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## Chronic stress experience in young physicians: impact of person- and workplace-related factors

Buddeberg-Fischer, B ; Stamm, M ; Buddeberg, C ; Klaghofer, R

**Abstract:** **OBJECTIVES:** The objectives of the present study are to investigate and compare the relative impact of workplace-related factors and personal characteristics on chronic psychosocial stress experience in young physicians. **METHODS:** In a prospective study, a cohort of Swiss medical school graduates was followed up, beginning in 2001. In their fourth and eighth year after graduation, 443 physicians assessed their workplace conditions, the experienced effort-reward imbalance, the received professional and emotional support as well as their personal characteristics. The chronic stress experience was measured by the Trier Inventory for the Assessment of Chronic Stress-Screening Subscale of Chronic Stress (TICS-SCSS), 7 years after graduation. The model of influencing factors on chronic stress experience was tested with a hierarchical regression analysis. **RESULTS:** The mean in chronic stress (TICS-SCSS) in our study sample is significantly higher ( $p < 0.001$ ) compared to an age-matched population representative sample. In the prediction of chronic stress, the workplace-related factor effort-reward imbalance as well as the personal characteristic overcommitment turned out to be the most important risk factors. Stress protective are high satisfaction with career support, sense of coherence and occupational self-efficacy. The whole set of variables used in the regression model explains 51% of the variance of chronic stress experience. In the prediction of chronic stress, gender has no significant moderator effect. **CONCLUSIONS:** It is a matter of concern that young physicians report to feel chronically stressed early in their professional career. Actions have to be taken to reduce the stress level mainly in regard to re-establish reciprocity between perceived effort invested and rewards received, in the form of esteem, monetary gain and career opportunities including job security.

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# Chronic stress experience in young physicians: impact of person- and workplace-related factors

Barbara Buddeberg-Fischer<sup>\*1</sup>, Martina Stamm<sup>1</sup>, Claus Buddeberg<sup>1</sup>, Richard Klaghofer<sup>1</sup>

Address: <sup>1</sup>Department of Psychosocial Medicine, Zurich University Hospital,  
Haldenbachstrasse 18, CH-8091 Zurich, Switzerland

\*Corresponding author:

Prof. Dr. med. Barbara Buddeberg-Fischer

E-mail: [barbara.buddeberg@usz.ch](mailto:barbara.buddeberg@usz.ch);

Tel.: 0041-44-255 51 27

Fax: 0041-44-255 43 84

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## **Abstract**

**Objectives** of the present study are to investigate and compare the relative impact of workplace-related factors and personal characteristics on chronic psychosocial stress experience in young physicians.

**Methods:** In a prospective study a cohort of Swiss medical school graduates was followed up, beginning in 2001. In their fourth and eighth year after graduation, 443 physicians assessed their workplace conditions, the experienced effort-reward imbalance, the received professional and emotional support as well as their personal characteristics. The chronic stress experience was measured by the Trier Inventory for the Assessment of Chronic Stress – Screening Subscale of Chronic Stress (TICS-SCSS), seven years after graduation. The model of influencing factors on chronic stress experience was tested with a hierarchical regression analysis.

**Results:** The mean in Chronic Stress (TICS-SCSS) in our study sample is significantly higher ( $p < 0.001$ ) compared to an age-matched population representative sample. In the prediction of chronic stress, the workplace-related factor effort-reward imbalance as well as the personal characteristic overcommitment turned out to be the most important risk factors. Stress protective are high satisfaction with career support, sense of coherence and occupational self-efficacy. The whole set of variables used in the regression model explains 51% of the variance of chronic stress experience. In the prediction of chronic stress, gender has no significant moderator effect.

**Conclusions:** It is a matter of concern that young physicians report to feel chronically stressed early in their professional career. Actions have to be taken to reduce the stress level mainly in regard to re-establish reciprocity between perceived effort invested and rewards received, in the form of esteem, monetary gain, and career opportunities including job security.

**Keywords: Chronic stress experience; young physicians; workplace-related factors;  
Effort-Reward Imbalance model; person-related characteristics**

## Introduction

Stress at work can be conceptualized as an interaction of a person with the demands of his/her personal and work environment (Richter & Hacker, 1998). In medicine, various workplace-related stressors are known: the quantity of work, e.g. long working hours and on-call duties, the quality of work, e.g. high standard and complexity of patient care, diversity of the demands, e.g. empathy with patients and high technological skills, time-pressure, coping with life-threatening situations, and compatibility with other demands, e.g. work-home interference (Buddeberg-Fischer, Dietz, Klaghofer, & Buddeberg, 2006; Roevik, Tyssen, Gude, et al., 2007). According to Siegrist's Effort-Reward Imbalance model (Siegrist, 1996), we hypothesize that jobs characterized by a perceived imbalance between high effort and low rewards elicit stress. The experience of 'high cost / low gain' at work (extrinsic component in stress experience) is frequent in people who exhibit a specific cognitive and motivational pattern of coping with demands characterized by excessive work-related commitment ('overcommitment': intrinsic component in stress experience) (Siegrist & Marmot, 2004). Overcommitted men and women suffer from inappropriate perceptions of demands and of their own coping resources more often than their less involved colleagues, because perceptual distortion prevents them from accurately assessing cost-gain relations (Preckel, von Känel, Kudielka, & Fischer, 2005). As known, physicians show a high professional commitment (Armstrong, et al., 2009). As long as they get the expected appreciation for their efforts, they have a high satisfaction in their profession.

Beyond the required balance between effort and reward, mentorship has been identified not only to be a relevant component of career guidance but also to be an important factor for young physicians to feel professionally and emotionally supported, factors which are decisive for not feeling stressed (Blickle, Kuhnert, & Rieck, 2003).

Furthermore, as known from recent stress research (Korotkov, 2008; McManus, Keeling, & Paice, 2004; Roevik, Tyssen, Gude, et al., 2007; Semmer, 2006; Vollrath, 2001; Vollrath &

Torgersen, 2000), subjects experience stress and deal with it differently, depending on their personal characteristics: they perceive specific aspects of a given situation as more or less stressful; they react differently to situations, and show different coping tendencies. Certain personal characteristics like high sense of coherence and self-efficacy proved to be important to cope with chronic stress (Höge & Büssing, 2004). These factors focus on an individual's salutogenetic potential and a subject's self-efficacy related to his/her occupation. Other studies investigating the impact of personality traits on chronic stress experience in physicians (Firth-Cozens, 1997; Höge & Büssing, 2004; McManus, et al., 2004; Tyssen, Vaglum, Groenvold, & Ekeberg, 2005) focus on pathogenetic characteristics such as neuroticism, vulnerability, and self-criticism. As mentioned, overcommitment is a further personal risk factor to experience the demands at work as stressful (Preckel, et al., 2005; Siegrist & Marmot, 2004).

There are some studies reporting on young physicians feeling chronically stressed early in their professional career (Buddeberg-Fischer, Klaghofer, & Buddeberg, 2005; Buddeberg-Fischer, Klaghofer, Stamm, Siegrist, & Buddeberg, 2008; Buddeberg-Fischer, Stamm, et al., 2008; Firth-Cozens, 2003; Roevik, Tyssen, Hem, et al., 2007; Tyssen, Vaglum, Groenvold, & Ekeberg, 2000). These findings are a matter of concern. It is known that chronically stressed physicians are affected in their well-being and life satisfaction with a negative impact on patient care. Additionally, distressed physicians may be distracted from staying in clinical work (Williams, Rondeau, Xiao, & Francescutti, 2007; Williams, Manwell, Konrad, & Linzer, 2007).

Most of the studies mentioned investigate either the impact of work-related factors or the impact of personal characteristics on chronic stress experience in physicians. Studies focussing on both these components are lacking. Therefore, the aim of the present study is to investigate and compare the relative impact of these components on chronic stress experience in young physicians eight years after graduation (Figure 1).

[Figure 1]

## Methods

### Study design, sample development, and study sample

The present study is part of an ongoing prospective survey of a cohort of graduates of the three medical schools in German speaking Switzerland (*SwissMedCareer Study*), beginning in 2001 (T1). All of the 1004 registered final-year students were sent a letter explaining the study design, accompanied by a recommendation letter of the deans of the three medical schools, and the baseline questionnaire; the students' addresses were provided by the university boards. To ensure participants' anonymity, the returned questionnaires are only identified by a code. The respondents send their addresses to an independent address-administration office, allowing for follow-up. The study protocol was approved by the ethical committee of Zurich University.

In the first assessment (T1, in 2001), 711 graduates participated (Buddeberg-Fischer, Klaghofer, Abel, & Buddeberg, 2003). Subjects were re-evaluated every two years (Buddeberg-Fischer, Klaghofer, Stamm, & Buddeberg, 2009). The present paper refers to results of the third (T3) and fifth assessment (T5); the latter was conducted in 2009, seven years after the participants' graduation.

The *study sample* consists of 443 physicians (233 females, 52.6%; 210 males, 47.4%) participating at T3 and T5 with a full data set, excluded were 31 physicians taking a break from work at T5, mainly because of children. The mean age of the participants at T5 is 35.2 years (SD 2.2 years, range 31 – 50 years). Of the residents 388 (87.8%) have a stable partnership, of whom 227 are married. Eighty-three (35.6%) of the females, and 81 (38.8%) of the males have children.

### Instruments

In the following, the applied instruments to measure the constructs are described as listed in Figure 1. All instruments are *self-assessment scales*. Cronbach's alpha values for the present

study are given in Table 1, ranging from 0.63 (Effort-Reward Imbalance) to 0.93 (Mentoring-Experience-Scale). All workplace-related variables are assessed at T5. In residency, the young doctors change their workplace almost every year. Therefore, actual stress experience at work has to be analyzed in respect of the actual workplace. As known from other studies (McManus, et al., 2004; R Tyssen, et al., 2005), personal characteristics have a high predictive value on stress experience, therefore we included data of personal characteristics from T3 testing their impact on chronic stress experience four years later.

### **Outcome**

- *The Trier Inventory for the Assessment of Chronic Stress (TICS)* at T5 (Schulz, Schlotz, & Becker, 2004) measures overall chronic stress by means of a five-point Likert scale ranging from 0 to 4 (never – very often). Subjects are asked whether they have had a certain stress experience or have found themselves in a particular stress situation over the past three months. The TICS consists of 57 items yielding the following dimensions extracted by factor analysis: *work overload, worries, social stress, lacking social recognition, work discontent and intrusive memories*. Twelve of the 57 items constitute the *Screening Subscale of Chronic Stress (TICS-SCSS)* used in this study. TICS screening items refer to aspects such as being afraid, that something unpleasant may happen, not being able to suppress worrying thoughts or not being able to cope with all duties. The TICS-SCSS is a sum score of the 12 items and linearly transformed into standard T-values (mean = 50, SD = 10). Higher values indicate greater stress.

### **Workplace-related factors at T5**

- *Workplace (hospital vs. other medical workplace)*
- *Employment in percent of fulltime (100%)*
- *Workload: Working hours per week*
- *Effort-Reward Imbalance at Work Questionnaire ERI-Q (Fragebogen zu beruflichen Gratifikationskrisen, five-point Likert scales)* (Rödel, Siegrist, Hessel, & Brähler, 2004;



- *Mentor-Protégé Relationships Questionnaire* (Blickle, et al., 2003) consists of five scales (Likert scale 0 – 4) measuring different types of career-support. We used the *Networking Scale* (4 items) and the *Support in career planning* scale (3 items). These two scales describe crucial aspects of mentoring. Our data analyses show that the two scales are highly correlated ( $r = 0.71$ ). We therefore combined them into one scale named '*Mentoring-Experience Scale*', having a high Cronbach's alpha = 0.93. We further used the *Emotional Support Scale* (4 items).
- *Question on Satisfaction with Career Support* (Likert scale 1 – 7, 1 = very unsatisfied – 7 = very satisfied).

### **Person-related characteristics**

- *Questions concerning socio-demographic data* at T5
- *Sense of Coherence Scale (SOC-13)* at T3 (Antonovsky, 1987) (seven-point Likert scale), a measure of a person's resistance to stress and his/her ability to manage stress.
- *Occupational Self-Efficacy Expectation Questionnaire* at T3 (Fragebogen zu beruflichen Selbstwirksamkeitserwartungen (BSW) (Abele, Stief, & Andrä, 2000) (6 items, five-point Likert scale): The BSW questionnaire is a measure of a person's general occupational self-efficacy expectations.

- *Overcommitment* at T5 (Siegrist, et al., 2004) (6 items, four-point Likert scale) is part of the Effort-Reward Imbalance at Work Questionnaire. It focuses on the intrinsic or personal component of the model which stands for a specific, individual pattern of coping with the various job demands and eliciting rewards. It reflects a respondent's (in)ability to withdraw from work obligations and develop a more distant attitude towards job requirements.

### **Statistical analyses**

All analyses were carried out with SPSS for windows, release 15 (SPSS Inc., Chicago, Ill.).

Descriptive statistics are given in terms of counts and percentages, means and standard deviations respectively. Cronbach's alpha was used to estimate the reliability of the scales.

The difference between the mean in TICS-SCSS in our study and a representative population sample was investigated with z-test. Bivariate correlations between independent variables and outcome were computed using Pearson correlations. A hierarchical regression analysis was conducted to investigate the associations between workplace-related factors, personal characteristics, and chronic stress experience: In a first step we included the workplace-related factors 'Workplace' (hospital vs. other medical workplace), 'Employment' in percent of fulltime (100%)', 'workload' (in hours per week), 'Effort-Reward Imbalance', 'Mentoring experience', 'Emotional support', and 'Satisfaction with Career Support'. In a second step we additionally included the personal characteristics 'Gender', 'Sense of Coherence', 'Occupational Self-efficacy Expectation', and 'Overcommitment' controlled for workplace-related factors. Beta-weights and 95% confidence intervals (Beta +/- SE(beta) x 1.96) are reported as well as adjusted R-square, F-statistics, and change in R-square and F. Furthermore we additionally included all interaction terms between gender and the workplace-related factors, and personal characteristics respectively in the regression model to investigate the moderator effect of gender.

## Results

Descriptive statistics of the used scales are given in Table 1. The mean in Chronic Stress (TICS-SCSS) in our study sample of young physicians is significantly higher ( $p < 0.001$ ) compared to the age-matched representative population sample (63.51 vs. 50) (Schulz, et al., 2004). Seven years after graduation, the majority of young physicians *work in hospital* (90.7%), only few work in private practice or in other medical fields. Most of the cohort doctors *work full-time* ( $n = 343, 77.4\%$ ); of the female physicians with children ( $n = 83$ ), 60 (72.3%) work part-time. The Swiss federal contract on working hours for residents and senior physicians, in place since 2005, limits the workload to 50 h/week. Nevertheless the mean *workload* of study participants is 54.5 (SD 9.0) hours per week. A lack of *reciprocity of effort expended and reward received* (ERI-Quotient  $> 1$ ) show 87 (18.5%) participants. The *gender* distribution in the study sample is comparable to the overall gender distribution in the age-matched group of working doctors (Foederatio Medicorum Helveticorum, 2009). The mean of the *Sense of Coherence Scale* is comparable with the age-matched representative population sample (mean 5.22 vs. 5.08) (Singer & Brähler, 2007).

[Table 1]

The *bivariate correlation analyses* (Table 2) show significant correlations between all independent variables and the outcome variable for chronic stress, except the workplace and the employment in percent of fulltime. The *hierarchical regression analysis* (Table 2) indicates that in regard to workplace-related factors the Effort-Reward Imbalance is a significant risk factor for stress, while Satisfaction with Career Support reveals to be stress protective. Controlled for workplace factors, the personal characteristics Sense of Coherence and Occupational Self-Efficacy Expectation have a significant protective impact on chronic stress experience, while Overcommitment proves to be a high risk factor. No interaction term between gender and workplace-related factors, and personal characteristics respectively is significant (all  $p$ -values  $> 0.05$ , change in R-square = 0.01,  $p = 0.281$ ), i.e. gender does not

play a significant role as a moderator variable. The value of the adjusted R-square (0.51) illustrates that the independent variables explain a significant percentage of variance in chronic stress experience.

[Table 2]

## **Discussion**

The present study is part of an ongoing prospective survey of a cohort of graduates of the three medical schools in German-speaking Switzerland, beginning in 2001 (T1) (Buddeberg-Fischer, et al., 2009). The paper reports data of the third (T3) and fifth (T5) assessment, conducted in the participants' fourth (T3 in 2005) and eighth year (T5 in 2009) after graduation. 443 young physicians participated in both assessments providing a complete data set.

### **Chronic stress experience**

Most studies on stress experience in physicians focus either on general workplace conditions (Höge & Büssing, 2004; Roevik, Tyssen, Hem, et al., 2007; Tyssen, et al., 2000), on Siegrist's Effort-Reward Imbalance model (Buddeberg-Fischer, Klaghofer, et al., 2008; Li, Yang, & Cho, 2006; Rockenbauch, Meister, Schmutzer, & Alfermann, 2006) or on personality traits (Firth-Cozens, 1997; Tyssen, et al., 2005). The present study investigates the combination of these dimensions in their impact on chronic stress experience.

As reported by our research group and other authors (Buddeberg-Fischer, et al., 2005; Buddeberg-Fischer, Klaghofer, et al., 2008; Firth-Cozens, 1997; Linzer, et al., 2002; Tyssen, et al., 2000), young physicians experience a high level of chronic stress at work. The proportion of chronically stressed physicians is remarkably consistent over time, and amounts up to about 30 percent of doctors (Buddeberg-Fischer, Klaghofer, et al., 2008; Buddeberg-Fischer, Stamm, et al., 2008; Firth-Cozens, 2001). Accordingly, the mean level of the

physicians' chronic stress experience in the present study is more than one standard deviation above the mean level of stress in a population representative sample.

### **Associations between workplace-related factors, personal characteristics and chronic stress experience**

In our hierarchical regression model as far as the workplace-related factors are concerned the *Effort-Reward Imbalance* reveals to be a significant risk factor for stress experience, as described in Siegrist's model (Siegrist, 1996). As long as physicians receive adequate reward they might cope with high efforts in their work. The *satisfaction with career support* has also a significant association with stress experience. Linzer et al. (2002) reported similar findings in their physician work-life study. In our study, fulltime or part-time *employment* and *workload* are not associated with chronic stress. Similarly, in the 10-year follow up study of general practitioners in Great Britain, Firth-Cozens did not find current stress levels to be correlated with hours worked in the past week (Firth-Cozens, 1997). While *mentoring experience* and *emotional support* are significantly associated with chronic stress in the bivariate analyses, these factors do not reach the level of significance in the multivariate model. Satisfaction with career support seems to have a higher impact suppressing the effect of the other two work-related factors.

The personal characteristics increase the explanatory power of the regression model.

*Overcommitment* reveals to be the most relevant risk factor for chronic stress experience in physicians. This finding supports results from our and other studies (Buddeberg-Fischer, Klaghofer, et al., 2008; Head, et al., 2007; Joksimovic, Starke, von dem Knesebeck, & Siegrist, 2002; Li, et al., 2006; Preckel, et al., 2005) that highly overcommitted subjects report high levels of stress and are more likely to experience vital exhaustion. Furthermore, the *Sense of Coherence* proves to be strongly stress-protective. In a cross-sectional study, Höge & Büssing (2004) also reported the sense of coherence having a protective impact on the work stressor-strain relationship. In previous studies within the prospective SwissMedCareer Study

(Buddeberg-Fischer, et al., 2009), the sense of coherence proved to be a protective factor also for health and life satisfaction (Buddeberg-Fischer, Stamm, et al., 2008; Buddeberg-Fischer, Stamm, Buddeberg, & Klaghofer, 2009). Our results are consistent with Antonovsky's salutogenetic concept (Antonovsky, 1987). Admittedly there is some discussion about the sense of coherence scale being inadvertently measuring negative affectivity, especially because some of the SOC items are negatively formulated (Höge & Büssing, 2004). It has to be considered, however, that the sense of coherence is a complex construct which is above the trait level described by Struempfer, Gouws, & Viviers (1998a, 1998b). As further personal characteristic *Occupational self-efficacy expectation* turns out to be stress-protective, but with lower beta weights than the sense of coherence, i.e. the sense of coherence plays a more important role in coping with stress. This might be explained by the sense of coherence being a broader construct, while occupational self-efficacy expectation mainly refers to the occupational context (Abele, et al., 2000).

*Gender* is neither a significant predictor for chronic stress nor a significant moderator variable; it does not influence stress experience. That means, the association between work-related factors, personal characteristics and chronic stress are not gender specific. This result can be explained by comparable objective workplace conditions in residency for both genders.

*Summarizing*, both workplace-related factors and personal characteristics have an equally substantial influence on chronic stress experience in residency. This influence is not gender specific.

*Limitations of the study:* It has to be considered that there is a potential conceptual overlap between Chronic Stress, Effort-Reward Imbalance and Sense of Coherence, as well as in the operationalization of the constructs (Höge & Büssing, 2004). Furthermore, the responses of the study participants could be partly explained by individual factors influencing the response pattern in general, i.e. negative affectivity or neuroticism (Watson, Pennebaker, & Folger,

1987). As a consequence this could lead to an overestimation of the common variance between chronic stress and the predictors. However, Spector, Zapf, Chen, & Frese (2000) argued, that partialling out negative affectivity could lead to an underestimation of a person's stress experience. Participants' reports of stressors and strain have to be understood as valid data of their perception and experiences.

## **Conclusion**

Considering the findings of the present study, it is a matter of concern that young physicians report to feel chronically stressed early in their professional career. Therefore, interventions of stress prevention addressing the principal work-related stressors should be implemented.

Primary preventive interventions should focus on giving junior doctors satisfactory professional support and adequate reward. Part of this reward consists in appreciation for the young physicians' professional commitment, so that they feel personally estimated. This kind of appreciation may also have a positive impact on a person's occupational self-efficacy, and contribute to reduce his or her tendency to be overcommitted at work.

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## **Conflict of Interest**

The authors declare that they have no conflict of interest.

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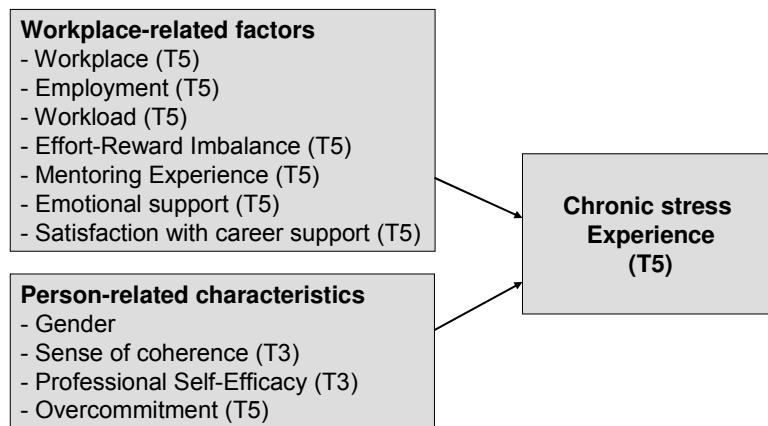
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## Figures



Legend: T3 third assessment  
T5 fifth assessment

Figure 1: Model of influencing factors on chronic stress experience in young physicians

## Tables

Table 1: Descriptive statistics of independent variables and chronic stress experience (TICS-SCSS) (N = 443)

<b>Variable</b>	<b>n (%) / Mean (SD)</b>	<b>Cronbach's Alpha</b>
<b>Workplace-related factors</b>		
Workplace (hospital)	n = 399 (90.1%)	-
Employment in % of fulltime (100%)	90.71 (19.03)	-
Workload (in hours per week)	54.49 (9.01)	-
Effort-Reward Imbalance	0.77 (0.39)	0.63
Mentoring Experience	1.79 (1.03)	0.93
Emotional Support	2.06 (1.04)	0.91
Satisfaction with Career Support	4.20 (1.61)	-
<b>Personal characteristics</b>		
Gender (female)	n = 233 (52.6%)	-
Sense of Coherence	5.22 (0.87)	0.86
Occupational Self-efficacy Expectation	3.73 (0.67)	0.76
Overcommitment	2.11 (0.54)	0.72
<b>Chronic Stress (TICS-SCSS)</b>	<b>63.51 (9.99)</b>	<b>0.91</b>

Table 2: Results of bivariate correlations and hierarchical regression analysis between independent variables and chronic stress experience (TICS-SCSS) (N = 443)

Dependent variable	Bivariate correlation with TICS-SCSS	Beta-weight in multiple regression for TICS-SCSS (step 1)	Beta-weight in multiple regression for TICS-SCSS (step 2)	95%CI for Beta (in step 2)
<b>Step one</b>				
<b>Workplace-related factors</b>				
Workplace (hospital)	0.06	0.06	0.06	-0.01;0.13
Employment in % of fulltime (100%)	0.01	-0.01	-0.03	-0.10;0.05
Workload (in hours per week)	0.16**	0.02	-0.03	-0.10;0.04
<i>Effort-Reward Imbalance</i>	<i>0.43***</i>	<i>0.39***</i>	<i>0.24***</i>	<i>0.17;0.32</i>
Mentoring Experience	-0.23***	-0.08	0.00	-0.09;0.09
Emotional Support	-0.20***	-0.01	-0.01	-0.09;0.07
<i>Satisfaction with Career Support</i>	<i>-0.35***</i>	<i>-0.23***</i>	<i>-0.18***</i>	<i>-0.27;-0.09</i>
Adjusted R <sup>2</sup> = 0.27; F(7,435) = 23.92; p < 0.001				
<b>Step two</b>				
<b>Personal characteristics</b>				
Gender (female)	0.19***		0.07	-0.01;0.14
<i>Sense of Coherence</i>	<i>-0.48***</i>		<i>-0.19***</i>	<i>-0.27;-0.10</i>
<i>Occupational Self-efficacy Expectation</i>	<i>-0.39***</i>		<i>-0.09*</i>	<i>-0.18;-0.01</i>
<i>Overcommitment</i>	<i>0.58***</i>		<i>0.38***</i>	<i>0.30;0.45</i>
R <sup>2</sup> change = 0.24; F Change = 55.85; p < 0.001				
Adjusted R <sup>2</sup> = 0.51; F(11,431) = 42.76; p < 0.001				
*p ≤ 0.05, **p ≤ 0.01, ***p ≤ 0.001				