu A. Work ability of employees in changing social services and health care organizations in Finland. *Int J Occup Med Environ Health* 2012;25:151–65.
57. Hilton MF, Whiteford HA. Associations between psychological distress, workplace accidents, workplace failures and workplace successes. *Int Arch Occup Environ Health* 2010;83:923–33.
58. Landrigan CP, Rothschild JM, Cronin JW, et al. Effect of reducing interns' work hours on serious medical errors in intensive care units. *N Engl J Med* 2004;351:1838–48.
59. Park C, Lee YJ, Hong M, et al. A multicenter study investigating empathy and burnout characteristics in medical residents with various specialties. *J Korean Med Sci* 2016;31:590–7.
60. Rabe M, Giacomuzzi S, Nübling M. Psychosocial workload and stress in the workers' representative. *BMC Public Health* 2012;12:34.
61. Tokuda Y, Hayano K, Ozaki M, et al. The interrelationships between working conditions, job satisfaction, burnout and mental health among hospital physicians in Japan: a path analysis. *Ind Health* 2009;47:166–72.
62. Anagnostopoulos F, Demerouti E, Sykioti P, et al. Factors associated with mental health status of medical residents: a model-guided study. *J Clin Psychol Med Settings* 2015;22:90–109.
63. Marchand A, Blanc MÈ. Occupation, work organisation conditions and the development of chronic psychological distress. *Work* 2011;40:425–35.
64. Cadieux N, Marchand A. Psychological distress in the workforce: a multilevel and longitudinal analysis of the case of regulated occupations in Canada. *BMC Public Health* 2014;14:808.
65. Alegre I, Mas-Machuca M, Berbegal-Mirabent J. Antecedents of employee job satisfaction: do they matter? *J Bus Res* 2016;69:1390–5.
66. Lee BJ, Lamichhane DK, Jung DY, et al. Psychosocial factors and psychological well-being: a study from a nationally representative sample of Korean workers. *Ind Health* Published Online First: 26 Dec 2015. doi:10.2486/indhealth.2015-0191
67. Dyrbye LN, Varkey P, Boone SL, et al. Physician satisfaction and burnout at different career stages. *Mayo Clin Proc* 2013;88:1358–67.
68. Velez MJ, Neves P. Abusive supervision, psychosomatic symptoms, and deviance: can job autonomy make a difference? *J Occup Health Psychol* Published Online First: 7 Dec 2015. doi:10.1037/a0039959
69. Fischer N, Degen C, Li J, et al. Associations of psychosocial working conditions and working time characteristics with somatic complaints in German resident physicians. *Int Arch Occup Environ Health* 2016;89:583–92.
70. Wang JL, Smailes E, Sareen J, et al. Three job-related stress models and depression: a population-based study. *Soc Psychiatry Psychiatr Epidemiol* 2012;47:185–93.
71. Rusli BN, Edimansyah BA, Naing L. Working conditions, self-perceived stress, anxiety, depression and quality of life: a structural equation modelling approach. *BMC Public Health* 2008;6:48.
72. Koreki A, Nakagawa A, Abe A, et al. Mental health of Japanese psychiatrists: the relationship among level of occupational stress, satisfaction and depressive symptoms. *BMC Res Notes* 2015;8:96.
73. Taylor SE. Social support: a review. In: Friedman MS, eds. *The handbook of health psychology*. New York: Oxford University Press, 2011:189–214.
74. van den Berg TI, Robroek SJ, Plat JF, et al. The importance of job control for workers with decreased work ability to remain productive at work. *Int Arch Occup Environ Health* 2011;84:705–12.
75. Parker SK. Enhancing role breadth self-efficacy: the roles of job enrichment and other organizational interventions. *J Appl Psychol* 1998;83:835–52.