



Archives of Environmental & Occupational Health

ISSN: 1933-8244 (Print) 2154-4700 (Online) Journal homepage: <https://www.tandfonline.com/loi/vaeh20>

Medical specialty choice and well-being at work: Physician's personality as a moderator

Sari Mullola, Christian Hakulinen, David Gimeno Ruiz de Porras, Justin Presseau, Markus Jokela, Jukka Vänskä, Tiina Paunio & Marko Elovainio

To cite this article: Sari Mullola, Christian Hakulinen, David Gimeno Ruiz de Porras, Justin Presseau, Markus Jokela, Jukka Vänskä, Tiina Paunio & Marko Elovainio (2019) Medical specialty choice and well-being at work: Physician's personality as a moderator, Archives of Environmental & Occupational Health, 74:3, 115-129, DOI: [10.1080/19338244.2018.1448355](https://doi.org/10.1080/19338244.2018.1448355)

To link to this article: <https://doi.org/10.1080/19338244.2018.1448355>



© 2018 The Author(s). Published with license by Taylor & Francis© Sari Mullola, Christian Hakulinen, David Gimeno Ruiz de Porras, Justin Presseau, Markus Jokela, Jukka Vänskä, Tiina Paunio and Marko Elovainio



[View supplementary material](#)



Accepted author version posted online: 09 Mar 2018.
Published online: 03 Apr 2018.



[Submit your article to this journal](#)



Article views: 1869



[View related articles](#)



[View Crossmark data](#)



Citing articles: 1 [View citing articles](#)

Medical specialty choice and well-being at work: Physician's personality as a moderator

Sari Mullola ^{a,b}, Christian Hakulinen^c, David Gimeno Ruiz de Porras^{d,e,f}, Justin Presseau ^{g,h}, Markus Jokela^c, Jukka Vänskäⁱ, Tiina Paunio^{j,k}, and Marko Elovainio^{c,k}

^aFaculty of Educational Sciences, University of Helsinki, Helsinki, Finland; ^bColumbia University Teachers College, New York, NY, USA;

^cDepartment of Psychology and Logopedics, Faculty of Medicine, University of Helsinki, Helsinki, Finland; ^dSouthwest Center for Occupational and Environmental Health (SWCOEH), Department of Epidemiology, Human Genetics and Environmental Science, School of Public Health, The University of Texas Health Science Center at Houston, San Antonio, TX, USA; ^eCenter for Research in Occupational Health (CISAL), Universitat Pompeu Fabra, Barcelona, Spain; ^fCentro de Investigación Biomédica en Red de Epidemiología y Salud Pública (CIBERESP), Madrid, Spain;

^gClinical Epidemiology Program, Ottawa Hospital Research Institute, Ottawa, Canada; ^hSchool of Epidemiology, Public Health, and Preventive Medicine, Ottawa, Canada; ⁱFinnish Medical Association, Helsinki, Finland; ^jDepartment of Psychiatry, University of Helsinki and Helsinki University Hospital, Finland; ^kInstitute for Health and Welfare, Helsinki, Finland

ABSTRACT

We examined whether physicians' personality traits moderate the association between medical specialty and well-being at work. Nationally representative sample of Finnish physicians ($n = 2,815$; 65% women; aged 25–72 years in 2015) was used. Personality was assessed with the shortened Big Five Inventory. Indicators of well-being at work were measured with scales from Work Ability Index, General Health Questionnaire, Jenkins' Sleep Problems Scale and Suicidal Ideation. Higher extraversion, openness to experience and agreeableness showed as personality traits beneficial for higher well-being at work among person-oriented specialties whereas higher conscientiousness but lower openness and agreeableness showed as personality traits beneficial for higher well-being at work among technique-oriented specialties. The role of neuroticism remains minor in general. Physicians' personality traits may moderate the association between medical specialty and well-being at work.

ARTICLE HISTORY

Received 15 November 2017
Accepted 1 March 2018

KEYWORDS

medical specialty; well-being at work; personality traits; psychological distress; work ability

Introduction

Many specialty-related organizational, professional and individual factors, such as employment sector, clinical patient contact, and work style preferences, have been found to contribute to physicians' career choice^{1–6} and well-being at work.^{3,7–12} From individual-level psychological factors, personality traits¹³ have been suggested to be among the most important determinants of work-related well-being.^{8,9,14} Personality traits refers to an individual's affective, experiential, and motivational characteristics that reflect his/her values, attitudes and coping strategies developed through interaction with the surrounding environment.¹⁵ So far however, the existing research considering the role of physician's personality on the association between medical career choices and


well-being at work is highly limited¹⁶ and it has not considered the context dependent effect of different specialties during the analyses.^{17,18} Therefore, the independent contribution made by the certain medical work environment with specialty-related work characteristics (i.e., job demands and resources within the current specialty)¹⁹ on the association of personality with occupational well-being and the question about how personality traits may moderate (i.e., either protect or predispose) the association between the chosen specialty and well-being at work has remained unknown.^{20,21}

In the current study, we examined the role of personality traits as possible moderating factors between physician's specialty and career choice and well-being at work such as work ability, psychological distress, sleeping

CONTACT Sari Mullola, PhD  sari.mullola@helsinki.fi  Faculty of Educational Sciences, University of Helsinki, P.O. Box 9, FIN-00014, Helsinki, Finland.

The authors declare that there are no conflicts of interest.

Color versions of one or more of the figures in the article can be found online at www.tandfonline.com/vaeh.

 Supplemental data for this article can be accessed on the [publisher's website](#).

© 2018 Sari Mullola, Christian Hakulinen, David Gimeno Ruiz de Porras, Justin Presseau, Markus Jokela, Jukka Vänskä, Tiina Paunio and Marko Elovainio. Published with license by Taylor & Francis

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

problems, and suicidal ideation. These four indicators were chosen as well-being outcomes as they have been found to have consequences to physicians' clinical performance and they are also significant indicators of health-system performance and quality as a whole.^{8,9} Higher person-job fit among physicians, in turn, has been suggested to predict higher perceived work ability.²² We also considered two important specialty-related work characteristics such as employment sector (public vs. private) and the amount of clinical patient work as potential confounding variables as they have been found to be associated with physicians' career choice and occupational well-being^{7,12,16,18,23–25} and be tempted by different personalities.^{16,18,23} We based our study on person-job fit theory²⁶ and on differential reactivity model²⁷ considering the moderating role of personality in the association between specialty and well-being at work. The more is known about the individual factors that underlie the association between medical specialty and career choice and well-being at work (i.e., individual characteristics that function either protective or predisposing factors on the associations between job demands and resources and occupational well-being), the more it may be possible to offer early phase information and career counseling that help junior doctors to make robust and successful career decisions that fit their individual characteristics and support their occupational well-being.

Physicians' occupational well-being can be defined by the "complex and multifaceted nature of physician's subjective psychosocial health and wellness"^{8,9,28} that reflects both positive (job resources) and negative (job demands) experiences^{19,27} of being well at work. Work ability refers to a worker's own assessment of his or her actual professional capacity^{8,29,30} whereas psychological distress refers to a continual feeling of anxiety, exhaustion, stress and/or depression.^{9,24,31,32} Sleeping problems refer to insomnia termed as "disorders of initiating and maintaining sleep"^{9,33–35} whereas suicidal ideation refers to having thought or planning to commit suicide during or after long continuum of personal distress.^{8,9,36} Observed decreases in work-related well-being in physicians is as a key concern worldwide, not only for physicians' personal lives and career paths, but for patient care and health systems as a whole.^{8,9} From 30% to 40%^{9,28} and even up to 75%³⁷ of physicians globally suffer from reduced work-related well-being indicated as psychological distress,^{9,24,31,32} sleeping problems,^{9,35} diminished work ability⁸ and suicidal ideations.^{8,9,36} Physicians' suicide rates are estimated to be six times higher compared with the general population.^{8,9,36}

As medical specialties differ in organizational settings (e.g., employment sector), job duties (e.g., patient structure and the amount and type of clinical patient work)

and requisite skills (e.g., person-oriented vs. technique-oriented specialties) even to the extent that they have been considered constituting distinct occupations,³⁸ they create different psychosocial work environment with varying job resources and demands as well.^{1,4,5,19,27,38} This inevitably challenge also physicians' individual characteristics such as personality to fit the specialty-related work environment.^{22,26,38}

The association between psychosocial work characteristics, including job resources and demands,^{19,27} and physician's well-being has yet been well established.^{7–12,22,24,25,39–41} In their recent large review, Oskrochi and colleagues¹² found that specialty-related professional factors such as workload including high work hours and increasing nights on call, for example, were among the most significant risk factors for surgeons' burnout and depression. Perceived work-related resources and demands^{19,27,40} have also been found to be strongly associated with well-being indicators (psychological distress, sleeping problems and job satisfaction) among Finnish physicians⁴⁰ and with perceived work ability among Finnish workers in general.²⁹ Good work ability, in turn, has been associated with a high quality of work, the enjoyment of staying in one's job as well as an active and meaningful retirement.²⁹ Finnish physicians working in the private sector have shown higher job satisfaction and organizational commitment and lower psychological distress and sleeping problems compared with physicians working in the public sector.⁷ Employment sector and employment change has been associated with clinical patient-related psychosocial demands such as time pressure, patient-related stress, distress and work interference with family.²⁵ Psychiatrists have shown higher psychological distress compared with other medical specialists and this has been partly accounted for by high patient-related stress.²⁴ They have also been found to be more likely to change their specialty compared with general practitioners.⁴² Also among Finnish general practitioners, the associations of employment change with distress change and work interference with family change has been partially explained by the changes in time pressure and patient-related stress.²⁵

Work-related factors and practical scenarios associated with public versus private sectors have been found to be associated with the structure and amount of clinical patient work that, in turn, may tempt different personality types.^{16,18,23} According to person-job fit theory,²⁶ personality traits are the most determining individual-level factors in employee's career choice and adaptation to a specific occupation and/or organization, and thus they offer a relevant concept for examining needs-supplies

perspective of person-job fit among medical specialists. A possibility to use one's professional strengths with personal skills and abilities has been found to be the most significant factor for the better person-job fit among physicians.²² Higher person-job fit, in turn, has been associated with higher perceived work ability.²² Although personality differences have been found to exist between physicians who represent for example person-oriented (e.g., Occupational Health, and Psychiatry) vs. technique-oriented (e.g., Surgery and Radiology) medical specialties,^{2,38} only agreeableness of Big Five personality traits has been found to predict significant differences between these two categories.³⁸ Personality traits concerning sociability such as agreeableness, extraversion and openness to experience are suggested becoming predictive for differences in clinical performance and in the applied medical circumstances,¹⁶ due to working environment that requires more interactive, flexible, and stress resistance learning.^{20,21,43} Extraversion, conscientiousness, and neuroticism have been associated with depressive symptoms⁴⁴ and display moderate correlations with job satisfaction across studies and different occupations.⁴⁵

In the present study, we address three main limitations of the extant literature linking physician's personality with the associations between specialty and career choice and well-being at work. First, previous research examining the role of physicians' personality traits on the association between career and specialty choices and well-being at work has focused on academic performances of physicians-in-training and in-practice^{43,46,47} and even then only on a few specialties such as surgery,¹² psychiatry^{24,48} and anesthesiology.⁴⁹ To our knowledge, there are only four prior studies that have examined the associations between physicians' five major personality traits and well-being at work^{11,16-18,50} and solely three of them relate to the physicians *after* medical education.^{11,17,18} In these studies, higher neuroticism and lower conscientiousness were associated with lower well-being in terms of higher perceived stress, emotional exhaustion and overall dissatisfaction with medicine as a career, and higher extraversion and agreeableness were associated with higher well-being, higher work attitudes, and overall satisfaction with medicine.^{11,17,18}

Second, these two above-mentioned studies did not consider the effect of different specialties during the analyses.^{17,18} Therefore, the context dependent contribution made by the certain specialty-related work characteristics (e.g., specialty-related job resources and demands within the specialty, employment sector and clinical patient contact)^{19,27} on the association of personality with physician's well-being at work has remained unknown. This is an important gap in our knowledge as

recent research with future directions postulates that the predictive validity of personality trait on medical career success and occupational well-being is context dependent having both benefits and costs depending on how personality trait is related to the present work environment and circumstances.^{20,21}

Third, particularly the question about how personality traits may moderate (i.e., either protect or predispose) the associations between physician's experienced job demands and resources and well-being at work within the certain specialty has remained unexplored.^{8,9,14} Here according to the differential reactivity model,^{27,51} physician's personality affects his/her reactivity (i.e., the extent to which a physician is likely to show emotional or physical reactions to specialty-related work environment with job demands and resources) in the associations between work characteristics within the chosen specialty and well-being at work.^{27,51} In clinical practice this means that a person with high conscientiousness, for example, may benefit from this personality trait in medical selection⁴³ and experience the current trait as a beneficial job resource that enhance his/her medical knowledge and skills and occupational well-being (e.g., higher work ability and lower psychological distress) also during pre-clinical years, where a more methodical learning approach is needed.^{20,21,52} However, across the changing learning context from pre-clinical years to clinical years when more flexible learning is needed in more stressful working circumstances, the same personality trait may begin to decrease his/her acquisition of clinical knowledge,^{20,21} particularly if the job demands and resources within the chosen specialty do not support the use of strengths related to the current personality trait.^{52,53} This may increase experiences of work-related psychosocial demands such as time pressure, patient-related stress, work interference with family, and diminishing professional identity and lead to lower occupational well-being such as diminished work ability and higher psychological distress and sleeping problems, for example.^{20,21,52}

Another example of the moderating role of personality on the association between work environment and well-being is that individuals' general well-being after unemployment has been found to significantly drop especially among those with higher conscientiousness.^{52,54} Individuals with higher conscientiousness seem to experience setbacks and failure harder than their counterparts with lower conscientiousness.⁵² Hence, although conscientiousness has been found to be the most prominent and reliable personality trait for successful medical career^{16,43} and subjective well-being in general,⁵⁵ it is not beneficial for well-being in all medical circumstances.⁵² Recent research with future directions suggests similar context dependent "bright and dark sides" for other personality traits as well,

such as for neuroticism^{20,21,52} and agreeableness with the facet of empathy,⁵⁶ for example.

The present study

By using a representative sample of Finnish physicians, we examined whether physician's personality traits moderate the association between physician's specialty and career choice and several indicators of well-being at work in terms of work ability, psychological distress, sleeping problems, and suicidal ideation after adjusted for important specialty-related work characteristics such as employment sector and clinical patient work. Figure 1 illustrates the study design with study hypotheses, adapted from "The Differential reactivity model" introduced by Bolger

& Zuckerman,²⁷ examining the moderating role of personality traits in the association between physician's specialty and career choice and well-being at work. Based on previous findings concerning only the associations between physician's personality traits and well-being at work without different specialties,^{11,16–18,50} following hypotheses were assessed considering the main effects between personality traits and well-being at work:

Hypotheses 1 and 2: Higher extraversion (H1) and agreeableness (H2) would be associated with higher well-being at work. Correspondingly, lower extraversion and agreeableness would be associated with lower well-being at work.

Hypotheses 3 and 4: Lower conscientiousness (H3) and higher neuroticism (H4) would be associated with lower well-being at work. Correspondingly, higher

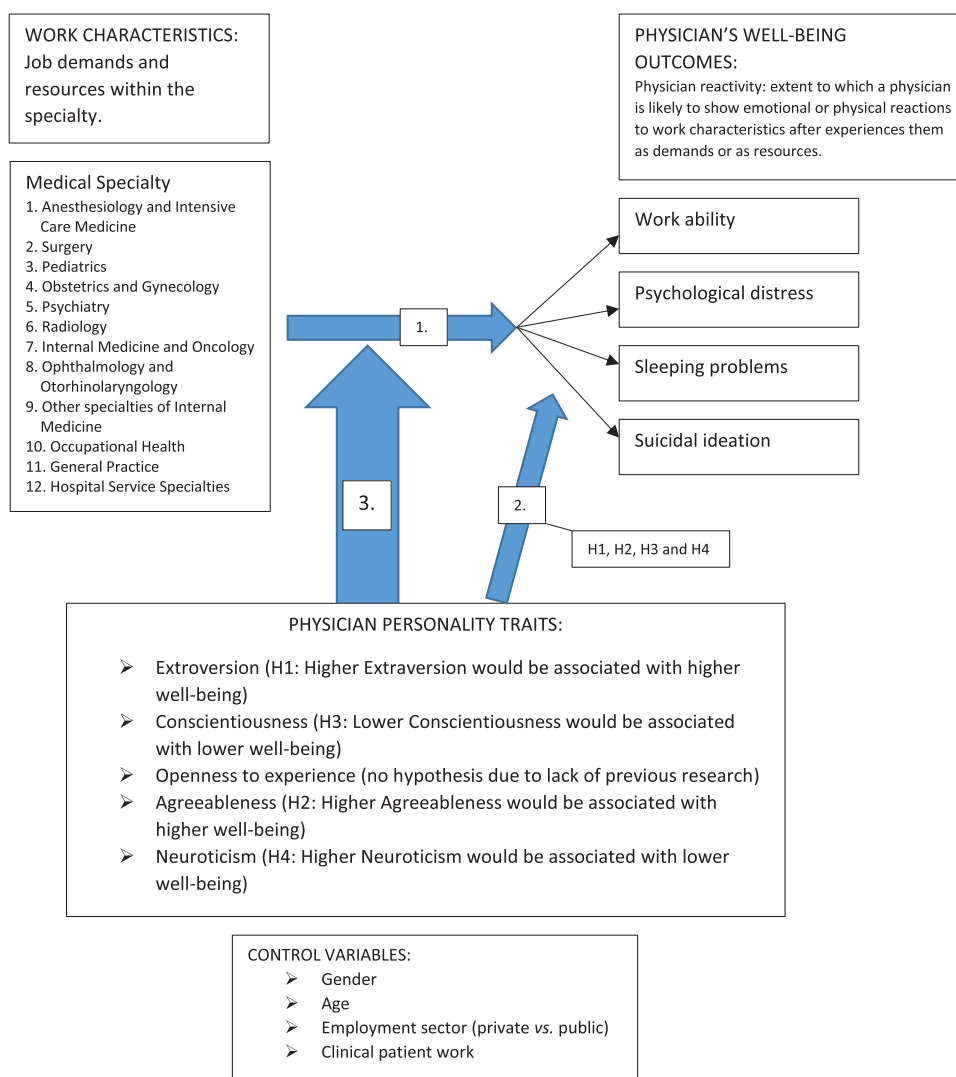


Figure 1. Study design with study hypotheses, adapted from "The Differential reactivity model" introduced by Bolger & Zuckerman (1995), examining the moderating role of personality traits in the association between physician's specialty and career choice and well-being at work after adjusted for gender, age, employment sector and clinical patient work. 1 = The main effects between specialty choice and well-being at work; 2 = The main effects and hypotheses (H1–H4) between personality traits and well-being; 3 = The moderating effect of personality traits in the association between medical specialty and well-being at work (i.e., whether personality traits protect or predispose the associations between specialty and well-being at work).

conscientiousness and lower neuroticism would be associated with higher well-being at work.

Due to lack of previous research considering the associations between physician's openness and well-being at work and particularly the moderating role of physician's personality traits in the association between different specialties and well-being at work, no further hypotheses were assessed.

Methods

The current study used data from the ongoing longitudinal Finnish Health Care Professionals' Study (HPS) launched in 2006.^{74,75} HPS consists of baseline data collected in 2006 and two follow-up measurements points in 2010 and 2015. In 2006, 2010 and 2015 random samples of 5,000, 7,000 and 8,374 physicians in Finland, respectively, were drawn from a database maintained by the Finnish Medical Association (FMA)⁵⁷ which maintains records of all licensed physicians in Finland. In 2006, 2010, and 2015, a total of 2,841, 3,826 and 4,145 Finnish physicians, respectively, responded to the survey, making for a response rate of 57%, 55%, and 50%, respectively. HPS is representative of the eligible population in terms of gender, age, and employment sector also after attrition analyses reported previously.^{74,75}

We included the data derived in 2015 from participants who had data for all study variables. Figure 2 shows the recruitment and outcome data for study participants. Altogether, 2,815 medical specialists formed the final sample. Of these specialists, 2,272 physicians reported that they were completed the Specialist Degree in Medicine, whereas 543 physicians reported being still specializing physicians. The ethics committee on the National Research and Development Centre for Health and Welfare, Finland, approved the study protocol which was conformed to the proposals by the World Health Organization and the Helsinki Declaration. Informed consent was obtained from all study participants.

Measurements

Medical specialty

Medical specialty was self-reported in 2006, 2010, and 2015. In Finland, a medical specialist degree requires five to six years of medical practice, including at least nine months of service in public health centers, theoretical and administrative courses, and a passing grade on a national written exam. If they had more than one specialty, they were advised to report the most recent one. Specialties were categorized into 12 different specialties according to the classification used by FMA⁵⁷: (1)

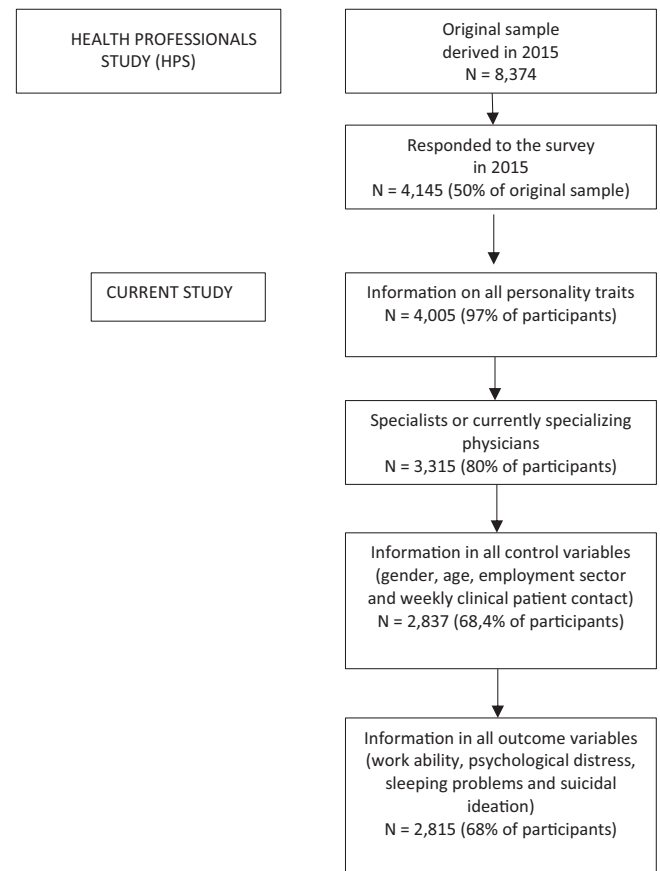


Figure 2. Recruitment and outcome data for study participants.

Anesthesiology and Intensive Care Medicine; (2) Surgery (including all surgeon sub-specialties); (3) Pediatrics (including Child neurology and Children's disease); (4) Obstetrics and Gynecology; (5) Psychiatry (including Child Psychiatry, Adolescent Psychiatry, and Forensic Psychiatry); (6) Radiology; (7) Internal Medicine and Oncology; (8) Ophthalmology and Otorhinolaryngology; (9) Other specialties of Internal Medicine (e.g., Endocrinology, Gastroenterology, Dermatology and Allergology); (10) Occupational Health; (11) General Practice; (12) Hospital Service Specialties (e.g., Clinical Microbiology, Forensic Medicine, Clinical genetics). The most recent specialty between study intervals was chosen for analyses purposes.

Personality traits

Personality traits were assessed in 2015 using the Five Factor Model on personality (FFM),¹³ which is the most established framework across different countries and cultures examining normal adult personality traits.⁵⁸ FFM consists of five personality dimensions: extraversion (referring to a tendency to be social, active, and feel positive emotions), conscientiousness (referring to a tendency to be persistent, organized and achievement

oriented), openness to experience (referring to a tendency to be curious, sensitive, and susceptible to variety), agreeableness (referring to a tendency to be trustful, cooperative, and sympathetic), and neuroticism (referring to a tendency to be anxious, and a tendency toward negative affect including fear and/or anger). We used the shortened 15-item version of the Big Five Inventory (BFI),¹³ which consists of three items per personality trait assessed on a 5-point Likert scale ranging from 1 (totally disagree) to 5 (totally agree). Measurement reliability ranged from satisfactory to good; extraversion ($\alpha = .83$), conscientiousness ($\alpha = .60$), openness ($\alpha = .70$), agreeableness ($\alpha = .52$), and neuroticism ($\alpha = .79$).

Well-being

Well-being indicators were assessed in 2015. *Work ability* was assessed with a single item from the Work Ability Index (WAI).³⁰ The respondents were asked 'Assume that your work ability in its best has a value of 10 and 0 would mean that you could not work all. How many points would you give to your current work ability?' The answer options range from 0 to 10. The score on the scale was used as a continuous variable. This single-item work ability has been shown to be predictive for retirement intentions among Finnish physicians⁵⁹ and health indicators among Finnish anesthesiologists.⁴⁹ Compared with longer scales, it has also been found to work as a valid single-item measure of stress symptoms, perceived health and diagnosed health for drawing group-level conclusions about mental well-being.⁶⁰

Psychological distress was measured with four items ($\alpha = .83$) from the General Health Questionnaire⁶¹ (GHQ-12) representing a factor for anxiety and depression. The answer options range from 1 (not at all) to 4 (much more than usually). The scores from each item were added up and the total scores, ranging from 4 to 16, were used as a continuous variable.

Sleeping problems were assessed by measuring insomnia with the four items ($\alpha = .79$) from the Jenkins's Sleep Problems Scale.⁶² The respondents were asked 'How often during the last four weeks you have had the following symptoms considering (1) having trouble falling asleep, (2) waking several times per night, (3) having trouble staying asleep (including waking up too early), and (4) waking up after your usual amount of sleep feeling tired and worn out?'. The responses were given along a 6-point scale from 6 = every night to 1 = never. The scores on the scale (ranging from 6 to 24) were used as a continuous variable.

Suicidal ideation was measured with single-item scale⁶³ that has been found to predict suicide attempts.^{63,64} The respondents were asked 'It is thought generally that every

tenth person in the population has suicidal ideation in his/her mind. Have you ever thought or planned to commit suicide?' Responses were dichotomized into never (i.e., "I have never thought") or any attempt or thought (i.e., "I have tried", "I have seriously planned" or "I have thought").

Gender, age, employment sector and clinical patient contact

Gender, age, employment sector, and clinical patient contact were self-reported in 2006, 2010, and 2015. The most recent value during intervals of the measurements was chosen. Employment sector was categorized as public (hospital; primary care; other municipal site of practice; state office or institution) or private (university; private practice, including private medical centers or clinics; foundation, association, or organization; and other sites, such as the pharmaceutical industry). Patient contact was treated as continuous variable referring physician's self-reported weekly working hours with clinical patient contact (range 0–60 hours per workweek).

Statistical analyses

Analyses of covariance (ANCOVA) and binary logistic regression were conducted adjusted for demographics (gender, age) and potential confounding factors affecting medical physicians' daily work within the specialty (employment sector, and the amount of clinical patient contact). Personality traits were standardized (Mean = 0; Standard Deviation (SD) = 1). Each personality trait was analyzed separately. General Practice (GP) was treated as a reference group for different specialties. GP is categorized as a specialty that relatively equally requires both technique-oriented and personality-oriented know-how from physicians engaged in it and therefore it is suggested to attract different types of personalities.³⁸ Physicians specialized in GP have been found to vary in their personality traits such as openness and agreeableness within the specialty,³⁸ for example.

We started by investigating gender by medical specialty interactions on each well-being indicator (work ability, psychological distress, sleeping problems, and suicidal ideation). As gender by medical specialty interactions for any outcomes were not found, all subsequent analyses combined women and men.

Second, we examined the main associations of medical specialty (adjusted for demographics, employment sector, and clinical patient contact) and personality traits (adjusted for specialty, demographics, employment sector, and clinical patient contact) with well-being factors in order to find out whether there is an indication for the moderator role of personality trait.

Third, we examined the interactions of specialty with personality traits and the effects of these interactions on work well-being (adjusted for demographics, employment sector, and clinical patient contact). The predictors for interaction model were added to the analyses in seven blocks: (1) the main effect of specialty, (2) the main effect of personality trait, (3) the interaction term of specialty and personality trait, (4) gender, (5) age, (6) employment sector, and (7) clinical patient contact (hours per workweek). We also used bootstrap estimation⁶⁵ as sensitive analyses in order to make certain the significance of the moderating effect of personality traits in the association between the chosen specialty and well-being at work. All analyses were conducted by using Stata 13.0 statistical software.

Results

Basic characteristics of the study sample are shown in Table 1. The study sample included 2,815 medical specialists (65% women) with a mean age of 49.4 years (SD

= 11.19; range 25–72 years). Of these specialists, 2,272 physicians (age $M = 52.9$ years; $SD = 8.9$; range 27–72 years) reported that they were completed the Specialist Degree in Medicine whereas 543 physicians (age $M = 34.7$ years; $SD = 6.8$; range 25–65 years) reported being still specializing physicians. The majority of medical specialists worked in the public employment sector (73%) as well as with a clinical patient contact at least half or more (72%) of their weekly working time. Women represented the majority of respondents for all other specialties except for surgery, where men were the most predominant (65.4%).

Women scored higher than men on perceived psychological distress and sleeping problems ($p < .0001$ for both outcomes). Gender differences on perceived work ability and suicidal ideation were not observed. Gender differences in work well-being (work ability, psychological distress, sleeping problems, and suicidal ideation) by specialty (expressed in the units of standardized regression coefficients (β) and 95% confidence intervals (95%

Table 1. Basic characteristics of 2,815 Finnish physicians, by gender and specialty.

Characteristics	Women (N = 1,820)		Men (N = 995)		Total (N = 2,815)	
	N	%	N	%	N	%
Gender						
Women	1,820	65			1,820	65
Men			995	35	995	35
Age (M ±SD)	47.96±10.62		52.00±11.74		49.39±11.19	
Employment sector						
Public	1,378	67.45	665	32.55	2,043	73
Private	442	57.25	330	42.75	772	27
Medical specialty						
Anesthesiology and Intensive Care Medicine	118	63.78	67	36.22	185	6.5
Surgery	79	34.65	149	65.35	228	8.1
Pediatrics	123	75.46	40	24.54	163	5.8
Obstetrics and Gynecology	152	83.06	31	16.94	183	6.5
Psychiatry	230	75.66	74	24.34	304	10.8
Radiology	55	52.88	49	47.12	104	3.7
Internal Medicine and Oncology	91	63.64	52	36.36	143	5.1
Ophthalmology and Otorhinolaryngology	68	51.91	63	48.09	131	4.6
Other specialties of Internal Medicine	265	61.77	164	38.23	429	15.2
Occupational Health	177	65.80	92	34.20	269	9.6
General Practice	400	71.94	156	28.06	556	19.8
Hospital Service Specialties	62	51.67	58	48.33	120	4.3
Clinical Patient Contact (hours per week; M ± SD)	18.72±9.71		18.35±11.15		18.59±10.24	
No clinical patient contact	111	54.15	94	45.85	205	7.3
1–12 hours per week	356	61.06	227	38.94	583	20.7
13–26 hours per week	947	69.38	418	30.62	1,365	48.5
27 hours per week or more	406	61.33	256	38.67	662	23.5
Personality trait (M ±SD; range 1–5)						
Extraversion	3.38±0.90		3.16±0.87		3.30±.89	
Conscientiousness	3.83±0.75		3.62±0.72		3.76±.75	
Openness to experience	3.18±0.74		3.30±0.74		3.22±.75	
Agreeableness	3.40±0.68		3.39±0.67		3.40±.68	
Neuroticism	2.94±0.83		2.62±0.76		2.83±.82	
Perceived Work Ability (M ± SD; range 0–10)	8.98±1.48		9.05±1.38		9.00±1.45	
Psychological Distress (M ± SD; range 1–4)	1.88±0.67		1.73±0.61		1.83±0.65	
Sleeping Problems (M ± SD; range 1–6)	2.54±1.06		2.34±0.99		2.47±1.04	
Suicidal Ideation (M ± SD; range 1–4)	1.22±0.48		1.20±0.46		1.21±0.47	
I have never thought	1465	64.09	821	35.91	2286	81.2
I have thought	319	67.30	155	32.70	474	16.8
I have seriously planned	27	62.79	16	37.21	43	1.5
I have tried	9	75	3	25	12	0.5

CI), adjusted for confounders are presented in online Supplementary Figure 1.

The main effects of medical specialty and personality traits on well-being

Table 2 shows the main associations of specialty (adjusted for confounders) and personality traits (adjusted for confounders) with well-being factors. Specialty was associated with all other well-being indicators (η^2 (Cohen's f) ranged from .056 to .082; $p < .05$ for all associations) except for psychological distress. All other personality traits were associated with well-being indicators (η^2 ranged from .047 to .082; $p < .05$ for all associations) except openness to experience with work ability and conscientiousness with sleeping problems and

suicidal ideation. The strongest associations were found for higher neuroticism with higher psychological distress and sleeping problems, and for higher extraversion with lower psychological distress and lower sleeping problems.

The interactions of medical specialty and personality traits on well-being

The interactions of specialty with personality traits on different well-being indicators (adjusted for confounders) among physicians are presented in Table 3. Higher extraversion was associated with higher work ability among occupational health specialists ($\eta^2 = .035$; $\beta = .158$, 95% CI = 0.03–0.29) compared with GPs. It was also associated with lower psychological distress among

Table 2. The main effects of medical specialty and personality traits (separately, one trait at a time) on well-being factors among 2,815 Finnish physicians.

Characteristics	Partial SS	F	df	p	η^2
Work Ability					
MODEL 1					
Specialty	17.12	2.04	11.2807	.021	.063
MODEL 2					
Extraversion (+)	20.02	26.51	1.2806	<.0001	.061
Conscientiousness (+)	13.54	17.87	1.2806	<.0001	.057
Openness to Experience (+)	0.07	0.09	1.2806	.766	.063
Agreeableness (+)	16.27	21.50	1.2806	<.0001	.061
Neuroticism (–)	166.88	237.43	1.2806	<.0001	.061
Psychological distress					
MODEL 1					
Specialty	18.63	1.77	11.2819	.053	.054
MODEL 2					
Extraversion (–)	39.68	42.19	1.2818	<.0001	.048
Conscientiousness (–)	7.17	7.53	1.2818	.006	.047
Openness to Experience (+)	11.96	12.59	1.2818	<.001	.049
Agreeableness (–)	17.57	18.53	1.2818	<.0001	.055
Neuroticism (+)	495.65	636.59	1.2818	<.0001	.061
Sleeping problems					
MODEL 1					
Specialty	29.61	2.76	11.2811	.002	.082
MODEL 2					
Extraversion (–)	32.97	34.16	1,2810	<.0001	.082
Conscientiousness (–)	1.11	1.13	1,2810	.287	.080
Openness to Experience (+)	4.13	4.23	1,2810	.040	.080
Agreeableness (–)	10.95	11.26	1,2810	<.001	.080
Neuroticism (+)	406.04	487.79	1,2810	<.0001	.089
Suicidal Ideation					
MODEL 1					
Specialty	19.19	1.80	11.2816	.048	.056
MODEL 2					
Extraversion (–)	14.61	15.18	1.2815	.0001	.050
Conscientiousness (–)	1.24	1.29	1.2815	.257	.052
Openness to Experience (+)	10.15	10.53	1.2815	.001	.051
Agreeableness (–)	26.93	28.10	1.2815	<.0001	.060
Neuroticism (+)	139.21	151.59	1.2815	<.0001	.047

Note. The results are based on analyses of covariance.

Model 1 = The main effect of specialty on well-being outcome adjusted for gender, age, employment sector (public vs. private), and clinical patient contact (hours per workweek).

Model 2 = The main effect of personality trait (separately, one trait at a time) on well-being outcome adjusted for specialty, gender, age, employment sector (public vs. private), and clinical patient contact (hours per workweek).

Partial SS = partial sum of squares.

η^2 = Cohen's f for the whole model.

The direction of the association of personality trait on well-being indicator in parentheses.

Table 3. The interactions of medical specialty and personality traits on different well-being indicators among 2,815 Finnish physicians.^a

Big 5 traits	Well-being indicators	Anesthe-siology and Intensive Care Medicine β (95%CI)										Hospital Service Specialties β (95%CI)
		Surgery β (95%CI)	Pediatrics β (95%CI)	Obstetrics and Gynecology β (95%CI)	Psychiatry β (95%CI)	Radiology β (95%CI)	Internal Medicine and Oncology β (95%CI)	Ophthalmology and Otorhino-laryngology $-\beta$ (95%CI)	Other specialties of Internal Medicine β (95%CI)	Occupational Health β (95%CI)		
Extraversion	Work ability	.048 (-0.09-0.18)	.144 (-0.00-0.29)	.057 (-0.08-0.19)	.002 (-0.13-0.13)	.070 (-0.11-0.25)	-.083 (-0.25-0.08)	.071 (-0.10-0.24)	.090 (-0.02-0.20)	.158 (0.03-0.29)	-.050 (-0.22-0.12)	
	Psychological distress	.022 (-0.13-0.18)	-.117 (-0.28-0.05)	-.120 (-0.27-0.03)	.003 (-0.14-0.14)	-.054 (-0.25-0.15)	.020 (-0.17-0.21)	-.072 (-0.26-0.12)	-.146 (-0.27-0.02)	-.234 (-0.38-0.09)	.057 (-0.13-0.25)	
	Sleeping problems	.011 (-0.14-0.16)	-.040 (-0.21-0.13)	-.041 (-0.20-0.11)	.006 (-0.14-0.15)	-.008 (-0.21-0.20)	-.030 (-0.22-0.16)	-.149 (-0.34-0.04)	-.100 (-0.22-0.02)	-.132 (-0.28-0.02)	.017 (-0.21-0.17)	
Conscientiousness	Work ability	.133 (-0.01-0.28)	.135 (0.00-0.27)	.123 (-0.02-0.27)	.154 (0.02-0.29)	-.056 (-0.23-0.12)	.165 (0.01-0.32)	.024 (-0.15-0.20)	.074 (-0.04-0.19)	.119 (-0.01-0.25)	.038 (-0.14-0.22)	
	Psychological distress	-.056 (-0.22-0.11)	-.085 (-0.24-0.07)	-.041 (-0.21-0.12)	-.053 (-0.20-0.09)	.127 (-0.07-0.33)	-.061 (-0.23-0.11)	-.037 (-0.23-0.16)	-.067 (-0.20-0.06)	-.024 (-0.17-0.12)	-.012 (-0.22-0.19)	
	Sleeping problems	-.115 (-0.28-0.05)	-.155 (-0.31-0.00)	-.101 (-0.27-0.07)	-.108 (-0.26-0.04)	-.037 (-0.24-0.17)	-.066 (-0.24-0.11)	-.024 (-0.22-0.17)	-.171 (-0.30-0.04)	-.102 (-0.25-0.04)	-.254 (-0.46-0.05)	
Openness to Experience	Work ability	.068 (-0.09-0.23)	-.118 (-0.26-0.02)	-.118 (-0.26-0.03)	.015 (-0.10-0.13)	-.181 (-0.36-0.00)	.061 (-0.11-0.23)	-.003 (-0.19-0.18)	-.089 (-0.20-0.02)	-.031 (-0.16-0.10)	-.072 (-0.24-0.09)	
	Psychological distress	-.024 (-0.20-0.15)	.076 (-0.08-0.23)	-.043 (-0.20-0.12)	-.010 (-0.14-0.12)	.002 (-0.20-0.21)	-.076 (-0.27-0.11)	.030 (-0.18-0.24)	-.040 (-0.16-0.08)	.009 (-0.13-0.15)	-.044 (-0.23-0.14)	
	Sleeping problems	-.074 (-0.25-0.10)	.050 (-0.11-0.21)	-.038 (-0.20-0.12)	-.015 (-0.15-0.12)	.221 (0.02-0.43)	-.259 (-0.45-0.07)	-.059 (-0.27-0.15)	.010 (-0.11-0.13)	-.018 (-0.16-0.13)	-.035 (-0.22-0.15)	
Agreeableness	Work ability	.031 (-0.12-0.18)	-.026 (-0.17-0.12)	.004 (-0.14-0.15)	-.007 (-0.13-0.12)	-.042 (-0.23-0.14)	.082 (-0.08-0.24)	-.154 (-0.33-0.02)	.092 (-0.01-0.20)	.141 (0.02-0.27)	.055 (-0.11-0.22)	
	Psychological distress	-.119 (-0.29-0.05)	-.099 (-0.26-0.06)	.014 (-0.15-0.17)	.077 (-0.06-0.22)	.013 (-0.19-0.22)	-.074 (-0.26-0.11)	.113 (-0.08-0.31)	-.087 (-0.21-0.03)	-.117 (-0.26-0.02)	-.009 (-0.20-0.18)	
	Sleeping problems	-.060 (-0.23-0.11)	-.075 (-0.24-0.08)	-.061 (-0.22-0.10)	.098 (-0.04-0.24)	.036 (-0.17-0.24)	-.147 (-0.33-0.04)	-.078 (-0.27-0.12)	-.062 (-0.18-0.06)	-.110 (-0.25-0.03)	-.051 (-0.24-0.14)	
Neuroticism	Work ability	.060 (-0.09-0.21)	.004 (-0.13-0.14)	.087 (-0.05-0.22)	-.038 (-0.16-0.08)	-.049 (-0.22-0.12)	-.045 (-0.21-0.12)	.064 (-0.09-0.22)	.005 (-0.10-0.11)	-.035 (-0.15-0.08)	.007 (-0.17-0.18)	
	Psychological distress	-.058 (-0.21-0.09)	.077 (-0.07-0.22)	-.156 (-0.30-0.01)	.023 (-0.10-0.15)	.014 (-0.16-0.19)	-.002 (-0.17-0.17)	-.132 (-0.30-0.03)	-.052 (-0.16-0.06)	-.037 (-0.16-0.09)	-.066 (-0.25-0.11)	
	Sleeping problems	-.022 (-0.18-0.14)	.126 (-0.02-0.27)	.020 (-0.13-0.17)	.022 (-0.11-0.15)	-.001 (-0.19-0.18)	.106 (-0.07-0.28)	-.007 (-0.18-0.16)	.023 (-0.09-0.14)	.047 (-0.08-0.18)	.007 (-0.18-0.19)	

Notes. ^a The results are based on analyses of covariance. Each model of the regression analysis was adjusted for gender, age, employment sector (public vs. private) and the amount of clinical patient contact (hours per work-week). β = Standardized regression coefficient (Mean = 0, SD = 1). Statistically significant results are bold. 95% CI = 95% confidence interval for Exp (β). Statistically significant results are bold. General Practice (GP) serves a reference group.

specialists from the other specialties of internal medicine and occupational health ($\eta^2 = .059$ for the whole model; $\beta = -.146$, 95% CI = -0.27 to -0.02 ; $\beta = -.234$, 95% CI = -0.38 to -0.09 , respectively).

Higher conscientiousness was associated with higher work ability among surgeons ($\eta^2 = .036$ for the whole model; $\beta = .135$, 95% CI = 0.00 – 0.27), psychiatrists ($\beta = .154$, 95% CI = 0.02 – 0.29), and internal medicines and oncologists ($\beta = .165$, 95% CI = 0.01 – 0.32) compared with GPs. It was also associated with lower sleeping problems among surgeons ($\eta^2 = .025$ for the whole model; $\beta = -.155$, 95% CI = -0.31 to -0.00) and pediatricians ($\beta = -.170$, 95% CI = -0.34 to -0.00) as well as among specialists from other specialties of internal medicine ($\beta = -.171$, 95% CI = -0.30 to -0.04) and hospital service specialties ($\beta = -.254$, 95% CI = -0.46 to -0.05). The Bootstrap method run as sensitive analyses confirmed the present results with the exception of the moderating effect of conscientiousness on the association between occupational health and work ability, that turned as significant ($\beta = .119$, 95% CI = 0.01 – 0.23 , $p < .05$) after bootstrapped sensitive estimation (the results considering sensitive analyses are not shown here, available from the corresponding author).

Higher openness to experience was associated with higher sleeping problems among radiologists ($\eta^2 = .041$ for the whole model; $\beta = .221$, 95% CI = 0.02 – 0.43) but lower sleeping problems among internal medicines and oncologists ($\beta = -.259$, 95% CI = -0.45 to -0.07) compared with GPs. Higher agreeableness was associated with higher work ability among occupational health specialists ($\eta^2 = .043$; $\beta = .141$, 95% CI = 0.02 – 0.27) compared with GPs. Higher neuroticism was associated with higher psychological distress among physicians representing obstetrics and gynecology ($\eta^2 = .016$; $\beta = -.156$, 95% CI = -0.30 to -0.01) compared with GPs. The Bootstrap method run as sensitive analyses confirmed the present results with the exception of the moderating effect of openness to experience on the association between radiology and sleeping problems, that turned as non-significant ($\beta = .221$, 95% CI = -0.02 to 0.46 , $p = .071$) after bootstrapped sensitive estimation (the results considering sensitive analyses are not shown here, available from the corresponding author).

The results of the binary logistic regression analyses examining the specialty by personality interactions on physician's suicidal ideation (adjusted for confounders) are presented in online Supplementary Table 1. Higher openness to experience among psychiatrists was associated with lower suicidal ideation (Odds Ratio (OR) = 0.66 ; 95% CI = 0.46 – 0.94) compared with GPs. Higher agreeableness among ophthalmologists and otorhinolaryngologists was associated with higher suicidal ideation

(OR = 1.92 ; 95% CI = 1.04 – 3.53) compared with GPs. Significant specialty by personality interactions on suicidal ideation were not observed for extraversion, conscientiousness and neuroticism. The Bootstrap method run as sensitive analyses produced the similar pattern of results (the results considering sensitive analyses are not shown here, available from the corresponding author).

Discussion

The current study used a nationally representative sample of over 2800 Finnish physicians to demonstrate that personality traits moderate the association between medical specialty and well-being at work among person-oriented specialties (occupational health, psychiatry, internal medicine, oncology and other specialties of internal medicine) versus technique-oriented specialties (surgery, radiology, and ophthalmology and otorhinolaryngology). In line with our hypotheses and previous studies,^{44,45} higher extraversion (H1) and lower neuroticism (H4) in general were the most strongly associated with higher well-being at work. The role of neuroticism as a moderator between the association of medical specialty and well-being at work remains, however, minor in the current study. Specifically, our study contributes to the previous literature by adding three novel findings not previously demonstrated on the effect of personality with occupational well-being among physicians^{20,21}: (1) the independent contribution made by 12 different specialties and work environments (i.e., work characteristics consisting of job demands and resources within the current specialty)¹⁹ on the association between personality and well-being at work, (2) the moderating role of physician's personality traits on the association between the chosen specialty and medical career and occupational well-being, and (3) the protective and predisposing effect of openness to experience on the association between medical specialty and well-being at work.

Higher extraversion and agreeableness showed to be personality traits beneficial for higher well-being at work in terms of higher work ability particularly among occupational health specialists. Higher extraversion also showed to be a protective trait against psychological distress among both occupational health specialists and specialists from the other specialties of internal medicine. Although being new with respect to certain medical specialties, the results are in line with our hypotheses (H1 and H2) based on previous findings on the associations between physicians' personality traits and occupational well-being.^{17,18,23,43,47} Physicians' higher extraversion and agreeableness have been predictive for higher clinical performance,⁴³ perceived work ability,¹⁷ positive work attitudes (e.g., personal accomplishment and perceived

work climate) and overall satisfaction with medicine as a career.¹⁸ Physicians' higher person-job fit, in turn, has been found to be predictive for higher perceived work ability.²² Both occupational health and internal medicine are person-oriented specialties^{2,38} that contain plenty of patient-related working in stressful situations that require flexible and interactive clinical performance with empathy. In addition that extroversion and agreeableness are personality traits that respond to these job demands and resources within the current specialty, these traits have been suggested becoming significant particularly during clinical years of medical career.^{15,16,20,21,47} Thus, our results suggest fairly successful person-job fit^{26,27} with optimal possibilities to use one's personality traits as professional strengths²² among occupational health specialists and specialists from the other specialties of internal medicine.

Higher agreeableness, however, also showed to be a risk factor for higher suicidal ideation among ophthalmologists and otorhinolaryngologists, which was against our hypothesis (H1). Ophthalmology and otorhinolaryngology have been categorized as technique-oriented specialties^{2,38} with controllable life style⁶⁶ reflecting more like lower agreeableness and openness to experience in their specialists' behavior. As physicians' work consists of the demand-abilities perspective of task performance (e.g., biotechnical competencies to perform specific tasks that distinguish the specialties) and the needs-supplies perspective of contextual performance (e.g., the maintenance of the social and organizational network surrounding the tasks), physicians' personality traits may differentially relate to these two components within the specialty.^{26,38} Higher agreeableness may be a supportive trait with respect to contextual performance but not with respect to task performance³⁸ which may further cause contradiction on person-job fit²⁶ and well-being within the current specialty. Another explanation may be found in the recent research that emphasizes the potential "dark-side" of agreeableness and empathy across medical career.²⁰ Agreeable individuals are characterized as "cooperative, nurturing, sensitive, altruistic, and softhearted".⁴⁷ Particularly the facet of empathy referring to the physician's ability to sense his/her patients' needs has been found to be beneficial in clinical performance and for example among anesthesiologist,⁶⁷ who also represent technique-oriented specialty.⁴⁷ Recent research however suggests that alongside obvious benefits there are also critical costs associated with empathy in medical practice in terms of reduced pain thresholds, susceptibility to psychological distress, and depression.^{56,68} Our present result concerning higher suicidal ideation among ophthalmologists and otorhinolaryngologists might be a signal of this point of view although future studies with more research-based evidence are necessary.

Higher conscientiousness showed to be a personality trait beneficial for higher occupational well-being among surgeons in terms of higher work ability and better quality of sleep. It was also associated with higher work ability among internal medicines and oncologists and occupational health specialists, with the latter one emerging as significant only after bootstrapped sensitive analysis. Furthermore, higher conscientiousness protected pediatricians, and physicians from other specialties of internal medicine and hospital service specialties against sleeping problems. Lower conscientiousness, in turn, was associated with psychiatrists' lower perceived work ability. The results are consistent with our hypothesis (H3) and the previous findings particularly with respect to surgeons⁶⁶ but also with other specialties.^{17,18} Higher conscientiousness among physicians in general has been predictive for positive perceptions of personal capabilities and achievement¹⁷ and lower work-related stress.¹⁸ It has also found to be the best predictor of academic success in both preclinical and clinical phases of medical education.^{16,43,47} Surgeons' higher tendency to be organized, careful and persistent is perceived as the most supportive characteristic considering the requisite skills of the technique-oriented surgical specialty.^{38,47} However, recent research postulates that higher conscientiousness may have a "dark-side" as well and predict lower medical skills and higher perceived stress across the changing context of medical career, particularly when emerging in combination with higher neuroticism.^{16,20,21,50,52} Psychiatrists' lower conscientiousness, in turn, seems to be a risk factor for their person-job fit and well-being at work. Personality profile such as lower conscientiousness with higher openness to experience and agreeableness has been suggested to predispose psychiatrists toward stress and make them more vulnerable to burnout.⁴⁸

On the other hand, particularly psychiatrists seem to benefit from their higher openness to experience within their daily work. Among psychiatrists, internal medicines and oncologists, higher openness to experience was associated with higher quality of sleep. It also protected psychiatrists from suicidal ideation. Our results concerning the protective or predisposing role of openness to experience on physician's occupational well-being is novel not previously demonstrated. Therefore, we did not assess any hypothesis regarding openness to experience. Psychiatrists have been shown to score higher in openness to experience⁶⁹ but then also having elevated suicide risk⁷⁰ compared with other specialties. Finnish psychiatrists have been found to suffer from higher psychological distress compared with other medical specialists partly accounted by their higher patient-related stress.²⁴ As discussed before, the combination of openness to experience with other personality traits such as lower

conscientiousness and higher agreeableness and neuroticism may predispose psychiatrists to lower well-being at work.⁴⁸ As a single trait, however, higher openness to experience (referring general attentiveness to inner feelings and independence of judgment) may function as an important individual-level resource for psychiatrists and help them to cope with the work-related challenges²⁴ they meet within their highly person-oriented specialty.^{2,38}

Lower openness to experience, in turn, was associated with better quality of sleep among radiologists. Radiologists have been categorized as supportive³⁸ and technique-oriented^{1,38} specialists with controllable lifestyle and with minimum patient contact⁶⁶ reflecting lower openness to experience compared with person-oriented specialties such as GP, internal medicine, or psychiatry.³⁸ Conservatively estimated, our results suggest relatively successful person-job fit²⁶ among radiologist at least from needs-supplies perspective. However, future research is needed to strengthen this result as the effect of openness to experience in the association between radiology and sleeping problems slightly turned as non-significant after bootstrapped sensitive estimation.

Higher neuroticism showed to be a risk factor for higher psychological distress only among physicians representing obstetrics and gynecology. Although concerning only one medical specialty and well-being outcome, this result was in line with our hypothesis (H4) as physicians' higher neuroticism has been predictive for lower well-being at work in terms of higher perceived stress, emotional exhaustion, and overall dissatisfaction with medicine as a career.^{17,18} Specialists representing obstetrics and gynecology have also been found to express higher dissatisfaction on their specialty compared with other specialties.⁷¹ High expectations for perfect birth outcomes, high medicolegal risks and personality-related factors have been suggested as potential confounding factors explaining these associations.⁷¹ Higher neuroticism has been shown to predispose individuals experiencing life events more negatively than other individuals⁷² partly because they select themselves into situations that foster negative affect.⁷³ Taken into account that medicine and obstetrics and gynecology in particular is an emotionally demanding field, this might have associations on physician's well-being indicators.⁴⁵

In the light of our narrow results considering neuroticism, however, it is worthy to note that recent research in medical education suggest that personality traits traditionally perceived as "detrimental" such as higher neuroticism would also have a "bright-side" across the medical career.^{20,21} Based on their recent research with future directions, Ferguson and colleagues^{20,21} suggest that moderate neuroticism with anxiety, for example,

may enhance the acquisition of medical knowledge and skills particularly during clinical years and therefore be predictive for higher professional competence and occupational well-being as well. In the current study, the main associations of higher neuroticism with lower occupational well-being were relatively strong considering all well-being outcomes. However, the moderating role of personality traits between specialty and well-being indicators remained minor. It seems that specialty-related working characteristics (i.e., job demands and resources within the specialty) might more like balance the negative effect of neuroticism on physicians' well-being at work.^{20,21} Physicians with higher neuroticism may have natural prerequisites for prepare themselves for dangerous, threatening, and/or otherwise challenging medical situations.^{20,21} Both pre-clinical and clinical years of medical education also prepare physicians to meet the specific job demands and resources within the current specialty and to adjust their personal coping skills to the demands of the chosen specialty.^{20,21} Ferguson and colleagues yet emphasize that "the expression of trait relevant behavior across medical career is dependent on context and is distributed with an average (typical behavior or personality) and a variance (plasticity or adaptability)".²⁰ Therefore, they call for future research to examine whether personality traits might change as a function of medical education and/or medical specialty choice across the career, for example.²⁰

Methodological considerations

The present study involved some limitations. Self-reported measures were used, which may cause some biases and problems associated with an inflation of the strengths of associations. The present results might not be generalizable to younger physicians as the study participants were mostly medical specialists with the mean age of 49 years. Also, the generalizability of our findings to medical specialists from other countries should be carefully considered, given that there are differences in health care systems across countries. The medical education systems and job descriptions of physicians within different specialties are, however, relatively similar across the Western countries.

Our study also has distinctive strengths. As far as we know, the present study is the first one to demonstrate the moderating role of physician's personality in the association between medical specialty and career choice and well-being at work. We used a relatively large and representative sample of actively working licensed Finnish physicians^{74,75} which is an important advantage compared with previous research in the current topic. Alongside the main analyses, we also used bootstrap

estimation⁶⁵ as sensitive analyses in order to verify the significance of the moderating effect of personality traits in the association between the chosen specialty and well-being at work.

Conclusions

The present results showed evidence of successful person-job fit from needs-supplies perspective among person-oriented versus technique-oriented medical specialties. Among occupational health specialists, higher extraversion, agreeableness, and conscientiousness were associated with higher work ability and higher extraversion with lower psychological distress. Similarly, surgeons' higher conscientiousness showed to be beneficial for their higher work ability and better quality of sleep. Although psychiatrists' lower conscientiousness showed to be a risk factor for their perceived work ability, their higher openness to experience seems to function as protective individual-level resource against the work-related challenges within the specialty. Among physicians representing internal medicine and oncology, higher conscientiousness, and openness to experience enhance their work ability and quality of sleep, respectively. The current result may offer useful information for career counseling in medical education when trying to help junior doctors to make robust and successful career decisions that fit their personality traits and support their occupational well-being.

Funding

This study was supported by the Academy of Finland (S.M., project 1297520; and M.E., project 265977), by KONE Foundation (S.M.), by a Centers for Disease Control and Prevention / National Institute for Occupational Safety and Health (CDC/NIOSH) (D.GRP.), and by Education and Research Center to the Southwest Center for Occupational and Environmental Health (SWCOEH) (D.GRP., Grant No. 5T42OH008421).

ORCID

Sari Mullola  <http://orcid.org/0000-0001-7566-714X>
Justin Presseau  <http://orcid.org/0000-0002-2132-0703>

References

- Borges NJ, Savickas S. Work style preferences among medical specialties. *J Vocat Behav.* 2014;84(3):303–306. doi:10.1016/j.jvb.2014.02.004.
- Taber BJ, Hartung PJ, Borges NJ. Personality and values as predictors of medical specialty choice. *J Vocat Behav.* 2011;78(2):202–209. doi:10.1016/j.jvb.2010.09.006.
- Woolf K, Elton C, Newport M. The specialty choices of graduates from Brighton and Sussex Medical School: a longitudinal cohort study. *BMC Med Educ.* 2015;15(1):46–57. doi:10.1186/s12909-015-0328-z. PMID:25889968.
- Borges NJ, Osmon WR. Personality and medical specialty choice: technique orientation versus people orientation. *J Vocat Behav.* 2001;58(1):22–35. doi:10.1006/jvbe.2000.1761.
- Borges NJ, Savickas ML. Personality and medical specialty choice: A literature review and integration. *J Career Assessment.* 2002;10(3):362–380. doi:10.1177/10672702010003006.
- Woods SA, Patterson FC, Wille B, Koczwara A. Personality and occupational specialty: An examination of medical specialties using Holland's RIASEC model. *Career Development International.* 2016;21(3):262–278. doi:10.1108/CDI-10-2015-0130.
- Heponiemi T, Kuusio H, Sinervo T, Elovainio M. Job attitudes and well-being among public vs. private physicians: Organizational justice and job control as mediators. *Eur J Public Health.* 2011;21(4):520–525. doi:10.1093/eurpub/ckq107. PMID:20709783.
- Blackwelder R, Watson KH, Freedy JR. Physician Wellness Across the Professional Spectrum. *Primary Care: Clinics in Office Practice.* 2016;43(2):355–361. doi:10.1016/j.pop.2016.01.004.
- Wallace JE, Lemaire JB, Ghali WA. Physician wellness: A missing quality indicator. *Lancet.* 2009;374(9702):1714–1721. doi:10.1016/S0140-6736(09)61424-0. PMID:19914516.
- Renzi C, Di Pietro C, Tabolli S. Psychiatric morbidity and emotional exhaustion among hospital physicians and nurses: association with perceived job-related factors. *Arch Environ Occup Health.* 2012;67(2):117–123. doi:10.1080/19338244.2011.578682.
- Taycan O, Taycan SE, Çelik C. Relationship of burnout with personality, alexithymia, and coping behaviors among physicians in a semiurban and rural area in Turkey. *Arch Environ Occup Health.* 2014;69(3):159–166. doi:10.1080/19338244.2013.763758.
- Oskrochi Y, Maruthappu M, Henriksson M, Davies AH, Shalhoub J. Beyond the body: A systematic review of the nonphysical effects of a surgical career. *Surgery.* 2016;159(2):650–664. doi:10.1016/j.surg.2015.08.017. PMID:26431813.
- Soto CJ, John OP. The next big five inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology.* 2017;113(1):117–143. doi:10.1037/pspp0000096. PMID:27055049.
- Firth-Cozens J, King J. Are psychological factors linked to performance. In: Firth-Cozens J, King J, Hutchinson A, McAwoy P, eds. *Understanding doctors' performance.* Oxford: Radcliffe Publishing, 2006:61–70.
- McAdams DP, Olson B. Personality development: Continuity and change over the life course. *Annu Rev Psychol.* 2010;61:517–542. doi:10.1146/annurev.psych.093008.100507. PMID:19534589.
- Doherty EM, Nugent E. Personality factors and medical training: A review of the literature. *Med Educ.* 2011;45(2):132–140. doi:10.1111/j.1365-2923.2010.03760.x. PMID:21208259.

17. Deary IJ, Blenkin H, Agius RM, Endler NS, Zealley H, Wood R. Models of job-related stress and personal achievement among consultant doctors. *British Journal of Psychology*. 1996;87(1):3–29. doi:10.1111/j.2044-8295.1996.tb02574.x. PMID:8852018.
18. McManus IC, Keeling A, Paice E. Stress, burnout and doctors' attitudes to work are determined by personality and learning style: A twelve-year longitudinal study of UK medical graduates. *BMC Med*. 2004;2(1):29. doi:10.1186/1741-7015-2-29. PMID:15317650.
19. Bakker AB, Demerouti E. The job demands-resources model: State of the art. *J Managerial Psychol*. 2007;22(3):309–328. doi:10.1108/02683940710733115.
20. Ferguson E, Lievens F. Future directions in personality, occupational and medical selection: Myths, misunderstandings, measurement, and suggestions. *Adv Health Sci Educ*. 2017;22(2):387–399. doi:10.1007/s10459-016-9751-0. PMID:28220334.
21. Ferguson E, Semper H, Yates J, Fitzgerald JE, Skatova A, James D. The 'Dark Side' and 'Bright Side' of personality: when too much conscientiousness and too little anxiety are detrimental with respect to the acquisition of medical knowledge and skill. *PLoS ONE*. 2014;9(2):e88606. doi:10.1371/journal.pone.0088606. PMID:24586353.
22. Hinami K, Whelan CT, Miller JA, Wolosin RJ, Wetterneck TB. Person-job fit: An exploratory cross-sectional analysis of hospitalists. *J Hosp Med*. 2013;8(2):96–101. doi:10.1002/jhm.1995. PMID:23169594.
23. Tyssen R, Vaglum P, Grønvold NT, Ekeberg Ø. Factors in medical school that predict postgraduate mental health problems in need of treatment. A nationwide and longitudinal study. *Med Educ*. 2001;35(2):110–120. doi:10.1046/j.1365-2923.2001.00770.x. PMID:11169082.
24. Heponiemi T, Aalto A-M, Puttonen S, Vänskä J, Elovainio M. Work-related stress, job resources, and well-being among psychiatrists and other medical specialists in Finland. *Psychiatr Serv*. 2014;65(6):796–801. doi:10.1176/appi.ps.201300200. PMID:24585088.
25. Heponiemi T, Kouvonen A, Aalto A-M, Elovainio M. Psychosocial factors in GP work: The effects of taking a GP position or leaving GP work. *Eur J Pub Health*. 2013;23(3):361–366. doi:10.1093/eurpub/cks112. PMID:22930744.
26. Edwards JR. Person-job fit: A conceptual integration, literature review, and methodological critique. In: Robertson CLCIT, ed. *International Review of Industrial and Organizational Psychology*, 1991, Vol. 6. Oxford, England: John Wiley & Sons; 1991:283–357..
27. Bolger N, Zuckerman A. A framework for studying personality in the stress process. *J Pers Soc Psychol*. 1995;69(5):890–902. doi:10.1037/0022-3514.69.5.890. PMID:7473036.
28. Siedsma M, Emler L. Physician burnout: Can we make a difference together? *Critical Care*. 2015;19(1):273. doi:10.1186/s13054-015-0990-x. PMID:26134266.
29. Tuomi K, Huuhtanen P, Nykyri E, Ilmarinen J. Promotion of work ability, the quality of work and retirement. *Occup Med*. 2001;51(5):318–324. doi:10.1093/occmed/51.5.318. PMID:11473138.
30. Tuomi K, Ilmarinen J, Jahkola A, Katajarinne L, Tulkki A. *Work ability index*. Vol 2nd revised edn, Occupational Health Care 19. Helsinki: Finnish Institute of Occupational Health; 1998.
31. Devi S. Doctors in distress. *The Lancet*. 2011;377(9764):454–455. doi:10.1016/S0140-6736(11)60145-1.
32. Tekin A, Karadağ H, Yayla S. The relationship between burnout symptoms and Type D personality among health care professionals in Turkey. *Arch Environ Occup Health*. 2017;72(3):173–177. doi:10.1080/19338244.2016.1179168.
33. Schwartz S, Anderson WM, Cole SR, Cornoni-Huntley J, Hays JC, Blazer D. Insomnia and heart disease: A review of epidemiologic studies. *J Psychosom Res*. 1999;47(4):313–333. doi:10.1016/S0022-3999(99)00029-X. PMID:10616226.
34. Elovainio M, Kivimäki M, Vahtera J, Keltikangas-Järvinen L, Virtanen M. Sleeping problems and health behaviors as mediators between organizational justice and health. *Health Psychol*. 2003;22(3):287–293. doi:10.1037/0278-6133.22.3.287. PMID:12790256.
35. Brennan J, McGrady A. Designing and implementing a resiliency program for family medicine residents. *Int J Psychiatry Med*. 2015;50(1):104–114. doi:10.1177/0091217415592369. PMID:26130769.
36. Gold KJ, Sen A, Schwenk TL. Details on suicide among US physicians: Data from the National Violent Death Reporting System. *Gen Hosp Psychiatry*. 2013;35(1):45–49. doi:10.1016/j.genhosppsych.2012.08.005. PMID:23123101.
37. Fahrenkopf AM, Sectish TC, Barger LK, Sharek PJ, Lewin D, Chiang VW. Rates of medication errors among depressed and burnt out residents: prospective cohort study. *BMJ*. 2008;336(7642):488–493. doi:10.1136/bmj.39469.763218.BE. PMID:18258931.
38. Borges NJ, Gibson DD. Personality patterns of physicians in person-oriented and technique-oriented specialties. *J Vocat Behav*. 2005;67(1 SPEC. ISS.):4–20. doi:10.1016/j.jvb.2003.12.015.
39. Shanafelt TD, Sloan JA, Habermann TM. The well-being of physicians. *Am J Med*. 2003;114(6):513–519. doi:10.1016/S0002-9343(03)00117-7. PMID:12727590.
40. Elovainio M, Heponiemi T, Jokela M, et al. Stressful work environment and wellbeing: What comes first? *J Occup Health Psychol*. 2015;20(3):289–300. doi:10.1037/a0038684. PMID:25705911.
41. Dyrbye LN, Thomas MR, Massie FS, Power DV, Eacker A, Harper W. Burnout and suicidal ideation among U.S. medical students. *Ann Intern Med*. 2008;149(5):334–341. doi:10.7326/0003-4819-149-5-200809020-00008. PMID:18765703.
42. Hoyler M, Finlayson SRG, McClain CD, Meara JG, Hagander L. Shortage of doctors, shortage of data: a review of the global surgery, obstetrics, and anesthesia workforce literature. *World J Surg*. 2014;38(2):269–280. doi:10.1007/s00268-013-2324-y. PMID:24218153.
43. Hojat M, Erdmann JB, Gonnella JS. Personality assessments and outcomes in medical education and the practice of medicine: AMEE Guide No. 79. *Med Teach*. 2013;35(7):e1267–e1301. doi:10.3109/0142159X.2013.785654. PMID:23614402.
44. Hakulinen C, Elovainio M, Pulkki-Råback L, Virtanen M, Kivimäki M, Jokela M. Personality and depressive symptoms: Individual participant meta-analysis of 10 cohort studies. *Depress anxiety*. 2015;32(7):461–470. doi:10.1002/da.22376. PMID:26014798.
45. Judge TA, Heller D, Mount MK. Five-factor model of personality and job satisfaction: A meta-analysis. *J Appl*

- Psychol.* 2002;87(3):530–541. doi:10.1037/0021-9010.87.3.530. PMID:12090610.
46. Ferguson E, James D, Madeley L. Factors associated with success in medical school and in a medical career: Systematic review of the literature. *BMJ.* 2002;324:952–957. doi:10.1136/bmj.324.7343.952. PMID:11964342.
 47. Lievens F, Ones DS, Dilchert S. Personality scale validities increase throughout medical school. *J Appl Psychol.* 2009;94(6):1514–1535. doi:10.1037/a0016137. PMID:19916659.
 48. Deary IJ, Agius RM, Sadler A. Personality and Stress in Consultant Psychiatrists. *Int J Soc Psychiatry.* 1996;42(2):112–123. doi:10.1177/002076409604200205. PMID:8811395.
 49. Lindfors P, Meretoja O, Töyry S, Luukkonen R, Elovainio M, Leino T. Job satisfaction, work ability and life satisfaction among Finnish anaesthesiologists. *Acta Anaesthesiol Scand.* 2007;51(7):815–822. doi:10.1111/j.1399-6576.2007.01343.x. PMID:17578460.
 50. Tyssen R, Dolatowski FC, Røvik JO, et al. Personality traits and types predict medical school stress: A six-year longitudinal and nationwide study. *Med Educ.* 2007;41(8):781–787. doi:10.1111/j.1365-2923.2007.02802.x. PMID:17661886.
 51. Mäkikangas A, Feldt T, Kinnunen U, Mauno S. Does Personality Matter? A Review of Individual Differences in Occupational Well-Being. In: Bakker AB, ed. *Advances in Positive Organizational Psychology*. Vol 1. Bingley, United Kingdom: Emerald Group Publishing Limited:107–143.
 52. Boyce CJ, Wood AM, Brown GDA. The dark side of conscientiousness: Conscientious people experience greater drops in life satisfaction following unemployment. *J Res Pers.* 2010;44(4):535–539. doi:10.1016/j.jrp.2010.05.001.
 53. Seligman MEP, Steen TA, Park N, Peterson C. Positive Psychology Progress: Empirical Validation of Interventions. *Am Psychol.* 2005;60(5):410–421. doi:10.1037/0003-066X.60.5.410. PMID:16045394.
 54. McKee-Ryan F, Song Z, Wanberg CR, Kinicki AJ. Psychological and Physical Well-Being During Unemployment: A Meta-Analytic Study. *J Appl Psychol.* 2005;90(1):53–76. doi:10.1037/0021-9010.90.1.53. PMID:15641890.
 55. Steel P, Schmidt J, Shultz J. Refining the relationship between personality and subjective well-being. *Psychol Bull.* 2008;134(1):138–161. doi:10.1037/0033-2909.134.1.138. PMID:18193998.
 56. Ferguson E. Empathy “The Good, The Bad and The Ugly”. In: Wood AM, Johnson J, eds. *The Wiley Handbook of Positive Clinical Psychology*, New York: John Wiley & Sons, Ltd; 2016:103–123.
 57. FMA. The Finnish Medical Association. 2017; <http://www.laakariliitto.fi>.
 58. John OP, Naumann LP, Soto CJ. Paradigm shift to the integrative big five trait taxonomy. *Handb Pers: Theory Res.* 2008;3:114–158.
 59. Heponiemi T, Kouvonen A, Vänskä J, et al. Health, psychosocial factors and retirement intentions among Finnish physicians. *Occup Med.* 2008;58(6):406–412. doi:10.1093/occmed/kqn064. PMID:18544590.
 60. Elo A-L, Leppanen A, Jahkola A. Validity of a single-item measure of stress symptoms. *Scand J Work, Environ Health.* 2003;29(6):444–451. doi:10.5271/sjweh.752.
 61. Goldberg DP. *The detection of psychiatric illness by questionnaire: A technique for the identification and assessment of non-psychotic psychiatric illness*. Oxford, England: Oxford University Press; 1972.
 62. Jenkins CD, Stanton B-A, Niemcryk SJ, Rose RM. A scale for the estimation of sleep problems in clinical research. *J Clin Epidemiol.* 1988;41(4):313–321. doi:10.1016/0895-4356(88)90138-2. PMID:3351539.
 63. Kessler RC, Borges G, Walters EE. Prevalence of and risk factors for lifetime suicide attempts in the National Comorbidity Survey. *Arch Gen Psychiatry.* 1999;56(7):617–626. doi:10.1001/archpsyc.56.7.617. PMID:10401507.
 64. Lindfors P, Meretoja O, Luukkonen R, Elovainio M, Leino T. Suicidality among Finnish anaesthesiologists. *Acta Anaesthesiol Scand.* 2009;53(8):1027–1035. doi:10.1111/j.1399-6576.2009.02014.x. PMID:19572941.
 65. Efron B, Tibshirani R. Bootstrap methods for standard errors, confidence intervals, and other measures of statistical accuracy. *Stat Sci.* 1986;1(1):54–75. doi:10.1214/ss/1177013815.
 66. Schwartz RW, Barclay JR, Harrell PL, Murphy AE, Jarceky RK, Donnelly MB. Defining the surgical personality: a preliminary study. *Surgery.* 1994;115(1):62–68. PMID:8284763.
 67. Gough HG, Bradley P, McDonald Js. Performance of residents in anesthesiology as related to measures of personality and interests. *Psychol Rep.* 1991;68(3):979–994. doi:10.2466/pr0.1991.68.3.979. PMID:1891552.
 68. Manczak EM, DeLongis A, Chen E. Does empathy have a cost? Diverging psychological and physiological effects within families. *Health Psychol.* 2016;35(3):211–218. doi:10.1037/hea0000281. PMID:26348495.
 69. Markert RJ, Rodenhauer P, El-Baghdadi MM, Juskaite K, Hillel AT, Maron BA. Personality as a Prognostic Factor for Specialty Choice: A Prospective Study of 4 Medical School Classes. *Medscape J Med.* 2008;10(2):49. PMID:18382718.
 70. Hawton K, Clements A, Sakarovich C, Simkin S, Deeks JJ. Suicide in doctors: a study of risk according to gender, seniority and specialty in medical practitioners in England and Wales, 1979–1995. *J Epidemiol Community Health.* 2001;55(5):296–300. doi:10.1136/jech.55.5.296. PMID:11297646.
 71. Leigh JP, Kravitz RL, Schembri M, Samuels SJ, Mobley S. Physician career satisfaction across specialties. *Arch Intern Med.* 2002;162(14):1577–1584. doi:10.1001/archinte.162.14.1577. PMID:12123400.
 72. Magnus K, Diener E, Fujita F, Pavot W. Extraversion and neuroticism as predictors of objective life events: A longitudinal analysis. *J Pers Soc Psychol.* 1993;65(5):1046–1053. doi:10.1037/0022-3514.65.5.1046. PMID:8246112.
 73. Emmons RA, Diener E, Larsen RJ. Choice of situations and congruence models of interactionism. *Pers Individ Differences.* 1985;6(6):693–702. doi:10.1016/0191-8869(85)90080-7.
 74. Elovainio M, Heponiemi T, Vänskä J, et al. [How well are Finnish physicians in the 21st century?] Miten suomalaisen lääkäri voi 2000-luvulla?. *Suomen Lääkärilehti [Finnish Medical Journal]*. 2007(62):20–21.
 75. Heponiemi T, Kouvonen A, Vänskä J, et al. Effects of active on-call hours on physicians’ turnover intentions and well-being. *Scandinavian journal of work, environment & health.* 2008;34(5):356–363.