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## **Portal to care: general practitioners' decision-making on child and youth mental health problems and the influence of their (lived) experience**

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### **Citation**

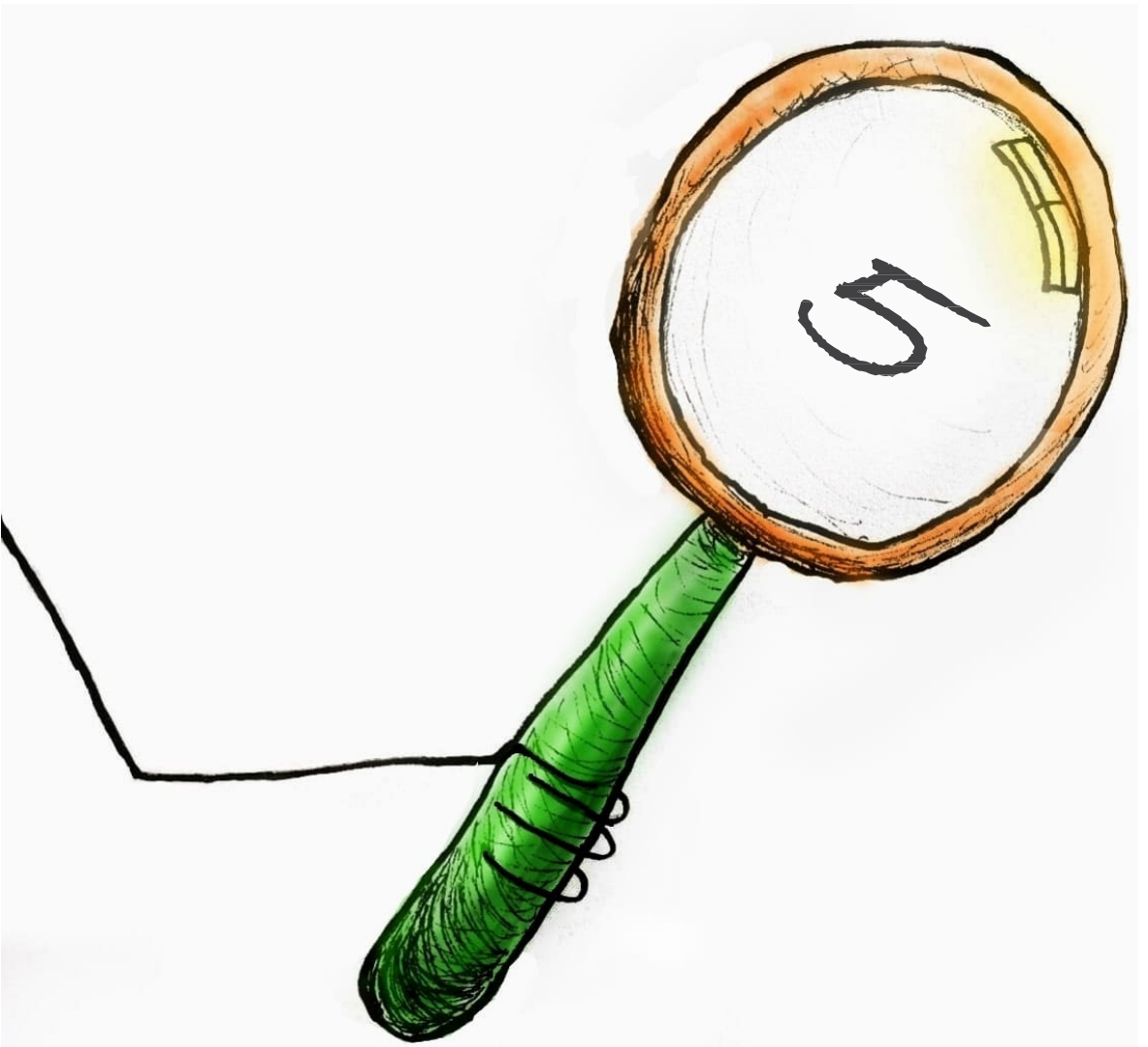
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## **Chapter 5 - Prevalence and risk factors of burnout-related symptoms in medical interns**

(Under review at European Review of Applied Psychology)

### **Abstract**

#### **Introduction**

The stressors that medical students are exposed to may increase the risk of stress-related symptoms.

#### **Objective**

We aimed to investigate the prevalence and correlates of burnout-related symptoms among medical interns.

#### **Method**

An extensive questionnaire was sent to 709 medical interns to assess burnout-related symptoms, work engagement, work pace and quantity, need for recovery, and dispositional optimism, of whom 426 responded (60.1%). The groups with and without burnout-related symptoms were compared using multivariable logistic regression analysis, to yield independent correlates for burnout-related symptoms.

#### **Results**

Of the interns 30.5% fulfilled criteria for moderate to severe symptoms indicative of burnout, and 16 (3.8%) of severe symptoms. This prevalence was higher than the Dutch reference group, mainly due to increases in emotional exhaustion (95% CI 17.1-17.9) and depersonalisation (95% CI 7.3-7.7), but not of personal accomplishment. Independent correlates for burnout-related symptoms were low levels of work dedication (95% CI 0.26-0.79), high work pace and quantity (95% CI 1.01-1.06), high need for recovery (95% CI 1.02-1.05) and low dispositional optimism (95% CI 0.78-0.95).

#### **Conclusion**

The prevalence of burnout-related symptoms among medical interns was high and associated with workload- and personality-related risk factors. Future initiatives should aim at timely identifying risk factors in young doctors to prevent burnout symptoms through organisation-directed interventions.

## **Introduction**

Life as a doctor or medical student poses particular challenges and stressors, which can impact on quality of life (Dyrbye et al., 2005; Henning et al., 2009). Medical schools are thought to be stressful environments for medical students, which may increase incidences of stress-related symptoms in this population (Puthran et al., 2016). In the last few years, multiple studies on this phenomenon were published, many of them focusing on burnout-related symptoms (Puthran et al., 2016; Silva et al., 2017; van Venrooij et al., 2015; Dyrbye et al., 2006, 2017; Wolf and Rosenstock, 2017; Fares et al., 2016; Seweryn et al., 2015; IsHak et al., 2013). Adverse affective states among medical students, such as burnout-related symptoms, may lead to impaired development on the social, academic and personal dimension (Dyrbye et al., 2005; Hope and Henderson, 2014). According to recent literature, burnout-related symptom prevalences vary from 45 to 71%, depending on used measurement instrument, study phase in the medical education and nationality of medical students (van Venrooij et al., 2015; IsHak et al., 2013; Hope and Henderson, 2014). Furthermore, in the literature, no fewer than 142 different characterisations of burnout have been used, leading to a wide variety of prevalence estimates (Rotenstein et al., 2018). The definition which is by far the most commonly used in the literature is the definition by Maslach and Jackson: ‘Burnout is a syndrome of emotional exhaustion, depersonalisation, and reduced personal accomplishment that can occur among individuals who do ‘people work’ of some kind (Maslach et al., 1997)’, which we have also employed in the current study. Traditionally, burnout is thought to manifest later in a career, after idealism and enthusiasm may have given way to routine and monotony in some. However, the last decade has shown burnout-related symptoms to be more prevalent in junior compared to senior doctors, which has been given increasing coverage in popular media (IsHak et al., 2013). Two studies on the prevalences of adverse affective states among Dutch preclinical medical students showed prevalences of self-reported stress-related symptoms of 20% and burnout-related symptoms of 46% (van Venrooij et al., 2015; Gaspersz et al., 2012). However, when medical students changed from theoretical studies to patient-centered internships as part of the medical curriculum, they appeared to be at particular high risk of burnout-related symptoms (IsHak et al., 2013). During this phase

of graduate training, they need to find a balance between training and private life. This transition is sometimes perceived as stressful, especially when interns feel that they are being overburdened. This is illustrated by relative high prevalence proportions of burnout-related symptoms in interns in the literature, ranging from 28 to 61% (IsHak et al., 2013).

Several risk and protective factors for burnout-related symptoms in medical professionals have been identified. The risk for burnout is evidently increased by a higher workload and work pace. Moreover, it is higher in those medical professionals who are younger, are at the start of their career, do not have a partner and do not have children (Demerouti et al., 2001). Women tend to experience more emotional exhaustion compared to men, whereas men tended to score higher on depersonalisation compared to women (Backovic et al., 2012). The type of medical specialty did not affect burnout-related symptoms among residents in one study (Martini et al., 2004).

There is evidence that intrapersonal skills and personality traits may serve as either risk factors for and protective factors against burnout. A sense of engagement with work may be a protective factor against burnout-related symptoms. Engagement can be defined as a separate construct, but there is some construct overlap as the opposite of burnout (Demerouti et al., 2001; Schaufeli and Bakker, 2003). To our knowledge, no research has been performed on possible relationships between engagement and burnout-related symptoms among medical interns. A high *need for recovery* (NFR), that is the need to recuperate from work-induced fatigue, experienced after a day of work, can also be a risk factor for burnout (Dyrbye et al., 2010; Jansen et al., 2002). Dispositional optimism, being a stable personality trait defined as the generalised tendency towards positive outcome expectations, is considered protective against development of somatic illness and depressive symptoms (Giltay et al., 2006). Previous literature showed no independent correlation between dispositional optimism and burnout-related symptoms (van Venrooij et al., 2015). However, it would be interesting to explore further the relation with dispositional optimism, as high optimism may increase resilience against burnout-related symptoms in medical interns.

In order to fill up above-mentioned spaces in the literature, we aimed to assess the prevalence of burnout-related symptoms among medical interns using the Dutch version of the Maslach Burnout Questionnaire-General Survey (UBOS-GS) (Maslach et al., 1997; Schaufeli and van Dierendonck, 2000). In addition, the independent risk factors for burnout-related symptoms were explored using a set of six questionnaires. We hypothesised that the prevalence would be increased relative to the general working population, with increased emotional exhaustion most pronounced, and that there would be unique intrapersonal protective factors involved such as work engagement and dispositional optimism. Such factors may be key to find the balance between patient care and self-development.

## **Methods**

The term medical intern can lead to confusion. A medical intern is a term used in the United States for a physician in training who has completed medical school. In many other countries, like the Netherlands, undergraduate medical education ends with a period of practical training called *internships*. The medical study at the LUMC consists of a bachelor and master program of 3 years each. The last 3 years comprise internships, starting in the second year of the master program. All medical interns and recently graduated physicians registered at the *Office of Education and Training* of the LUMC at the 1<sup>st</sup> of May 2013 were included. They were sent an email explaining the goal of the study with an attachment containing background information. They were asked to participate via an online self-report questionnaire. The respondents were asked to answer a total of six validated questionnaires, of which one was used to assess the prevalence of burnout-related symptoms and five were used to explore possible risk and protective factors. Participation in the study was voluntary. As an incentive for taking part in the study, fifteen gift certificates were raffled. Prior to the study, a declaration of no objection was granted by the Institutional Ethics Review Board of LUMC (see below).

### ***Data collection***

Over the course of 1 month, data were anonymously collected using an online survey-tool. All medical interns who did not complete the set of questionnaires were sent three email reminders and one reminder sent in a posted letter to their home address. Promotional activities were undertaken in the form of posters at the university and affiliated hospitals and via social media.

### ***Measurement instruments***

Five (sections of) questionnaires were included based on previous research (Dyrbye et al., 2010; Giltay et al., 2006; Prins et al., 2010). Demographics include gender, age, date of internship start, current internship, mother language, university where preclinical years were followed, partnership status, housing arrangements, number of children, number of sick leave days in past year. Furthermore, medical interns were asked to answer questions based on the past two weeks of internships: the number of hours per week spent on their internship including studying time, number of hours slept on average per night, loss of sleep due to their internship, self-rated physical health and self-rated psychological health. Lastly, we assessed overall happiness (on a Likert scale from 0 to 10).

### ***Maslach Burnout Inventory (MBI)***

Burnout-related symptoms were measured with the Dutch translation of the *Maslach Burnout Inventory* (MBI), the *Utrechtse BurnOut Schaal* (UBOS) (Maslach et al., 1997; Schaufeli and van Dierendonck, 2000). According to the definition by Maslach and Jackson, it measures three domains of burnout: emotional exhaustion/U-subscale (8 items, Cronbach's  $\alpha$  in this study = 0.88), depersonalisation/D-subscale (5 items,  $\alpha$  = 0.68) and personal accomplishment/C-subscale (7 items,  $\alpha$  = 0.76). These Cronbach's alphas were comparable to those previously published (Maslach et al., 1997). Table I describes a hierarchical solution from Omega analysis in R on the individual items of the UBOS, that applies the Schmid-Leiman transformation (R Foundation, 2021; Table I). In order to provide evidence of construct validity of the MBI, a confirmatory factor analysis (CFA) was conducted with burnout as the



second-order factor and burnout's components as first-order factors. Therefore, we used several indices for evaluating the model fit: the Comparative Fit Index (CFI), the Tucker-Lewis Index (TLI), the standardised root mean square residual (SRMR), and the root mean square error of approximation (RMSEA) and its 90% confidence interval (CI). To evaluate the fit indices, the following cut-off criteria were used: (1) for CFI and TLI, values of  $>0.9$  indicate good model fit,  $0.8-0.9$  indicate acceptable fit,  $<0.8$  indicate poor fit; (2) for RMSEA, values of  $<0.05$  indicate close fit,  $0.05-0.10$  indicate adequate fit,  $>0.10$  indicate poor fit; (3) for SRMR, values of  $<0.08$  indicate acceptable fit (Byrne, 1989; Brown, 2006; Hu and Bentler, 1999; Table II).

Items were rated on a 7-point Likert scale of 0-6 (0=never, 6=always or daily). A high mean score on emotional exhaustion and depersonalisation or a lower mean score on personal accomplishment was considered indicative of being 'burned out'. Unlike the original version of the MBI, the UBOS provides cut-off scores for moderate to severe burnout. A person is considered to suffer from moderate burnout-related symptoms if he or she has either a sum score  $\geq 19.92$  on emotional exhaustion and  $> 7.95$  (women) or  $> 8.95$  (men) on depersonalisation, or a sum score  $\geq 19.92$  on emotional exhaustion and  $\leq 25.97$  on personal accomplishment. A person is considered to suffer from severe burnout-related symptoms if he or she has either a sum score  $\geq 28.96$  on emotional exhaustion and  $\geq 10.15$  on depersonalisation, or a sum score  $\geq 28.96$  on emotional exhaustion and  $\leq 24.29$  on personal accomplishment. To date, these cut-off scores have not been extensively validated as a diagnostic tool in clinical practice. Therefore, further studies are needed on the MBI/UBOS to assess its validity as a screening tool for clinical psychodiagnostics in individuals (Schaufeli and van Dierendonck, 2000). A case is 'diagnosed' as being burned out if the individual scores above the 75<sup>th</sup> percentile on the EE- and DP scale or below the 25<sup>th</sup> percentile on the PA-scale (Schaufeli and van Dierendonck, 2000). This decision rule has been validated in multiple accuracy analyses (Maslach et al., 2009). For example, one study compared UBOS scores of 44 well-functioning individuals with those of 29 individuals diagnosed as suffering from burnout, in order to develop a guideline for obtaining a dichotomous measure of burnout (Brenninkmeijer and VanYperen, 2003). The reference data presented in the manual were based on 10,552 Dutch health care employees.

This is a heterogeneous group of people from various medical professions in different medical settings (i.e. doctors, nurses, dentists and paramedics). The mean age of the reference group was 37 years and 55% was male (Schaufeli and van Dierendonck, 2000).

#### *Utrecht Work Engagement Scale (UWES)*

Engagement was measured using the 9-item *Utrecht Work Engagement Scale* (UWES) (Prins et al., 2010). Items were rated on a 7-point Likert scale. The questionnaire has good psychometric properties and consists of three engagement subscales: vigor (3 items, Cronbach's  $\alpha$  in present study 0.83), dedication (3 items,  $\alpha = 0.85$ ) and absorption (3 items,  $\alpha = 0.74$ ).

#### *Work Pace and Quantity Scale (WPQ) and Need for Recovery Scale (NFR)*

Work pace and quantity (WPQ) and need for recovery (NFR), both sections of the *Questionnaire on Perception and Assessment of Labour*, were used (van Veldhoven et al., 2002). The WPQ-scale contains 11 statements about work pace and quantity, which are rated on a 4-point frequency scale. Reference values were provided in the Dutch manual and were based on 97,132 subjects. The NFR-scale measures if professionals experience problems in recovering from the efforts and stress at work. The scale consists of 11 statements, of which the employee is asked to indicate whether the statement applies to him or her (yes=1, no=0). Higher sum scores indicate a higher level of NFR, with a cut off value of 6 considered as increased NFR.

#### *Life Orientation Test-Revised (LOT-R)*

Dispositional optimism was assessed by using the *Life Orientation Test-Revised* (LOT-R) (Glaesmer et al., 2012). The LOT-R consists of ten items of which four statements are filler items. These items are not used in scoring. The six items are scored on a 5-point Likert scale. Three negatively worded items were

reversely coded for computation of the LOT-R sum score, ranging from 0 to 24, with higher scores indicative of higher optimism. Low dispositional optimism was defined yielding a sum score of 12 or lower (van de Rest et al., 2010).

## **Data analysis**

Descriptive analyses were used to describe medical interns' demographic and internship-specific characteristics and to examine the prevalences of burnout-related symptoms and work engagement. T-tests for independent samples were used to compare outcomes for interns with those of the Dutch reference group. One sample t-tests were done to compare subscale means to the reference values. Cohen's *d* effect sizes (standardised difference in means) were used to gain insight into the clinical relevance of differences. A Cohen's *d* effect size of  $\leq 0.20$  indicates a negligible difference, an effect size of 0.20–0.50 indicates a small difference, 0.50–0.80 a medium and  $>0.80$  a large difference. Chi-squared test and t-tests for independent samples were used for comparisons among the groups with and without burnout-related symptoms. Logistic regression analyses were used to compare potential independent correlates among these groups, in which we included all correlates with a significance level  $<0.10$  in the multivariable model. This yielded odds ratios (OR) with their accompanying 95% confidence intervals (CI). All tests were two-tailed with  $p < 0.05$  denoting statistical significance. Data were analysed with SPSS 26.0 statistical software (SPSS Inc). The omega coefficient was used as an estimate of reliability, with a Schmid Leiman transformation. The “lavaan” (version 0.6-9) and “psych” (version 2.0.12) packages for the R statistical software were used for the CFA and omega analyses (R version 4.0.3; R Foundation for Statistical Computing, Vienna, Austria, 2016. URL: <https://www.R-project.org/>).

## **Results**

### **Reliability of the Maslach Burnout Inventory (MBI)**

The MBI (Dutch UBOS) contained eight items for the emotional exhaustion domain, five items for the depersonalisation domain and seven items for the personal accomplishment domain (Maslach et al., 1997;

Schaufeli and van Dierendonck, 2000). The (Omega) exploratory factor analysis showed that all items correlated with the general factor 'burnout' (range: 0.21-0.55), except for 'I feel fatigued when I get up in the morning and have to face another day on the job'. The total Omega was 0.90 and the Cronbach's alpha was 0.87. Communality ( $h^2$ ) ranged from 0.18 – 0.72, uniqueness ( $u^2$ ) from 0.28 – 0.82 (Table I). Furthermore, confirmatory factor analysis yielded an adequate fit between the three-factor with 20-item model structure and the data (Table II), confirming the three-factor structure described by Maslach et al. (1997; Maslach et al., 1997). The fit indices from the confirmatory factor analysis showed a CFI of 0.848, a TLI of 0.828, a RMSEA of 0.081 (90%CI: 0.074 - 0.088) and a SRMR of 0.085.

### **Characteristics and prevalences of burnout-related symptoms**

Of the 709 medical interns approached, 462 responded (65.2%), of whom 426 (60.1%) completed the entire set of questionnaires. In order to analyse the possible correlates, partially completed questionnaires were excluded, resulting in a moderately sized sample ( $n=426$ ) (Figure 1). A total of 67.4% of the 426 respondents included in this study were female. The average age was 24.1 ([SD]=2.1; interquartile range [IQR]=22.8-24.8). 27% were married or cohabiting with their partners and 2% had children. Respondents had been doing their internships for an average of 1 year and 2 months (while the total length of internships is 2 years and 2 months). All students except one (0.2%) received their bachelor's degree at the LUMC (Table III).

Of the 426 interns who completed the questionnaires, 130 (30.5%) were suffering from moderate to severe symptoms indicative of burnout, 16 of whom (3.8%) were suffering from severe symptoms indicative of burnout. Moderate to severe symptoms of burnout were mainly due to increases in emotional exhaustion (17.5, SE=0.4 vs reference value of 14.5; Cohen's  $d=0.46$ ;  $p<0.001$ ) and –to a lesser extent– depersonalisation (7.5, SE=0.2 vs reference value of 6.1; Cohen's  $d=0.37$ ;  $p<0.001$ ), whereas the mean level of personal accomplishment was not decreased (Cohen's  $d=0.04$ ;  $p=0.44$ ; Figure 2).

### **Independent correlates of burnout-related symptoms**

Potential independent correlates between the groups (with and without burnout-related symptoms) were analysed using logistic regression analysis. The univariate model yielded several significant correlates (Table IV). Sociodemographic variables did not differ among subjects without and with burnout-related symptoms. These correlates were further explored in a multivariate model (in which we included all correlates with a significance level  $p < 0.10$ ). The odds ratios for burnout were decreased for the UWES-dimension dedication (OR: 0.45; 95% CI: 0.26-0.79) and dispositional optimism (OR: 0.86; 95% CI: 0.78-0.95). The odds ratios for burnout-related symptoms were increased for work pace and quantity (OR: 1.03; 95% CI: 1.01-1.06) and need for recovery (OR: 1.04; 95% CI: 1.02-1.05; Table IV).

### **Discussion**

Our main finding was that 30.5% of medical interns fulfilled the criteria for moderate to severe burnout-related symptoms, with 3.8% suffering from severe symptoms indicative of burnout. Mainly increased emotional exhaustion and to a lesser extent increased depersonalisation were the dimensions of burnout most affected. The independent correlates we found suggested that there are risk factors and protective factors involved. The multivariate analysis of these factors showed high work pace and quantity, low dedication, high need for recovery, and low dispositional optimism to be the independent risk factors.

Our findings fit within the prevalence range identified in previous studies done in populations consisting not only of medical interns, but also of medical students and residents (van Venrooij et al., 2015; Dyrbye et al., 2006, 2011; IsHak et al., 2013; Hope and Henderson, 2014; Prins et al., 2007; Ripp et al., 2011). In comparison, a national survey among the general Dutch workforce showed that only 13% of this study population suffered from burnout-related symptoms (Koppes et al., 2011). This strongly suggests that the prevalence of burnout-related symptoms among the interns of the institution we examined is higher compared to the general working population. Preclinical medical students of our university hospital, also reported a high prevalence of 46.0% of burnout-related symptoms. The latter prevalence seems higher as

both studies used the Maslach Burnout Inventory, but different reference populations were used causing cut-off values to be slightly lower in the study among preclinical medical students. Furthermore, the 2015 study used the MBI-GS, which uses slightly different wordings in order to be more comprehensive to medical students (van Venrooij et al., 2015). Our findings fit well with the previously published prevalence proportions of burnout-related symptoms in medical interns that ranged from 28 to 61% (Puthran et al., 2016; Silva et al., 2017; van Venrooij et al., 2015; Dyrbye et al., 2006, 2017; Wolf and Rosenstock, 2017; Fares et al., 2016; Seweryn et al., 2015; IsHak et al., 2013).

Risk factors identified in our analyses may help to better target primary and secondary preventive action against burnout-related symptoms. Previous studies have identified some effective interventions. A systematic review of 13 controlled trials has demonstrated that there are few high quality studies, resulting in evidence for a few strategies like mindfulness-based stress reduction, meditation and pass/fail grading - in which study results are documented and presented as 'passed' or 'failed', instead of using a grading system (Shiralkar et al., 2013). In 2014, a randomised clinical trial amongst physicians in the U.S. found evidence for a biweekly facilitated physician discussion, with sustained results 12 months after the study (West et al., 2014). This promising approach fits well with the risk factors identified in the present study, as both levels of depersonalisation and emotional exhaustion decreased and work dedication was found to increase due to the intervention. However, more research is necessary whether this approach is also beneficial when implemented among medical students. As dispositional optimism was the strongest correlate of burnout-related symptoms found in this study, a specific approach to enhancing optimism would potentially decrease the risk of burnout-related symptoms. Interventions like *Best-Possible-Self Mental Imagery* are promising, which may help to increase (long term) optimism (Blackwell et al., 2013). Motivation and encouragement of personal strengths related to dispositional optimism and work engagement during discussion groups may help to address this.

In the Netherlands, several initiatives that target risk factors for burnout-related symptoms have been taken. For example, the LUMC initiated a mentoring program for medical interns. Furthermore, the

Netherlands Association of Medical Education installed a nationwide workgroup which focuses on future health care professionals' well-being. These are two steps on the road to a sustainable workforce, in which job satisfaction is integrated in its working culture. However, there are still many steps to take.

Risk factors that have been identified in previous studies include, for example, experiencing a major illness, being on a rotation which requires being on call and psychiatric morbidity (only a risk factor for emotional exhaustion) (IsHak et al., 2009). This study also found several robust correlates of burnout-related symptoms. First, work pace and quantity were especially strongly associated with burnout-related symptoms and its dimension emotional exhaustion (Barilan et al., 2011). It is evidently hard to change the workload. Reducing intern working hours in the US has not prevented against adverse outcomes like depressive symptoms, poor general well-being, and medical errors (Sen et al., 2013). Furthermore, previous literature recommended that preventive and therapeutic action should mainly target personality trait-related factors and need for recovery, rather than work-related factors (van Venrooij et al., 2015). Second, the need for recovery was another strong risk factor of burnout-related symptoms. A large cross-sectional study among over 12,000 employees found that the need for recovery was higher in those suffering from burnout-related symptoms and found it to be a separate entity from fatigue (Jansen et al., 2002). Third, of the correlates found in our study, UWES-dedication and dispositional optimism were strongly associated with burnout-related symptoms. Engagement (scored on the UWES) was previously found to be protective against burnout-related symptoms (Demerouti et al., 2001; Backovic et al., 2012; Martini et al., 2004; Schaufeli and Bakker, 2003; Dyrbye et al., 2010; Jansen et al., 2002; Giltay et al., 2006; Schaufeli and van Dierendonck, 2000; Prins et al., 2010). In the present study, the dimension dedication (rather than vigour and absorption) was independently inversely associated with burnout-related symptoms. Dedication refers to being strongly involved in one's work and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge (Schaufeli and Bakker, 2003). Medical professionals and young doctors specifically are possibly prone to experiencing more dedication than the average employee, as a study among residents has shown (Prins et al., 2010). Fourth, besides a protective

effect against depressive symptoms, dispositional optimism was inversely associated with burnout-related symptoms in various previous studies among academic staff (Giltay et al., 2006; Barkhuizen et al., 2014). The present study underlines this effect, supporting dispositional optimism as a personality trait that may protect against the development of burnout-related symptoms.

### **Strengths and limitations**

Our study contains several strengths, among which the response rate (61%), which is higher compared to other similar online questionnaires (van Holland et al., 2007; Cook et al., 2000; Tjebkink et al., 2014). The multivariable analyses of the several potentially important factors, including positive psychology ones, allowed for a clear overview of the meaningful intrapersonal factors involved in burnout-related symptoms. Furthermore, combined with the results of the 2015 study, our study provides insight into the medical student population at the LUMC as a whole. Our findings should also be interpreted in the light of some limitations. First, we included solely medical interns from one of the eight academic medical centers in the Netherlands, so these findings are not necessarily generalisable to other university centres, nationally or internationally. Second, this study has a cross-sectional design, which cannot disentangle cause from effect. Third, we used self-report questionnaires which are inherently affected by a person's feelings at the time of filling out the questionnaire. Fourth, we presented data which were obtained in 2013, which one may consider as somewhat outdated. Fifth, while being an important risk factor for burnout and low work engagement (Schaufeli et al., 2017), the personality trait of neuroticism was not measured in this study (Bianchi et al., 2021). Sixth, as burnout prevalence data for other groups of Dutch medical interns are lacking in the literature, we could only compare our findings to those from different countries, which also found high prevalence rates (Shanafelt et al., 2015; Brazeau et al., 2014). Another study among Dutch medical interns on health behavior and care needs has shown similar demographics with regards to the gender distribution (67.4% female in our study vs. 70.3% in their study), but differed with regards to ethnicity (93.0% has Dutch as their native language vs. 79.4% being native in their study) (Van der Veer et al., 2011). Finally, the CFA we have conducted on the UBOS showed that the fit of the



domains to the model was not high in this population.

## **Conclusions**

We conclude that prevalence of burnout-related symptoms was high among medical interns in this study, and associated with workload- and personality-related factors. In order to confirm these correlates as risk factors, prospective studies in which interns are followed during their rotations are needed. Identifying these risk factors may be important to develop effective (organisation-directed) interventions and preventive strategies in medical schools (Panagioti et al., 2017). By reducing seemingly highly prevalent burnout-related symptoms, these strategies ultimately aim at assisting young doctors to enjoy their work, build resilience, and develop a professional level of work engagement.

## **Research ethics and informed consent**

The study was in accordance with the Declaration of Helsinki. A declaration of no objection was granted by the Institutional Ethics Review Board (ERB) of LUMC. This declaration means the Committee has only checked the research proposal in terms of completeness and the protection of the privacy of participating subjects. Furthermore, no persons were subjected to a treatment or were required to behave in a certain manner (ERB-identification number P13.078). All participants were asked to give informed consent online prior to filling in the questionnaire.

## **Declaration of Competing Interest**

Conflict of interest: none.

## **Contributors**

Erik Giltay, Jan van Lith, Daniëlle Eindhoven, Jill Mentink, Arnout Jan de Beaufort, Jacqueline Bustraan, Vivianne de Croon-Koevoets, Pieter Barnhoorn and Floor Tilmans contributed to the conception and

design of the research. Floor Tilmans, Erik Giltay en Pieter Barnhoorn worked on the acquisition of the data, Lennard van Venrooij provided additional assistance with regard to analysis and interpretation of the data. Floor Tilmans and Lennard van Venrooij conducted literature searches and contributed to the writing of the manuscript. All authors commented on the manuscript regularly and have approved the final version.

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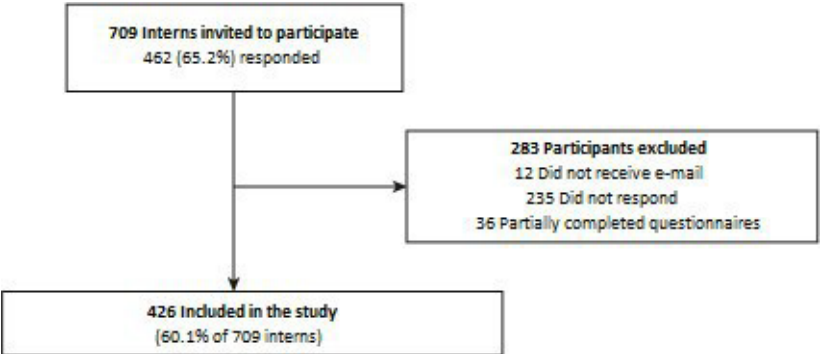
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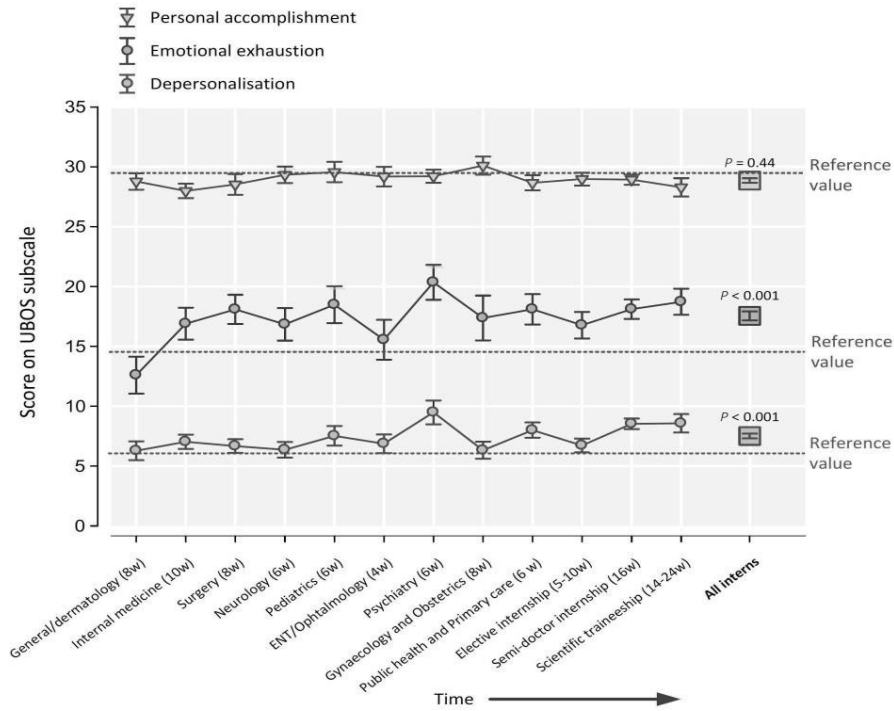
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**Figure 1. Flowchart of participants (n=426)**





**Figure 2. Burnout-subscale scores per internship and reference values in medical interns (n=426)<sup>1</sup>**



<sup>1</sup> Error bars represent standard errors. The reference lines were based on data from 10.552 Dutch health care employees (Schaufeli and van Dierendonck, 2000; Koppes et al., 2011).

**Table I. The hierarchical solution from Omega analysis in R on the individual items of the UBOS**

UBOS domains and items	g	F1*	F2*	F3*	h2	u2	p2
<b>Emotional exhaustion:</b>							
1. I feel emotionally drained from my work	0.29	0.77			0.68	0.32	0.13
2. I feel used up at the end of the workday	0.27	0.72			0.59	0.41	0.12
3. I feel fatigued when I get up in the morning and have to face another day on the job		0.65			0.46	0.54	0.07
4. Working with people all day is really a strain for me	0.55	0.29		0.29	0.51	0.49	0.61
5. I feel burned out from my work	0.38	0.76			0.72	0.28	0.20
6. I feel frustrated by my job	0.41	0.57			0.52	0.48	0.33
7. I feel I am working too hard on my job	0.23	0.42			0.28	0.72	0.20
8. I feel like I am at the end of my rope	0.32	0.72			0.63	0.37	0.16
<b>Depersonalisation:</b>							
1. I feel I treat some recipients as if they were impersonal objects	0.34			0.24	0.20	0.80	0.57
2. I have become more callous toward people since I took this job	0.46	0.29		0.31	0.39	0.61	0.54
3. I worry that this job is hardening me emotionally	0.46	0.42		0.26	0.45	0.55	0.46
4. I don't really care what happens to some recipients	0.41			0.31	0.28	0.72	0.60
5. I feel recipients blame me for some of their problems	0.34			0.24	0.20	0.80	0.57
<b>Personal accomplishment:</b>							
1. I can easily understand how my recipients feel about things	0.41	-0.21	0.36	0.25	0.41	0.59	0.42
2. I deal very effectively with the problems of my recipients	0.25		0.52		0.34	0.66	0.18
3. I feel I'm positively influencing other people's lives through my work	0.26		0.53		0.36	0.64	0.18
4. I can easily create a relaxed atmosphere with my recipients	0.41	-0.21	0.36	0.25	0.41	0.59	0.42
5. I feel exhilarated after working closely with my recipients	0.41		0.53		0.46	0.54	0.37
6. I have accomplished many worthwhile things in this job	0.33		0.49		0.36	0.64	0.29
7. In my work, I deal with emotional problems very calmly	0.21		0.32		0.18	0.82	0.24

\*Schmid Leiman Factor loadings greater than 0.2 are given. The total Omega was 0.90 and the Cronbach's alpha was 0.87. Items from the Personal accomplishment domain were reverse coded. The h2 refers to the amount of variance in the item explained by the (retained) factors (i.e., communality), and the u2 refers to 1 - h2 (i.e., residual variance, uniqueness).

**Table II. Confirmatory factor analysis (CFA) of the UBOS items**

UBOS domains and items		Estimate	Standard Error	z-value	p-value
<b>Emotional exhaustion:</b>					
1.	I feel emotionally drained from my work	1.000			
2.	I feel used up at the end of the workday	0.998	0.056	17.914	0.000
3.	I feel fatigued when I get up in the morning and have to face another day on the job	0.817	0.058	14.206	0.000
4.	Working with people all day is really a strain for me	0.634	0.057	11.122	0.000
5.	I feel burned out from my work	1.148	0.055	21.056	0.000
6.	I feel frustrated by my job	0.910	0.059	15.523	0.000
7.	I feel I am working too hard on my job	0.623	0.064	9.773	0.000
8.	I feel like I am at the end of my rope	1.094	0.059	18.459	0.000
<b>Depersonalisation:</b>					
1.	I feel I treat some recipients as if they were impersonal objects	1.000			
2.	I have become more callous toward people since I took this job	2.021	0.271	7.465	0.000
3.	I worry that this job is hardening me emotionally	2.139	0.282	7.581	0.000
4.	I don't really care what happens to some recipients	0.951	0.163	5.837	0.000
5.	I feel recipients blame me for some of their problems	0.986	0.168	5.870	0.000
<b>Personal accomplishment:</b>					
1.	I can easily understand how my recipients feel about things	1.000			
2.	I deal very effectively with the problems of my recipients	0.995	0.127	7.837	0.000
3.	I feel I'm positively influencing other people's lives through my work	1.434	0.178	8.073	0.000
4.	I can easily create a relaxed atmosphere with my recipients	1.334	0.151	8.832	0.000
5.	I feel exhilarated after working closely with my recipients	1.541	0.168	9.177	0.000
6.	I have accomplished many worthwhile things in this job	1.537	0.180	8.548	0.000
7.	In my work, I deal with emotional problems very calmly	0.961	0.157	6.107	0.000

Comparative Fit Index (CFI) = 0.848; Tucker-Lewis Index (TLI) = 0.828; RMSEA = 0.081 (90%CI: 0.074 – 0.088), SRMR 0.08

**Table III. Characteristics of medical interns (n=426)**

<b>Variable</b>	<b>Data</b>
Socio-demographic variables	
Female sex – n (%)	287 (67.4)
Age, year – mean±SD	24.1±2.1
Age, year – range (IQR)	20–38 (22.8–24.8)
Total duration of internships, months – mean±SD	13.6±8.6
Partnership status – n (%)	
Single	164 (38.5)
Living alone, having a partner	144 (33.8)
Married or living together with partner	118 (27.7)
Housing situation – n (%)	
With parents	38 (8.9)
Student housing (shared facilities)	157 (36.9)
Private housing (own facilities)	231 (54.2)
Having no children – n (%)	419 (98.4)
Native language Dutch – n (%)	396 (93.0)
Possible correlates for burnout-related symptoms	
Working hours – mean±SD	53.5 (16.8)
Hours of sleep per night – mean±SD	6.87 (0.80)
High amount of sleep loss due to internship <sup>1</sup> – n (%)	67 (15.7)
Poor self-rated physical health <sup>2</sup> – n (%)	110 (25.8)
Poor self-rated mental health <sup>2</sup> – n (%)	107 (25.1)
Sick leave days in past year – mean±SD	3.21±4.72
Ten or more sick leave days in past year – n (%)	51 (12.0)
Happiness (0-10) – mean±SD	7.43±1.40

SD, Standard deviation; IQR, interquartile range.

<sup>1</sup> High amount of sleep loss was defined as a score (on a Likert scale from 1 to 5) of equal to or above 4.

<sup>2</sup> Low self-rated physical or mental health was defined as a score (on a Likert scale from 1 to 5) of equal to or below 2.

**Table IV. Comparisons between 426 medical interns with and without burnout-related symptoms (n=426)**

	Univariate			Multivariate		
	No burnout (n=296)	Burnout (n=130)	P-value	OR (95% CI)	P-value	Wald (df)
Socio-demographic variables						
Female sex - n (%)	196 (66.2)	91 (70.0)	0.44			
Age, year – mean±SE	24.1±0.13	24.2±0.19	0.91			
Total duration of internships (years) – mean±SE	1.13±0.04	1.16±0.06	0.71			
Partnership status – n (%)						
Single	117 (39.5)	47 (36.2)	0.50			
Living alone, having a partner	102 (34.5)	42 (32.3)				
Married or living together with partner	77 (26.0)	41 (31.5)				
Housing situation - n (%)						
With parents	22 (7.40)	16 (12.3)	0.26			
Student housing (shared facilities)	112 (37.8)	45 (34.6)				
Private housing (own facilities)	162 (54.7)	69 (53.1)				
Having no children – n (%)	292 (98.6)	127 (97.7)	0.48			
Native language Dutch – n (%)	279 (94.3)	117 (90.0)	0.11			
Possible correlates for burnout-related symptoms						
Working hours – mean±SE	52.5±0.96	55.8±1.56	0.06	1.01 (0.99-1.03)	0.49	0.48 (1)
Hours of sleep per night – mean±SE	6.90±0.05	6.81±0.07	0.33			
High amount of sleep loss due to internship <sup>1</sup> – n (%)	<b>32 (10.8)</b>	<b>35 (26.9)</b>	<b>&lt;0.001</b>	1.14 (0.50-2.58)	0.75	0.10 (1)
Poor self-rated physical health <sup>2</sup> – n (%)	<b>49 (16.6)</b>	<b>61 (46.9)</b>	<b>&lt;0.001</b>	1.94 (0.98-3.84)	0.06	3.66 (1)
Poor self-rated mental health <sup>2</sup> – n (%)	<b>44 (14.9)</b>	<b>63 (48.5)</b>	<b>&lt;0.001</b>	1.02 (0.50-2.08)	0.95	0.003 (1)
Days off sick in past year – mean±SE	<b>2.74±0.24</b>	<b>5.74±0.50</b>	<b>0.002</b>	0.98 (0.89-1.09)	0.73	0.12 (1)
Ten or more sick leave days in past year – n (%)	31 (10.5)	20 (15.4)	0.15			
Utrecht Work Engagement Scale (UWES)						
UWES Vigour – mean±SE	<b>3.88±0.04</b>	<b>3.06±0.07</b>	<b>&lt;0.001</b>	0.95 (0.53-1.70)	0.86	0.03 (1)
UWES Dedication – mean±SE	<b>4.44±0.04</b>	<b>3.72±0.07</b>	<b>&lt;0.001</b>	<b>0.45 (0.26-0.79)</b>	<b>0.006</b>	<b>7.63 (1)</b>
UWES Absorption – mean±SE	<b>3.99±0.05</b>	<b>3.44±0.07</b>	<b>&lt;0.001</b>	0.78 (0.48-1.29)	0.33	0.93 (1)
Work pace and quantity score (0-100) <sup>3</sup> – mean±SE	<b>37.6±0.79</b>	<b>48.4±1.19</b>	<b>&lt;0.001</b>	<b>1.03 (1.01-1.06)</b>	<b>0.007</b>	<b>7.28 (1)</b>
Need for recovery score (0-100) <sup>4</sup> – mean±SE	<b>36.8±1.51</b>	<b>71.3±2.11</b>	<b>&lt;0.001</b>	<b>1.04 (1.02-1.05)</b>	<b>&lt;0.001</b>	<b>26.67 (1)</b>
Happiness score (0-10) – mean±SE	<b>7.86±0.06</b>	<b>6.45±0.14</b>	<b>&lt;0.001</b>	0.77 (0.59-1.00)	0.05	3.76 (1)
Optimism (LOT-R) score (0-24) <sup>5</sup> – mean±SE	<b>17.2±0.19</b>	<b>14.1±0.31</b>	<b>&lt;0.001</b>	<b>0.86 (0.78-0.95)</b>	<b>0.002</b>	<b>9.71 (1)</b>

Bold items are statistically significant at a  $\alpha < 0.05$ ; OR, Odds ratio; 95% CI, 95% confidence interval; SE, standard error of mean.

<sup>1</sup> High amount of sleep loss was defined as a score (on a Likert scale from 1 to 5) of equal to or above 4.

<sup>2</sup> Poor self-rated physical or mental health was defined as a score (on a Likert scale from 1 to 5) of equal to or below 2.

<sup>3</sup> Work pace and quantity score (0-100): higher score, the greater the work pace and quantity.

<sup>4</sup> NFR score (0-100): the greater the score, the higher the need for recovery after a working day.

<sup>5</sup> Optimism (LOT-R) score (0-24): the higher the score, the more positive one's attitude in life is.