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Published in:
 Medical Education

DOI:
[10.1111/j.1365-2923.2009.03590.x](https://doi.org/10.1111/j.1365-2923.2009.03590.x)

IMPORTANT NOTE: You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

Document Version
 Publisher's PDF, also known as Version of record

Publication date:
 2010

[Link to publication in University of Groningen/UMCG research database](#)

Citation for published version (APA):

Prins, J. T., Hoekstra-Weebers, J. E. H. M., Gazendam-Donofrio, S. M., Dillingh, G. S., Bakker, A. B., Huisman, M., ... van der Heijden, F. M. M. A. (2010). Burnout and engagement among resident doctors in the Netherlands: a national study. *Medical Education*, 44(3), 236-247. DOI: 10.1111/j.1365-2923.2009.03590.x

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Burnout and engagement among resident doctors in the Netherlands: a national study

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OBJECTIVES This study was performed in order to gather insight into the well-being of Dutch medical residents.

METHODS In 2005, all Dutch residents registered through the Medical Registration Committee ($n = 5245$) were sent a self-report questionnaire to assess socio-demographic and work-related characteristics, burnout and engagement.

RESULTS Of the 5140 eligible residents, 2115 completed the questionnaire (41%). Of those, 21% fulfilled the criteria for moderate to severe burnout and 27% were highly engaged with their work. Women reported more emotional exhaustion and less depersonalisation than men; age was weakly but significantly related to depersonalisation, and married residents and parents reported less depersonalisation than their single or childless counterparts. More men than women were found to be highly engaged and men specifically reported more vigour. Number of years in training was weakly but significantly related to absorption. With regard to

occupational risk factors, significant between-group differences were found for the effects of clinical setting on emotional exhaustion, engagement, vigour and absorption. Residents in training in a mental health clinic were most emotionally exhausted and those in a rehabilitation centre were least engaged. General surgery represented the specialty with the lowest number of residents suffering from burnout, followed by obstetrics and gynaecology and any supportive specialty. General surgery residents were also found to be more highly engaged, vigorous, dedicated and absorbed than others.

CONCLUSIONS As more than a fifth of the medical residents who responded could be diagnosed as suffering from burnout, we conclude that this problem needs addressing in the Dutch health care system, especially given that a relationship was proven between burnout and suboptimal patient care. We must look for solutions and interventions which will improve the work situation of medical residents. Striving for healthy workers in health care has to become daily practice.

Medical Education 2010; **44**: 236–247
doi:10.1111/j.1365-2923.2009.03590.x

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INTRODUCTION

In the last few years, awareness that resident doctors may be vulnerable to burnout has grown.^{1,2} Maslach *et al.*³ describe burnout as 'a prolonged response to chronic emotional and interpersonal stressors on the job defined by three dimensions: emotional exhaustion, depersonalisation, and reduced personal accomplishment.' In the limited number of studies on the prevalence of burnout in resident doctors, burnout rates varied from 18% to 82%.¹ The different methods used to measure burnout and the different interpretations used to define it may explain this large variance. A recently published pilot study⁴ among resident doctors in a university medical centre in the Netherlands reported burnout to have a prevalence rate of 13%. Compared with earlier studies, this was the lowest prevalence found, which raises questions about whether the results from the pilot study were representative for Dutch resident doctors on a national level. Therefore, we decided to perform a nationwide study of the working conditions of medical residents in the Netherlands and the way in which they affect the well-being of residents.

Resident doctors may develop burnout as a result of high job and educational demands and a high level of work-home interference.^{1,5} Organisational and educational factors such as lack of autonomy, lack of social and supervisory support,⁶ lack of reciprocity in relationships at work,⁷ high workloads, and long and irregular working hours are characteristics of residency linked to stress and burnout.¹

In addition, several demographic risk factors for burnout have been identified. The risk for burnout seems to be higher for younger employees, those at the start of their career, for single people and for those who do not have children.⁸⁻¹¹ Women tend to experience more emotional exhaustion than men, whereas men score higher on depersonalisation than women.^{11,12} One study reported that type of medical specialty did not affect burnout in residents,⁹ but another reported that psychiatry residents were at risk for burnout.⁴

A sense of energetic connection, or engagement, with work may be a protective factor against burnout. Engagement was formerly considered to represent the opposite of burnout along a single continuum.^{8,13} Currently, engagement is defined as a separate construct, a positive, fulfilling, work-related state of mind characterised by vigour, dedication and absorption.¹³ High levels of energy and willingness to

invest in work define vigour. Dedication is defined as feelings of enthusiasm, pride and inspiration about one's job. Absorption means being so engrossed in work that time passes quickly and other things do not matter.¹⁴ Engagement has been associated with age and gender, although weakly. Older employees and men reported slightly higher engagement.¹⁴ To our knowledge, no research has been performed on the prevalence of engagement or on possible relationships between engagement and burnout among resident doctors.

The first aim of this study was to examine prevalences and levels of burnout and engagement among Dutch resident doctors and to compare these with prevalences in Dutch reference groups. The second aim was to investigate relationships between burnout and engagement and the third was to explore risk and protective factors for burnout and (a lack of) engagement. Although this study looked at a national population, its results may have broader implications for medical residents outside the Netherlands as the working conditions of medical residents in other countries are also under pressure.

METHODS

Procedure and participants

Resident doctors registered through the Medical Registration Committee as being in training in the Netherlands on 1 October 2005 were sent a self-report questionnaire together with a letter explaining the goal of the study to their home address. All residents were sent three reminders within a time-frame of 2 months, along with a non-response form. Taking part in the study was voluntary. There was no interference in the study by anyone outside the team of researchers, which means that no pressure was applied by medical teachers, supervisors, managers or others to either take part in or ignore the study. The questionnaire could be returned anonymously in a pre-paid return envelope to the researchers. Participants could also choose to complete the questionnaire online on a specially constructed website.

Non-response

Of the 5245 resident doctors approached, 105 indicated they were not eligible for the study because they were no longer in training. Of the 5140 eligible residents (the entire population), 2240 responded: 2115 completed the questionnaire (41%)

and 125 residents returned a non-response form indicating that they did not wish to participate. A total of 74% of the respondents completed the paper questionnaire and 26% responded online. Although the response rate of 41% could be considered moderate, it represents the participants as a percentage of the total population of residents in the Netherlands, and not the percentage of a sample from the total population. A response rate of 41% therefore still results in a large sample ($n = 2115$).

Of the 125 residents who returned a non-response form indicating that they did not wish to participate, 23% cited lack of time, 22% cited the length of the questionnaire and 11% cited lack of energy as their reason for non-participation. These reasons for non-response suggest dependencies between non-response and burnout or engagement, which potentially leads to a biasing of results. Analyses of the non-responses did not reveal, however, the occurrence of biases because of systematic differences between responders and non-responders. We will return to this later.

Measures

Burnout

Burnout was measured using the Dutch version¹² of the Maslach Burnout Inventory (MBI) Human Services Survey,³ a questionnaire designed for use with people working in human services and health care. The Dutch questionnaire consists of 20 items covering three domains of burnout: emotional exhaustion (eight items; in the present study Cronbach's $\alpha = 0.89$); depersonalisation (five items, $\alpha = 0.73$), and personal accomplishment (seven items, $\alpha = 0.79$). Cronbach's alphas were comparable with those in the manual. Items were rated on a 7-point frequency scale of 0–6. Each score has two anchors; the first anchor is a subjective rating of frequency using an unspecified timeframe and the second is a subjective rating of frequency with a specified timeframe. A score of 0 represents never in both anchors; a score of 1 represents a sporadic occurrence of a couple of times a year or fewer; 2 represents now and then or once a month or less; 3 represents regularly or a couple of times a month; 4 represents often or once a week; 5 represents very often or a couple of times a week, and 6 represents always or daily. The range for emotional exhaustion is 0–48, for depersonalisation 0–30, and for personal accomplishment 0–42. The higher the score on emotional exhaustion and depersonalisation and the lower the score on

personal accomplishment, the more symptoms of burnout are experienced.

Cut-off scores for moderate and severe burnout are provided in the Dutch manual of the MBI.¹² A person is diagnosed with moderate burnout if he or she has either mean sum scores ≥ 19.92 on emotional exhaustion and > 7.95 (women) or > 8.95 (men) on depersonalisation, or mean sum scores ≥ 19.92 on emotional exhaustion and ≤ 25.97 on personal accomplishment. A person is diagnosed with severe burnout if he or she has either mean sum scores ≥ 28.96 on emotional exhaustion and ≥ 10.15 on depersonalisation, or mean sum scores ≥ 28.96 on emotional exhaustion and ≤ 24.29 on personal accomplishment.

The reference group as provided in the manual consists of 10 552 Dutch health care employees. This is a heterogeneous group of people from various medical professions in different medical settings, such as doctors, nurses, dentists and paramedics. The mean age of the group is 37 years and 55% are men. Mean scores and standard deviations on the three subscales for this reference group are given in the manual. Women score consistently lower on depersonalisation than men. Therefore, different mean scores are listed in the manual and different cut-off points have been established.¹²

Engagement

Engagement was measured using the 15-item Utrecht Work Engagement Scale (UWES).¹⁵ The questionnaire has good psychometric properties and consists of three engagement subscales: vigour (five items; in the present study Cronbach's $\alpha = 0.80$); dedication (five items, $\alpha = 0.88$), and absorption (five items, $\alpha = 0.78$). The sum of all items can be used as a total engagement score (Cronbach's $\alpha = 0.92$ in the present study). Items were rated on a 7-point Likert scale.

Item scores are summed and then divided by the number of items in the scale. Therefore, the possible range for each subscale and the total score is 0–6; higher scores denote higher engagement. The manual provides Dutch norm scores and cut-off scores to determine whether a person is highly engaged in his or her job.¹⁵ Respondents with a score ≥ 4.67 on the total engagement scale are considered to be (very) highly engaged; respondents with a score ≥ 4.81 on vigour are (very) highly vigorous; those with a score ≥ 4.91 on dedication are (very) highly dedicated, and those with a score ≥ 4.41 on absorption are (very) highly absorbed in their job.

The reference group consists of 6727 respondents from different professions at all levels and varying sectors of the workforce, including 655 doctors who filled in the questionnaire during career counselling. Of all groups, these doctors achieved the lowest scores on all subscales and the total score. The authors of the manual describe the reference group as heterogeneous but not necessarily representative of the total workforce.¹⁵

Demographics and occupational characteristics

Respondents provided information on: gender; age; marital status; the presence and number of children; type of specialty; number of years in training at the time of this study; number of years between graduation from medical school and start of residency, and clinical setting (university medical hospital, general teaching hospital, mental health clinic, or other type of clinic such as rehabilitation centre).

Analysis

Descriptive analyses were used to describe residents' demographic and training-related characteristics and to examine the prevalence of burnout and work engagement. Pearson's correlation coefficients were calculated to examine relationships between residents' characteristics and burnout and engagement. Correlation coefficients < 0.30 were considered weak, those of 0.30–0.50 moderately strong and those > 0.50 strong.¹⁶

Independent *t*-tests were computed to compare outcomes for residents with those of the Dutch reference group. Cohen's *d* effect sizes (standardised difference in means) were used to gain insight into the clinical relevance of differences. A Cohen's¹⁶ *d* effect size of ≤ 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. A chi-squared test was computed to compare prevalences of burnout between groups. Effect sizes were computed using Cramer's *V*, which has values of 0.10, 0.30 and 0.50 for small, medium and large effects, respectively.¹⁶ ANOVAS with post hoc Bonferroni tests were performed to investigate differences between resident groups in burnout and engagement. For all ANOVAS eta-squared effect sizes were calculated, which reflect the proportion-explained variation caused by group differences. Here, values for small, medium and large effects are 0.01, 0.06 and 0.14, respectively.¹⁶

Sensitivity analyses were performed in order to investigate the possible impact of the non-

response and to facilitate the interpretation of the outcomes.

In order to keep analyses manageable, eight groups were created based on residents' specialty. The largest specialties, which also had the largest number of respondents, were analysed separately (general surgery, internal medicine, obstetrics and gynaecology, paediatrics and psychiatry). The smaller specialties were clustered together based on the nature of the specialty into the following groups: surgical specialties (orthopaedics, plastic surgery, urology, neurosurgery, cardio-thoracic surgery, ear-nose-throat, ophthalmology); medical specialties (cardiology, respiratory medicine, hepatology, rheumatology, clinical geriatrics, dermatology, neurology, rehabilitation medicine); supportive specialties (radiology, radiotherapy, anaesthesiology, pathology, nuclear medicine, medical microbiology, clinical genetics). Because of the number of comparisons performed in the post hoc tests, significance levels were adjusted with a Bonferroni correction.

RESULTS

Descriptives

A total of 61% of the respondents were female. This percentage was significantly higher than the 52% in the overall population of Dutch resident doctors in 2005 ($\chi^2 = 13.94$, $P < 0.001$). Ages ranged from 23 to 58 years, with the vast majority aged 23–35 years. Of the respondents, 77% were married or cohabiting and 31% had children. Residents had been in training to become specialists for an average of 3 years (range 0 [just started] to 9 years). The length of residency programmes in the Netherlands varies between 4 and 6 years full-time. Mean time between completion of medical school and start of medical residency was 3.1 years (Table 1). Almost half (48%) of the resident doctors were employed or in training at a university medical centre, 41% at a general teaching hospital, 9% at a mental health clinic (all were residents in psychiatry) and 2% at a rehabilitation centre (all were residents in rehabilitation medicine) (Table 2).

Prevalences of burnout and engagement

Of the residents, almost 21% appeared to suffer from burnout, 6% of whom suffered from severe burnout. Statistics Netherlands (CBS) has reported that 8–11% of the Dutch labour force is burned out.¹⁷ This suggests that burnout is twice as

Table 1 Demographics of the study population

	<i>n</i>	%	Mean (SD)
Gender			
Men	820	38.8	
Women	1290	61.0	
Data missing	5	0.2	
Age, range 23–58 years			31.5 (3.5)
23–35 years	1882	89.0	
36–40 years	192	9.1	
40–50 years	28	1.3	
> 50 years	13	0.6	
Marital status/living arrangements			
Married or cohabiting	1627	76.9	
Single	478	22.6	
Other (e.g. with parents, commune)	10	0.5	
Children < 18 years			
≥ one child	663	31.3	
No children	1429	67.6	
Data missing	23	1.1	
Years in training			3.0 (1.5)
Number of years between MD and start of residency, range 0–25 years			3.1 (2.5)

SD = standard deviation

prevalent in residents as it is in the general Dutch workforce. However, the CBS assesses burnout using five questions from the emotional exhaustion scale and applies a lower cut-off score than the manual suggests to define moderate or severe burnout. If we applied the same criteria as the CBS, the rate of burnout in our study would jump to 41%, giving a prevalence rate four times higher than that in the national labour force. This is worrisome because burnout leads to decreased work performance and affects the quality of care.¹⁸

Additionally, 30% of residents scored above the cut-off on emotional exhaustion, 38% of male and 37% of female residents scored above the cut-off on depersonalisation and 14% of residents scored lower than the cut-off score on personal accomplishment. Residents had significantly higher mean scores on emotional exhaustion and depersonalisation and a significantly lower mean score on personal accomplishment than the reference group. However, effect sizes were small (Table 3). This suggests not

only that emotional exhaustion and depersonalisation may be more prevalent in people working in health care compared with the entire Dutch workforce, but also that, of health care workers, resident doctors are more vulnerable. At the same time, residents experienced a greater sense of personal accomplishment than the reference group, which is a surprising finding. There are various possible explanations for this. Firstly, given the limited number of residency positions, it is quite an accomplishment to be accepted. Secondly, residents are highly aware that their skills and competencies increase substantially during residency.

To correct for survey non-response bias, adjustment weighting was carried out.¹⁹ Weighted estimates of burnout rates were calculated adjusting for gender and resident specialty, implicitly assuming that gender and specialty were related to non-response. The weights used in the adjustments reflect the differences in gender and specialty between respondents and non-respondents, and correct the estimated burnout rates for these differences. These estimates hardly differed from the original estimates, at 20% for moderate burnout and 6% for severe burnout versus 21% and 6%, respectively.

A sensitivity analysis was performed to investigate the impact of non-response on burnout rates. In a first analysis, all 3025 non-respondents were considered to have either experienced burnout or not. This results in burnout rates ranging from 8% (if none of the 59% of target responders who did not respond had experienced burnout) to 67% (if all of this 59% had experienced burnout). In a second analysis, the information provided by the non-response forms was used to re-estimate the burnout rates: 23% of non-respondents did not participate because of lack of time and 11% did not because of lack of energy. Estimating these percentages (lack of time, lack of energy) in the observed sample, and using these estimates to adapt burnout rates results in rates ranging from 24% to 29%, depending on whether the reasons are used separately or in combination, and the definition of the variables used in the estimation. Rates of severe burnout range from 7% to 11%. These ranges show slightly higher percentages of burnout cases, but they should be considered to represent upper bounds rather than corrected burnout rates as they are often stricter than the cut-off on the burnout scales.

A total of 27% of the respondents could be classified as highly engaged, 23% as highly vigorous, 36% as highly dedicated and 28% as highly absorbed.

Table 2 Frequencies of engagement and burnout subscale descriptives by clinical setting, showing comparisons between groups by ANOVA and chi-squared tests

Clinical setting	n (%)	Vigour, mean ± SD	Dedication, mean ± SD	Absorption, mean ± SD	Total engagement, mean ± SD	Emotional exhaustion, mean ± SD	Depersonalisation, mean ± SD	Personal accomplishment, mean ± SD	Diagnosed with burnout, n (%)
Rehabilitation centre	37 (1.8)	3.6 ± 0.59	4.0 ± 0.93	3.4 ± 0.94	3.66 ± 0.68	17.8 ± 9.6	6.5 ± 4.3	31.1 ± 4.8	11 (29.7)
Mental health clinic	191 (9.1)	3.8 ± 0.94	4.4 ± 0.97	3.8 ± 0.96	4.02 ± 0.88	18.3 ± 9.0	7.5 ± 4.6	31.7 ± 5.2	49 (25.7)
General teaching hospital	859 (40.7)	4.0 ± 0.88	4.5 ± 0.89	3.9 ± 0.92	4.16 ± 0.81	15.5 ± 8.3	7.4 ± 4.6	31.3 ± 4.9	172 (20.1)
University medical centre	1021 (48.4)	3.9 ± 0.90	4.5 ± 0.92	3.9 ± 0.95	4.11 ± 0.84	15.7 ± 8.3	6.9 ± 4.2	30.7 ± 5.3	200 (19.9)
Test value		$F = 4.98^\dagger$	$F = 3.40$	$F = 6.20^*$	$F = 5.54^*$	$F = 6.40^*$	$F = 3.15$	$F = 3.05$	$\chi^2 = 2.24$
Partial η^2		$\eta^2 = 0.007$		$\eta^2 = 0.009$	$\eta^2 = 0.008$	$\eta^2 = 0.009$			

* Significant at $P < 0.001$

† Significant at $P < 0.01$

Range of burnout subscales: emotional exhaustion 0–48 (8 items, cut-off > 19.92); depersonalisation 0–30 (5 items, cut-off > 8.95 for men, > 7.95 for women), and personal accomplishment 42–0 (7 items, cut-off < 25.97)

Range of engagement and subscales (all 5 items): 0–6 for all scales; vigour (cut-off > 4.81); dedication (cut-off > 4.91); absorption (cut-off > 4.41), and total engagement (cut-off > 4.67)

SD = standard deviation

Table 3 Burnout and engagement descriptives for all residents and comparisons on subscales between sample and reference group

	Mean ± SD	Reference group, mean ± SD	<i>t</i>	Cohen's <i>d</i>
Emotional exhaustion	15.88 ± 8.4	14.48 ± 8.0	7.20*	0.17
Depersonalisation				
Men	7.71 ± 4.7	6.35 ± 4.2	7.90*	0.31
Women	6.76 ± 4.1	5.70 ± 3.9	8.63*	0.27
Personal accomplishment	31.00 ± 5.2	29.54 ± 5.5	11.82*	0.27
Vigour	3.97 ± 0.89	3.99 ± 1.10	– 0.89	– 0.02
Dedication	4.47 ± 0.91	3.91 ± 1.31	23.48*	0.50
Absorption	3.90 ± 0.94	3.59 ± 1.18	13.08*	0.29
Total engagement score	4.11 ± 0.83	3.82 ± 1.10	13.66*	0.30

* Significant at $P < 0.001$

Range of burnout subscales: emotional exhaustion 0–48 (8 items, cut-off > 19.92); depersonalisation 0–30 (5 items, cut-off > 8.95 for men, > 7.95 for women), and personal accomplishment 42–0 (7 items, cut-off < 25.97)

Range of engagement and subscales (all 5 items): 0–6 for all scales; vigour (cut-off > 4.81); dedication (cut-off > 4.91); absorption (cut-off > 4.41), and total engagement (cut-off > 4.67)

SD = standard deviation

Residents were significantly more dedicated, absorbed and engaged than the reference group. Residents had significantly higher mean scores on dedication, absorption and overall engagement, but

not on vigour, than the reference group. A medium effect size was found for dedication, a small effect size for absorption and total engagement, and a negligible effect size for vigour (Table 3).

Sensitivity analysis showed engagement rates of 10% (if all of the 59% of recipients who did not respond were not highly engaged) to 68% (if all 59% were highly engaged). A second analysis using the information provided by the non-response forms (as above) resulted in engagement rates in the range of 27–32%.

Relationships between burnout and engagement

Over two-thirds of residents (69%) were neither burned out nor highly engaged. A very small group (0.7%) was both burned out and highly engaged. Of the residents, 10% were highly engaged, but not burned out. Finally, almost 20% were burned out, but not highly engaged in their jobs.

Emotional exhaustion was moderately strong and negatively related to vigour and dedication, depersonalisation was moderately strong and negatively related to dedication, and personal accomplishment was moderately strong and positively related to all three subscales (Table 4). This table shows correlations between burnout and engagement scales, as well as partial correlations. The partial correlation shows the relationships corrected for the influence of gender, clinical setting and specialty type, as we see significant differences between groups of these factors (reported later). As Table 4 indicates, the correlations and partial correlations hardly differ.

It is interesting that a small number of resident doctors were simultaneously burned out and highly engaged. This finding, combined with the weak to moderate correlations between the burnout and engagement subscales (the strongest correlation was 0.58), underlines the suggestion that burnout and engagement are two different constructs.^{13,20}

If we specifically examine the relationships we found between burnout and engagement, it seems that personal accomplishment is most strongly related to the three engagement subscales, which is in line with the manual.¹⁵ By contrast with the manual, which reports strong relationships between depersonalisation and the engagement subscales, no strong relationships were found in this study. Apparently engagement is less of a protective factor against the depersonalisation of resident doctors.

Burnout and socio-demographics

Personal characteristics

Women reported being significantly more emotionally exhausted than men (mean 16.7 ± 8.4 versus mean 14.6 ± 8.3 ; $t = -5.66$, $P < 0.001$, $d = 0.25$), but experienced significantly less depersonalisation than men (mean 6.8 ± 4.1 versus mean 7.7 ± 4.7 ; $t = 4.70$, $P < 0.001$, $d = 0.22$). A significant but weak correlation was found between depersonalisation and age ($r = -0.09$, $P < 0.001$).

Married residents experienced less depersonalisation than single residents (mean 7.0 ± 4.3 versus mean 7.6 ± 4.6 ; $t = -2.64$, $P = 0.008$, $d = 0.14$) and parents experienced less depersonalisation than those without children (mean 6.5 ± 4.3 versus mean 7.4 ± 4.4 ; $t = 4.23$, $P < 0.001$, $d = 0.20$).

One of the aims of this study was to identify possible risk factors for burnout and disengagement. With regard to burnout, the four demographic characteristics examined in the current study seem to have an effect on one or more of the subscales. Women, married residents and parents and, to a lesser extent, more senior residents, reported feeling less distant

Table 4 Pearson correlations between burnout and engagement. Partial correlations are shown in parentheses, correcting for the influence of gender, setting and specialty

	Vigour (<i>n</i> = 2110), <i>r</i>	Dedication (<i>n</i> = 2110), <i>r</i>	Absorption (<i>n</i> = 2110), <i>r</i>
Emotional Exhaustion (<i>n</i> = 2106)	- 0.42 (- 0.41)	- 0.42 (- 0.41)	- 0.20 (- 0.19)
Depersonalisation (<i>n</i> = 2077)	- 0.25 (- 0.27)	- 0.32 (- 0.32)	- 0.17 (- 0.17)
Personal accomplishment (<i>n</i> = 2076)	0.56 (0.56)	0.58 (0.59)	0.44 (0.44)

All correlations are significant at $P < 0.001$

from their jobs than their counterparts,^{9,21} and women had higher levels of emotional exhaustion than men.^{5,22} These findings conform with the literature.

Occupational characteristics

No significant relationships were found between burnout subscales and years in training or length of gap between medical school and residency. A chi-squared test showed no significant difference between clinical settings in the percentages of residents diagnosed with burnout. An ANOVA revealed small significant differences between groups according to clinical setting on emotional exhaustion ($F = 6.40, P < 0.001, \eta^2 = 0.009$) (Table 2). A post hoc Bonferroni test showed that residents working in mental health clinics reported significantly more emotional exhaustion than residents working in university medical centres ($P = 0.001, d = 0.30$) or general teaching hospitals ($P < 0.001, d = 0.33$). As only residents in psychiatry worked in mental health clinics, we decided to compare residents in psychiatry working in mental health clinics with residents in psychiatry in other clinical settings. An additional *t*-test comparing residents in mental health clinics ($n = 186$) with psychiatry residents in training in general teaching hospitals or university medical centres (total $n = 55$) revealed that the first group reported more emotional exhaustion (mean

18.25 ± 8.9) than the second (mean 15.87 ± 7.1 ; $t = -2.05, P = 0.043, d = 0.28$).

A chi-squared test revealed a significant difference in prevalence of burnout between specialties ($\chi^2 = 23.99, P < 0.001, V = 0.11$). More specifically, the percentage of residents in general surgery or supportive specialties diagnosed with burnout was significantly lower than those in a surgical specialty ($\chi^2 = 10.20, P < 0.001, V = 0.15$; $\chi^2 = 6.44, P = 0.01, V = 0.10$, respectively), in a medical specialty ($\chi^2 = 11.41, P < 0.001, V = 0.13$; $\chi^2 = 7.98, P = 0.005, V = 0.10$, respectively), in internal medicine ($\chi^2 = 9.88, P < 0.001, V = 0.15$; $\chi^2 = 6.11, P = 0.01, V = 0.10$, respectively) and in psychiatry ($\chi^2 = 8.55, P = 0.003, V = 0.14$; $\chi^2 = 4.77, P = 0.03, V = 0.09$, respectively). In addition, significantly fewer residents in obstetrics and gynaecology suffered from burnout than in surgical specialties ($\chi^2 = 4.16, P = 0.04, V = 0.10$), medical specialties ($\chi^2 = 4.55, P = 0.03, V = 0.09$) or internal medicine ($\chi^2 = 3.92, P = 0.05, V = 0.10$) (Table 5). All effects found were small (Cramer's *V*). ANOVA revealed significant moderate differences of type of specialty on emotional exhaustion ($F = 5.605, P < 0.001, \eta^2 = 0.018$), depersonalisation ($F = 9.005, P < 0.001, \eta^2 = 0.030$) and personal accomplishment ($F = 8.03, P < 0.001, \eta^2 = 0.026$). Post hoc Bonferroni tests revealed that general surgery residents reported significantly less emotional exhaustion than residents in internal medicine

Table 5 Specialty clusters; frequencies and engagement and burnout subscale descriptives, and ANOVA and chi-squared tests to compare groups

Specialty clusters	n (%)	Vigour, mean ± SD	Dedication, mean ± SD	Absorption, mean ± SD	Total engagement, mean ± SD	Emotional exhaustion, mean ± SD	Depersonalisation, mean ± SD	Personal accomplishment, mean ± SD	Diagnosed with burnout, n (%)
Surgical specialties	270 (12.8)	4.1 ± 0.83	4.5 ± 0.87	3.9 ± 0.89	4.2 ± 0.77	15.9 ± 8.3	8.4 ± 4.8	31.2 ± 4.8	65 (24.3)
Medical specialties	497 (23.5)	3.8 ± 0.93	4.3 ± 0.94	3.8 ± 0.96	4.0 ± 0.86	16.3 ± 8.7	7.4 ± 4.4	30.7 ± 5.1	119 (24.1)
Internal medicine	292 (13.8)	3.8 ± 0.85	4.3 ± 0.90	3.8 ± 0.89	4.0 ± 0.78	16.8 ± 7.9	7.5 ± 4.2	31.0 ± 4.9	69 (23.9)
Psychiatry	242 (11.5)	3.8 ± 0.94	4.4 ± 0.96	3.8 ± 0.96	4.0 ± 0.87	17.7 ± 8.5	7.3 ± 4.4	31.7 ± 5.1	56 (23.2)
Paediatrics	162 (7.7)	4.1 ± 0.79	4.6 ± 0.81	4.0 ± 0.87	4.3 ± 0.74	15.4 ± 7.5	6.1 ± 3.6	31.4 ± 4.3	29 (17.9)
Supportive specialties	354 (16.8)	3.9 ± 0.88	4.6 ± 0.92	3.9 ± 1.0	4.2 ± 0.84	14.9 ± 8.8	6.2 ± 4.4	29.5 ± 6.2	55 (16.0)
Obstetrics and gynaecology	125 (5.9)	4.1 ± 0.88	4.6 ± 0.86	4.1 ± 0.93	4.3 ± 0.83	15.5 ± 8.3	5.8 ± 3.6	32.4 ± 4.9	19 (15.2)
General surgery	170 (8.0)	4.4 ± 0.83	4.8 ± 0.81	4.3 ± 0.85	4.5 ± 0.75	13.1 ± 7.6	7.4 ± 4.5	32.4 ± 4.7	20 (11.8)
Test value		$F = 11.97^*$	$F = 9.72^*$	$F = 8.75^*$	$F = 11.87^*$	$F = 5.61^*$	$F = 9.01^*$	$F = 8.03^*$	$\chi^2 = 23.99^*$
Effect size		$\eta^2 = 0.038$	$\eta^2 = 0.031$	$\eta^2 = 0.028$	$\eta^2 = 0.038$	$\eta^2 = 0.018$	$\eta^2 = 0.030$	$\eta^2 = 0.026$	$V = 0.11$

* Significant at $P < 0.001$

Range of burnout subscales: emotional exhaustion 0–48 (8 items, cut-off > 19.92); depersonalisation 0–30 (5 items, cut-off > 8.95 for men, > 7.95 for women), and; personal accomplishment 42–0 (7 items, cut-off < 25.97)

Range of engagement and subscales (all 5 items): 0–6 for all scales; vigour (cut-off > 4.81); dedication (cut-off > 4.91); absorption (cut-off > 4.41), and total engagement (cut-off > 4.67)

SD = standard deviation

($P < 0.001$, $d = 0.44$), medical specialties ($P = 0.001$, $d = 0.37$) and psychiatry ($P < 0.001$, $d = 0.55$). Additionally, residents in supportive specialties reported less emotional exhaustion than residents in psychiatry ($P = 0.003$, $d = 0.33$). Residents in surgical specialties reported more depersonalisation than residents in obstetrics and gynaecology ($P < 0.001$, $d = 0.60$), supportive specialties ($P < 0.001$, $d = 0.51$) and paediatrics ($P < 0.001$, $d = 0.53$) and those in supportive specialties reported less depersonalisation than those in medical specialties ($P < 0.006$, $d = 0.27$). Finally, residents in supportive specialties reported less personal accomplishment than colleagues in general surgery ($P < 0.001$, $d = 0.56$), surgical specialties ($P = 0.001$, $d = 0.34$), obstetrics and gynaecology ($P < 0.001$, $d = 0.56$), paediatrics ($P = 0.005$, $d = 0.36$) and psychiatry ($P < 0.001$, $d = 0.43$).

As we have shown, clinical setting and type of specialty seem to play a role in burnout. The specialty with the smallest proportion of residents suffering from burnout was general surgery, followed by obstetrics and gynaecology and supportive specialties. General surgery residents were also found to be more highly engaged, vigorous, dedicated and absorbed than others. An earlier study showed that, although surgeons reported the highest levels of stress compared with other specialties, they also reported the highest levels of job satisfaction.²³ The present study does not give any explanation for the current finding. Therefore, the effect of type of specialty on burnout and engagement should be the focus of further research.

Residents working in mental health clinics reported experiencing more emotional exhaustion than residents in other clinical settings. Previous studies have reported that psychiatric residents and psychiatrists are more at risk for burnout than others, a finding we seem to have replicated.^{4,24,25} Additionally, residents in mental health clinics were more emotionally exhausted than psychiatry residents in other clinical settings. This suggests that the interaction between clinical setting and specialty, rather than either in isolation, plays a role in whether residents in psychiatry develop burnout. A possible explanation may be that residents working in university medical centres or general teaching hospitals may have more professional, interdisciplinary interaction and collaboration with colleagues from different specialties than residents working in specialised clinics. A second explanation may refer to the type of patients these residents work with. Patients in mental health clinics are often chronically ill, their treatment is long-lasting and their functioning may not recover to pre-morbid levels.

Engagement and socio-demographics

Personal characteristics

More men (almost 30%) than women (25%) were found to be highly engaged ($\chi^2 = 5.73$, $P = 0.017$, $V = 0.05$). *T*-tests showed that men (mean 4.07 ± 0.9) scored significantly higher on vigour than women (mean 3.90 ± 0.9 ; $t = 4.34$, $P < 0.001$, $d = 0.19$).

The fact that only one demographic characteristic was found to be associated with engagement seems to be in line with the literature.²⁶ The only common risk factor identified for both burnout and engagement is gender. However, firstly, in the literature women consistently score lower than men on depersonalisation and, secondly, the manual on engagement advises that caution should be applied in the drawing of conclusions based on gender differences. Therefore, we are not able to conclude that any of these demographic variables is a common risk factor for both burnout and disengagement. This again underlines the proposal that burnout and engagement are two different constructs.

Occupational characteristics

A significant but weak correlation was found between absorption and years in training ($r = -0.06$, $P = 0.005$).

AN ANOVA revealed a significant effect of clinical setting on engagement ($F = 5.54$, $P = 0.001$, $\eta^2 = 0.008$). Residents working in rehabilitation centres were significantly less engaged than residents in university medical centres ($P = 0.008$, $d = 0.54$) or general teaching hospitals ($P = 0.002$, $d = 0.61$), according to a Bonferroni post hoc test (Table 2). As only residents in rehabilitation worked in rehabilitation centres, we decided to do an additional *t*-test in which we compared residents in rehabilitation working in rehabilitation centres with residents in rehabilitation working in other clinical settings. This additional *t*-test between residents working in rehabilitation centres ($n = 37$, mean 3.66 ± 0.68) and rehabilitation residents in university medical centres or general teaching hospitals ($n = 44$, mean 3.97 ± 0.88) failed to reach significance ($t = 1.79$, $P = 0.078$).

On the engagement subscales, a significant effect of clinical setting was found for vigour ($F = 4.98$, $P = 0.002$, $\eta^2 = 0.007$) (Table 2). Post hoc Bonferroni tests showed that residents working in rehabilitation centres reported less vigour than residents working in

general teaching hospitals ($P = 0.020$, $d = 0.50$). An additional t -test showed no significant difference in vigour between rehabilitation residents working in rehabilitation centres ($n = 37$, mean 3.58 ± 0.59) and rehabilitation residents in general teaching hospitals ($n = 24$, mean 3.97 ± 1.03 ; $t = 1.88$, $P = 0.067$). In addition, residents working in mental health clinics reported less vigour than residents working in general teaching hospitals ($P = 0.035$, $d = 0.22$). As with the effect of clinical setting on engagement, an additional t -test comparing residents in psychiatry working in mental health clinics with residents in psychiatry working in other clinical settings showed no significant difference in vigour between psychiatry residents working in mental health clinics ($n = 186$, mean 3.83 ± 0.93) and psychiatry residents in general teaching hospitals ($n = 13$, mean 3.82 ± 0.87 ; $t = -0.075$, $P = 0.93$).

We also found significant differences between clinical settings on absorption ($F = 6.20$, $P < 0.001$, $\eta^2 = 0.009$). Post hoc Bonferroni tests showed that residents working in rehabilitation centres reported less absorption than residents in general teaching hospitals ($P < 0.001$, $d = 0.65$). An additional t -test comparing residents in rehabilitation working in rehabilitation centres with residents in rehabilitation working in other clinical settings showed no differences in absorption between rehabilitation residents in rehabilitation centres ($n = 37$, mean 3.37 ± 0.77) and residents in rehabilitation medicine working in general teaching hospitals ($n = 24$, mean 3.84 ± 1.05 ; $t = 1.87$, $P = 0.069$). The effect of clinical setting on dedication failed to reach the significance level used in this study ($F = 3.40$, $P = 0.017$).

An ANOVA revealed an effect of type of specialty on engagement ($F = 11.87$, $P < 0.001$, $\eta^2 = 0.038$) (Table 5). Post hoc Bonferroni tests showed that general surgery residents were more highly engaged than residents in surgical specialties ($P = 0.001$, $d = 0.41$), internal medicine ($P < 0.001$, $d = 0.64$), medical specialties ($P < 0.001$, $d = 0.68$), supportive specialties ($P < 0.001$, $d = 0.44$) and psychiatry ($P < 0.001$, $d = 0.60$). Additionally, residents in medical specialties were significantly less engaged than residents in obstetrics and gynaecology ($P = 0.001$, $d = 0.41$) and paediatrics ($P < 0.001$, $d = 0.37$).

On the engagement subscales, a significant effect of specialty was found on vigour ($F = 11.97$, $P < 0.001$, $\eta^2 = 0.038$), dedication ($F = 9.72$, $P < 0.001$, $\eta^2 = 0.031$) and absorption ($F = 8.75$, $P < 0.001$, $\eta^2 = 0.028$). According to Bonferroni post hoc tests, general surgical residents reported more vigour than

residents in surgical specialties ($P = 0.003$, $d = 0.38$), internal medicine ($P < 0.001$, $d = 0.66$), medical specialties ($P < 0.001$, $d = 0.67$), supportive specialties ($P < 0.001$, $d = 0.48$) or psychiatry ($P < 0.001$, $d = 0.65$). Residents in medical specialties were additionally found to have less vigour than those in surgical specialties ($P = 0.002$, $d = 0.28$) or paediatrics ($P = 0.005$, $d = 0.33$). Furthermore, general surgery residents were more dedicated and more absorbed than residents in internal medicine ($P < 0.001$, $d = 0.54$ and $d = 0.55$, respectively), medical specialties ($P < 0.001$, $d = 0.57$ and $d = 0.61$, respectively) or psychiatry ($P < 0.001$, $d = 0.43$ and $d = 0.55$, respectively) and more absorbed than residents in supportive specialties ($P < 0.001$, $d = 0.46$) and surgical specialties ($P = 0.001$, $d = 0.40$). Residents in medical specialties reported significantly less dedication than those in obstetrics and gynaecology ($P = 0.003$, $d = 0.39$), supportive specialties ($P < 0.001$, $d = 0.33$) and paediatrics ($P = 0.001$, $d = 0.37$).

With regard to engagement, residents in training in mental health clinics were less vigorous than residents in other clinical settings. However, vigour did not vary between psychiatry residents in different clinical settings. It should be noted, however, that all eta-squared effect sizes were small.

Rehabilitation residents working in rehabilitation centres appeared to be less engaged and less absorbed than rehabilitation residents in other clinical settings. The explanations offered above for the differences between psychiatry residents in mental health clinics and those in other settings may also apply to rehabilitation residents.

CONCLUSIONS

As shown by our study, burnout and engagement are common in the medical resident population in the Netherlands. The prevalence of burnout found is comparative with the lower ranges found in other studies. The limited number of studies that have focused on the prevalence of burnout in resident doctors have reported burnout rates in the range of 18–82%.¹ As described in the literature,²⁷ the most effective criteria in the diagnosis of burnout are scores above the cut-off on both emotional exhaustion and depersonalisation, or scores above the cut-off on emotional exhaustion and below the cut-off on personal accomplishment. Only the present study has used this guideline. The next best set of criteria (i.e. scores above the cut-off on emotional exhaustion

and depersonalisation and below the cut-off on personal accomplishment) results in a more conservative estimate of the prevalence of burnout. This method was used by Garza *et al.*,²² who reported an overall burnout rate of 17.6% in residents, which may therefore be an underestimation. Other studies presenting higher prevalence rates applied less stringent criteria for diagnosing burnout, increasing the chance of inflated prevalence rates.

However, this knowledge does not excuse us for not taking the percentage found seriously. That more than a fifth of the medical residents who responded can be diagnosed as burned out indicates there is a problem in the Dutch health care system. This becomes even more urgent in view of the evidence of a relationship between burnout and suboptimal patient care.

The differences in the percentages of burnout found in our pilot study and the national study as described in this paper need more explanation. In our pilot study, conducted at one university medical centre in the Netherlands,⁴ we used the same criteria to determine the prevalence of burnout as in this study. Remarkably, the prevalence reported by that study (13%) was significantly lower. It may be that burnout is less prevalent in that particular clinic. However, the difference in findings may be the result of having applied a different scoring method in that study. In the current national study, residents reported burnout on a Likert scale with two frequency anchors: a subjective perception using an unspecified timeframe, and a subjective perception with a specified timeframe. In the pilot study, only the first anchor for frequency was used, which means that the responses in that study were more dependent on the residents' subjective interpretation. Further research is needed to investigate the effect of using either or both anchors to determine the most accurate method for assessing the perceived prevalence of burnout symptoms.

In order to gain insight into the prevalence of burnout and engagement among Dutch resident doctors, all Dutch residents were approached for this study, making it the largest study to date. Its response rate of 41% makes it comparable with other questionnaire-based studies with similar response rates. We cannot be sure whether burnout is under- or over-reported in this study. However, it has been reported that individuals with burnout are less likely to return questionnaires.²⁸ One of the reasons mentioned for not participating in our

study was lack of energy (exhaustion), which seems to support this suggestion. This may suggest that the prevalence of burnout among Dutch residents may be even higher. However, investigation of the non-respondents showed that there was no bias with respect to gender and specialty, and although sensitivity analyses showed a wide range of burnout rates, the most realistic analyses increased the rates only a little. Moreover, if all non-respondents were considered to suffer from burnout, the rate of burnout (67%) would still fall within the range found in other studies.¹ Additionally, the study's cross-sectional design prevents us from drawing causal inferences. Future studies on burnout and engagement among resident doctors should be longitudinal in design and preferably should follow residents from their first day of residency. This might give us insight into the development of burnout in residents and possible risk and resistance variables. Such knowledge could lead to preventive interventions for residents at risk for burnout. In particular, the impacts of specialty and work environment deserve more attention as this study shows that these variables affect burnout and engagement.

It can be concluded that burnout and engagement are prevalent in medical residents and that type of specialty and the clinical environment affect both. Further research is needed to gather more information about the influence of working conditions on medical residents. In addition, further research into the effects of working conditions on well-being and patient care is required. As well as developing new research we must look for solutions and interventions which will improve the working situation of medical residents. Striving for healthy workers in health care has to become daily practice. It is time to put research like ours into action.

Contributors: all authors made substantial contributions to the study conception and design, and/or acquisition of data, and/or analysis and interpretation of data, and/or drafting the article or revising it critically for important intellectual content. All authors approved the final version.

Acknowledgements: none.

Funding: this project was funded by SWG Arts en Werk, Stichting Capaciteitsorgaan voor Medische en Tandheelkundige Vervolgopleidingen, the Vincent van Gogh Institute, the University Medical Centre Groningen and the Dutch Junior Doctors' Committee (LVAG).

Conflicts of interest: none.

Ethical approval: not applicable.

REFERENCES

- 1 Prins JT, Gazendam-Donofrio SM, Tubben BJ, van der Heijden FMMA, van de Wiel HBM, Hoekstra-Weebers JEHM. Burnout in medical residents: a review. *Med Educ* 2007;**41**:788–800.
- 2 Thomas N. Resident burnout. *JAMA* 2004;**292** (23):2880–9.
- 3 Maslach C, Jackson SE, Leiter MP. *Maslach Burnout Inventory Manual*, 3rd edn. Palo Alto, CA: Consulting Psychologists Press 1996.
- 4 Prins JT, Hoekstra-Weebers JEHM, van de Wiel HBM, Gazendam-Donofrio SM, Sprangers F, Jaspers FCA, van der Heijden FMMA. Burnout among medical residents. *Int J Behav Med* 2007;**14** (3):119–25.
- 5 Geurts S, Rutte C, Peeters M. Antecedent and consequences of work–home interference among medical residents. *Soc Sci Med* 1999;**48**:1135–48.
- 6 Prins JT, Hoekstra-Weebers JEHM, Gazendam-Donofrio SM, van de Wiel HBM, Sprangers F, Jaspers FCA, van der Heijden FMMA. The role of social support in burnout among Dutch medical residents. *Psychol Health Med* 2007;**12**:1–6.
- 7 Prins JT, Gazendam-Donofrio SM, Dillingh GS, van de Wiel HBM, van der Heijden FMMA, Hoekstra-Weebers JEHM. The relationship between reciprocity and burnout in Dutch medical residents *Med Educ* 2008;**42**:721–8.
- 8 Demerouti E, Bakker AB, de Jonge J, Janssen PPM, Schaufeli WB. Burnout and engagement at work as a function of demands and control. *Scand J Work Environ Health* 2001;**27** (4):279–86.
- 9 Martini S, Arfken C, Churchill A, Balon R. Burnout comparison among residents in different medical specialties. *Acad Psychiatry* 2004;**28**:240–2.
- 10 Maslach C, Jackson SE. The role of sex and family variables in burnout. *Sex Roles* 1985;**12**:837–51.
- 11 Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol* 2001;**52**:397–422.
- 12 Schaufeli WB, van Dierendonk D. *Utrechtse Burnout Schaal (UBOS), handleiding [Utrecht Burnout Scale, manual]*. Utrecht: Swets & Zeitlinger 2000.
- 13 Schaufeli WB, Salanova M, Gonzalez-Roma V, Bakker AB. The measurement of engagement and burnout: a two-sample confirmatory factor analytic approach. *J Happiness Stud* 2002;**3**:71–92.
- 14 Schaufeli WB, Bakker AB. Job demands, job resources and their relationship with burnout and engagement: a multi-sample study. *J Org Behav* 2004;**25**:293–315.
- 15 Schaufeli WB, Bakker AB. *UBES: Utrechtse Bevoelgenheidschaal [UWES: Utrecht Work Engagement Scale]*. Utrecht: University of Utrecht 2003.
- 16 Cohen J. *Statistical Power Analysis for the Behavioral Sciences* (2nd edn). Hillsdale, NJ: Lawrence Erlbaum 1988.
- 17 Statistics Netherlands . *Arbeidsomstandigheden: werk en gezondheidsaspecten*. [http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37633&D1=5&D2=0&D3=\(1-11\)-1&HD=080705-1124&HDR=T&STB=G1,G2](http://statline.cbs.nl/StatWeb/publication/?VW=T&DM=SLNL&PA=37633&D1=5&D2=0&D3=(1-11)-1&HD=080705-1124&HDR=T&STB=G1,G2). [Accessed 8 January 2009.]
- 18 West CP, Hushka MM, Novotny PJ, Sloan JA, Kolars JC, Habermann TM, Shanafelt TD. Association of perceived medical errors with resident distress empathy: a prospective longitudinal study *JAMA* 2006;**296** (9):1071–8.
- 19 Bethlehem JG. Weighting non-response adjustments based on auxiliary information. In: Groves RM, Dillman DA, Eltinge JL, Little RJA, eds. *Survey Nonresponse*. New York, NY: John Wiley & Sons 2002; 275–87.
- 20 González-Romá V, Schaufeli WB, Bakker AB, Lloret S. Burnout and work engagement: independent factors or opposite poles? *J Vocat Behav* 2006;**62**:165–74.
- 21 Michels P, Probst J, Godenick M, Palesch Y. Anxiety and anger among family practice residents: a South Carolina Family Practice Research Consortium study. *Acad Med* 2003;**78**:69–79.
- 22 Garza JA, Schneider KM, Promecene P, Mong M. Burnout in residency: a statewide study. *South Med J* 2004;**97** (12):1171–3.
- 23 Ramirez AJ, Graham J, Richards MA, Cull A, Gregory WM. Mental health of hospital consultants: the effects of stress and satisfaction at work. *Lancet* 1996;**347** (9003):724–8.
- 24 Korkeila JA, Toyry S, Kumpulainen K, Toivola JM, Rasanen K, Kalimo R. Burnout and self-perceived health among Finnish psychiatrists and child psychiatrists: a national survey. *Scand J Public Health* 2003;**31** (85):85–91.
- 25 Olkinoura M, Asp S, Juntunen J, Kauttu K, Strid L, Aarrimaa M. Stress symptoms, burnout and suicidal thoughts among Finnish physicians. *Soc Psychiatry Psychiatr Epidemiol* 1990;**25**:81–6.
- 26 de Cuyper N, de Witte H. Autonomy and workload among temporary workers: their effects on job satisfaction, organisational commitment, life satisfaction, and self-rated performance. *Int J Stress Manag* 2003;**13** (4):441–59.
- 27 Brenninkmeijer V, van Ypereren N. How to conduct research on burnout: advantages and disadvantages of a unidimensional approach in burnout research. *Occup Environ Med* 2003;**60**:16–20.
- 28 Taris TW, Schreurs PJG. How may non-response affect findings in organisational surveys? The tendency-to-the-positive effect. *Int J Stress Manag* 2007;**14**:249–59.

Received 7 February 2009; editorial comments to authors 24 February 2009, 12 August 2009; accepted for publication 18 November 2009