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J. T. Prins ^a; F. M. M. A. van der Heijden ^b; J. E. H. M. Hoekstra-Weebers ^{cd}; A. B. Bakker ^e; H. B. M. van de Wiel ^{ac}; B. Jacobs ^a; S. M. Gazendam-Donofrio ^a

^a Dutch Doctor's Association, Groningen, The Netherlands ^b GGZ Noord- en Midden-Limburg, Venray, The Netherlands ^c Wenckebach Institute, University Medical Center Groningen, Groningen, The Netherlands ^d Comprehensive Cancer Center North Netherlands, Groningen, The Netherlands ^e Department of Work and Organizational Psychology, Erasmus Universiteit Rotterdam, Rotterdam, Netherlands

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Burnout, engagement and resident physicians' self-reported errors

J.T. Prins^{a*}, F.M.M.A. van der Heijden^b, J.E.H.M. Hoekstra-Weebers^{c,d},
A.B. Bakker^e, H.B.M. van de Wiel^{a,c}, B. Jacobs^a and S.M. Gazendam-Donofrio^a

^aDutch Doctor's Association, Groningen, The Netherlands; ^bGGZ Noord- en Midden-Limburg, Venray, The Netherlands; ^cWenckebach Institute, University Medical Center Groningen, Groningen, The Netherlands; ^dComprehensive Cancer Center North Netherlands, Groningen, The Netherlands; ^eDepartment of Work and Organizational Psychology, Erasmus Universiteit Rotterdam, Rotterdam, Netherlands

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Burnout is a work-related syndrome that may negatively affect more than just the resident physician. On the other hand, engagement has been shown to protect employees; it may also positively affect the patient care that the residents provide. Little is known about the relationship between residents' self-reported errors and burnout and engagement. In our national study that included all residents and physicians in The Netherlands, 2115 questionnaires were returned (response rate 41.1%). The residents reported on burnout (Maslach Burnout Inventory-Health and Social Services), engagement (Utrecht Work Engagement Scale) and self-assessed patient care practices (six items, two factors: errors in action/judgment, errors due to lack of time). Ninety-four percent of the residents reported making one or more mistake without negative consequences for the patient during their training. Seventy-one percent reported performing procedures for which they did not feel properly trained. More than half (56%) of the residents stated they had made a mistake with a negative consequence. Seventy-six percent felt they had fallen short in the quality of care they provided on at least one occasion. Men reported more errors in action/judgment than women. Significant effects of specialty and clinical setting were found on both types of errors. Residents with burnout reported significantly more errors ($p < 0.001$). Highly engaged residents reported fewer errors ($p \leq 0.01$). Overall residents disclosed that in their perception they regularly make errors throughout their residency. Steps should be taken to help residents minimize the number of perceived errors made. Therefore, it is important to prevent residents from developing burnout and to keep residents engaged in their work.

Keywords: burnout; engagement; medical errors; residents

Introduction

The medical errors committed by residents are not uncommon. To date, studies that examined errors as reported by residents have focused only on internal medicine. These studies have found that between 34 and 47% of residents report committing errors during their training (Mizrahi, 1984; West et al., 2006). West et al. (2006) found in their longitudinal study a relationship between self-perceived errors and worsened measures in all domains of burnout, and conversely, increased burnout in all domains with increased odds of self-perceived errors in the following 3 months.

*Corresponding author. Email: jelleprins@artsenstichtingnederland.nl

Self-reported errors have been found to be related to administrative workload and other work stressors (Vidyarthi, Auerbach, Wachter, & Katz, 2007). A feeling of being “overwhelmed” was found to relate to minor errors (Baldwin, Dodd, & Wrate, 1997). Another study described mistakes being caused by three factors as follows: inexperience, job overload (i.e. fatigue and too many other tasks to take care of), and case complexity (Wu, Folkman, McPhee, & Lo, 1991). In two studies, burnout was associated with suboptimal patient care among internal medicine residents (Shanafelt, Bradley, Wipf, & Back, 2002) and physicians (Williams, Manwell, Konrad, & Linzer, 2007). Of the residents with burnout (Shanafelt et al., 2002), 53% reported providing at least one type of suboptimal patient care per month. However, only residents from one university residency program, especially those in internal medicine, were included in this particular study.

Specialists in training are at risk for developing burnout (Prins et al., 2007a). Among residents, the prevalence of burnout ranges vastly – from 18 to 76%. In a university medical center in The Netherlands, 13% of residents were found to meet the criteria for clinical burnout (Prins et al., 2007b). Burnout is a syndrome specific to the workplace brought on by chronic work-related stress. It is characterized by a negative or detached response to others (depersonalization), a feeling of being depleted of emotional resources (emotional exhaustion) and the perception of being incompetent to perform tasks (reduced personal accomplishment) (Maslach, Schaufeli, & Leiter, 2001). Heavy job and educational demands and a high degree of work-home interference make residents vulnerable (Geurts, Rutte, & Peters, 1999; Thomas, 2004). Their work is characterized by long and irregular hours, a full workload, limited supervisory support, and a lack of autonomy, all of which have been linked to burnout (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Halbesleben & Buckley, 2004; Prins et al., 2007b). Demographic variables also seem to place residents at risk. Burnout seems to affect younger employees and those at the beginning of their career (Maslach et al., 2001). Burnout can lead to decreased effectiveness at work (Maslach et al., 2001; Taris, 2006) and can affect more than the individual. In professions where workers are deeply involved with others, such as health care, decreased job performance can have unfortunate consequences for the other party, i.e. the patient.

On the flip side of burnout is engagement. While a person with burnout is detached, drained and feels incompetent, a highly engaged person is positive and feels fulfilled by his work (Bakker, 2009). A sense of energetic connection, or engagement, with work may be a protective factor for burnout. Engagement is defined as a separate construct, a positive, fulfilling, work-related state of mind characterized by vigor, dedication, and absorption (Demerouti et al., 2001). High levels of energy and the willingness to invest in work define vigor. Dedication is defined as feelings of enthusiasm, pride, and inspiration about one's job. Absorption means being so engrossed in work that the time passes quickly and other things do not matter (Schaufeli & Bakker, 2004). To our knowledge, no research has been done on the prevalence of engagement or on possible relationships between engagement and burnout among resident physicians.

This study has three aims. The first is to explore self-reported errors among resident physicians in The Netherlands on a national level and to identify the possible risk factors (e.g. gender, time in training, clinical setting, specialty). We also set out to explore relationships between self-reported errors and burnout (second aim), and engagement (third aim). We hypothesize that burned out residents will report more errors, and that engaged residents will report fewer errors.

Methods

Procedure and respondents

All residents in The Netherlands in training for a referral specialty on 1 October 2005 received a self-report questionnaire at their home address with a cover letter explaining the goal of the study. Residents were sent three reminders and a non-response form. Questionnaires could be returned anonymously in pre-paid return envelopes or could be completed online on a specially constructed website.

Measures

Self-reported errors

To measure errors, residents were asked to answer six questions specifically developed for this study regarding the quality of patient care they provide (Table 2). The questions were developed based on questions used in a previous study of errors made by residents (Shanafelt et al., 2002). Residents responded on how often certain situations had occurred to them, with answers ranging from 1 (never occurs) to 5 (occurs often).

Burnout. Burnout was measured using the Utrecht Burn-Out Scale (UBOS-C/ Maslach Burnout Inventory for Health and Social Services) (Schaufeli & van Dierendonck, 2000), the Dutch version of the Maslach Burnout Inventory. This questionnaire is designed for people working in human services and health care. The 20-item questionnaire covers three domains of burnout: emotional exhaustion (eight items, Cronbach's $\alpha = 0.89$, this study), depersonalization (five items, $\alpha = 0.73$, this study), and personal accomplishment (seven items, $\alpha = 0.79$, this study). Items are rated on a 7-point Likert scale. The possible range for emotional exhaustion is 0–48, for depersonalization 0–30, and for personal accomplishment 0–42. The UBOS manual provides cut-off scores to diagnose moderate and severe burnouts (Schaufeli & van Dierendonck, 2000).

Engagement. Engagement was measured using the Utrecht Work Engagement Scale (UWES) (Schaufeli & Bakker, 2003). The 15-item questionnaire evaluates three domains of engagement: vigor (five items, Cronbach's $\alpha = 0.80$, this study), dedication (five items, Cronbach's $\alpha = 0.88$, this study), and absorption (five items, Cronbach's $\alpha = 0.78$, this study). Items were rated on a 7-point Likert scale. The UWES manual (Schaufeli & Bakker, 2003) provides cut-off scores for all three subscales of engagement to determine whether a person is highly vigorous, dedicated, or absorbed. Research (Schaufeli & Bakker, 2003) has shown that the subscales of engagement are highly correlated, usually >0.65 . It is, therefore, possible to construct a one-dimensional variable of total engagement by calculating the total score of the three scales (De Cuyper & De Witte, 2003; Hallberg & Schaufeli, 2006).

Demographic information

Respondents provided information about their gender, age, marital status, and number of children. They also provided information on their area of specialty, number of years in training and the type of clinic they work in (university medical center, general hospital, rehabilitation center, mental health services clinic).

Analysis

Descriptive analyses were performed on demographic information and on self-reported errors, burnout, and engagement. To keep analyses manageable, a factor analysis was performed on the questions regarding errors, and the resulting factor variables were used in further comparisons. Additionally, eight groups were created based on the residents' specialty. The largest specialties were analyzed separately (general surgery, internal medicine, obstetrics/gynecology, pediatrics, and psychiatry). The smaller specialties were clustered together based on the nature of the specialty into the following groups: *surgical specialties* (orthopedics, plastic surgery, urology, neurosurgery, cardio-thoracic, ear–nose–throat, and ophthalmology); *medical specialties* (cardiology, respiratory medicine, hepatology, rheumatology, clinical geriatrics, dermatology, neurology, and rehabilitation medicine); *supportive specialties* (radiology, radiotherapy, anesthesiology, pathology, nuclear medicine, medical microbiology, and clinical genetics). Analysis of variances (ANOVAs) with Bonferroni *post hoc* tests and Mann–Whitney and Kruskal–Wallis tests were performed to examine differences in self-reported errors as a factor of demographic data. T-tests and an ANOVA with a Bonferroni *post hoc* test were performed to explore differences in self-reported errors as a factor of burnout and engagement. Because of the high number of calculations, significant values were adjusted with a Bonferroni correction. Significance levels were adjusted to $p \leq 0.007$ for years in training, $p \leq 0.0125$ for clinical setting, and $p \leq 0.00625$ for specialty. Pearson and Spearman correlation coefficients were calculated to explore the relationships between self-reported errors and burnout and engagement. Correlation coefficients < 0.30 were considered as weak, 0.30 – 0.50 as moderately strong and > 0.50 as strong (Cohen, 1988).

Results

Demographics

Of the 5140 residents in training in The Netherlands, 2115 residents completed the questionnaire (response rate 41.1%) and an additional 125 indicated they did not wish to participate. A total of 1607 (74%) respondents completed the paper questionnaire, 508 (26%) responded online. The reasons given for not participating were lack of time (22.5%), the length of the questionnaire (22%), and lack of energy (11%).

The demographic information is summarized in Table 1. More than half of the residents were females (61%), the mean age was 31.5 (± 3.5) and the residents had been in training for a mean of 3.1 years (± 1.5). Residents were working in university clinics (48%), general teaching hospitals (41%), state mental health services clinics (9%), and rehabilitation clinics (2%). The residents reported working for an average of 50.6 h per week.

Self-reported errors – descriptives

Results on self-reported errors are listed in Table 2. Only 6% of the residents ($N = 123$) said they never made a mistake that did not have negative consequences for the patient, while 94% ($N = 1968$) made one or more of this type of error. Of those reporting one or more error(s) without negative consequences, 28 (1%)

Table 1. Demographics.

Age, M (SD)/range	31.5 (3.5)/23–58
Gender, <i>N</i> (%)	
Men	820 (39)
Women	1290 (61)
Marital status, <i>N</i> (%)	
Married/cohabitating	1627 (77)
Single	488 (23)
Number of children, <i>N</i> (%)	
0	1430 (68)
1	345 (16)
≥2	335 (16)
Data missing	5
Years in residency, M (SD)/range	3.1 (1.5)/1–9
Clinical setting	
University medical center	1021 (48)
General teaching hospital	859 (41)
Mental health clinic	191 (9)
Rehabilitation clinic	37 (2)
Specialty, <i>N</i> (%)	
General surgery	170 (8.0)
Surgical specialties	270 (12.8)
Internal medicine	292 (13.8)
Medical specialties	497 (23.5)
Supportive specialties	354 (16.8)
Obstetrics and gynecology	125 (5.9)
Pediatrics	162 (7.7)
Psychiatry	242 (11.5)
Hours worked per week, M (SD)/range	
Men	52.3 (6.7)/32–80
Women	49.6 (7.4)/26–80

reported making this type of error often. Seventy-one percent ($N = 1475$) reported performing procedures that they are not properly trained for. More than half (56%, $N = 1172$) reported making (a) mistake(s) that had a negative consequence for a patient, while 44% ($N = 917$) reported never making mistakes that do have negative consequences.

Two-thirds of the residents ($N = 1342$) said they never discharged patients later because their workload was too heavy. Three-quarters said it had occurred once or more often that they experienced falling short in the quality of care they provide ($N = 1579$). One hundred ninety-three residents said they often do not have enough time for their patients (9%); 12% ($N = 244$) indicated they always had enough time.

Based on a factor analysis (Table 2), questions were grouped into two factors, each with three items. The first factor denotes how often residents believed they made errors or performed procedures without enough experience (“action/inexperience errors”, Cronbach’s $\alpha = 0.62$) and the second measures how much time the resident feels he/she has for patients (“errors due to lack of time”, Cronbach’s $\alpha = 0.64$).

On the two error factor scores, we found the following (Table 3). Men reported significantly more action/inexperience errors than women. An effect of years in residency was found for action/inexperience errors. First year residents reported significantly fewer action/inexperience errors than the fifth year residents, according

Table 2. Self-reported errors.

	M	SD	Factor value		Never, N (%)	Once, N (%)	A couple of times, N (%)	Multiple times, N (%)	Often, N (%)
			Factor 1	Factor 2					
Factor 1: action/inexperience error	2.11	0.59	$\alpha = 0.62$		123 (6)	737 (35)	948 (46)	255 (12)	28 (1)
I make mistakes without negative consequences for the patient.	2.68	0.81	0.80	0.18					
I perform procedures for which I am not properly trained.	2.02	0.85	0.59	0.25	610 (29)	902 (44)	451 (22)	89 (4)	9 (1)
I make mistakes that have negative consequences for the patient.	1.66	0.65	0.83	0.01	917 (44)	983 (47)	178 (8)	11 (1)	0 (0)
Factor 2: errors due to lack of time	2.21	0.76	$\alpha = 0.64$		1342 (66)	405 (20)	207 (10)	66 (3)	14 (1)
I discharge patients later because my workload is too heavy.	1.56	0.85	0.06	0.66					
I fall short in the quality of care I provide.	2.20	0.95	0.24	0.78	517 (24)	863 (41)	524 (25)	161 (8)	31 (2)
I do not have enough time/attention for my patients.	2.90	1.15	0.13	0.79	244 (12)	572 (27)	620 (30)	456 (22)	193 (9)

Table 3. Self-reported errors, descriptives by group.

	Action/inexperience errors, M (SD)	Difference between groups	Errors due to lack of time, M (SD)	Difference between groups
Gender		$t = 2.92^*$		$t = -1.72$
Female	2.08 (0.57)		2.24 (0.75)	
Male	2.17 (0.60)		2.18 (0.78)	
Years in residency		$F = 3.35^*$		$F = 2.73$
1	2.02 (0.57)		2.21 (0.78)	
2	2.15 (0.59)		2.27 (0.78)	
3	2.09 (0.59)		2.24 (0.77)	
4	2.14 (0.59)		2.26 (0.78)	
5	2.19 (0.56)		2.12 (0.69)	
≥ 6	2.15 (0.59)		2.05 (0.67)	
Clinical setting		$F = 4.97^*$		$F = 14.64^{**}$
University medical center	2.09 (0.57)		2.15 (0.74)	
General teaching hospital	2.15 (0.59)		2.22 (0.76)	
Mental health clinic	2.19 (0.63)		2.54 (0.81)	
Rehabilitation clinic	1.87 (0.47)		2.09 (0.68)	
Specialty		$F = 7.97^{**}$		$F = 23.35^{**}$
General surgery	2.31 (0.57)		2.04 (0.64)	
Surgical specialties	2.02 (0.54)		1.97 (0.62)	
Obstetrics and gynecology	2.13 (0.56)		2.29 (0.65)	
Internal medicine	2.16 (0.59)		2.18 (0.65)	
Medical specialties	2.04 (0.62)		1.89 (0.72)	
Supportive specialties	2.16 (0.62)		2.49 (0.82)	
Pediatrics	2.02 (0.56)		2.27 (0.79)	
Psychiatry	2.23 (0.56)		2.47 (0.79)	

* $p \leq 0.01$.** $p \leq 0.001$.

to a Bonferroni *post hoc* test ($p = 0.004$). No effect of years in residency was found for errors due to lack of time.

An effect of clinical setting was found on both action/inexperience errors and errors due to lack of time. A Bonferroni *post hoc* test showed that residents in mental health service clinics reported significantly more errors due to lack of time than residents in the other three clinical settings ($p < 0.001$ for university medical center and general teaching hospital, $p = 0.005$ for rehabilitation center). No significant group differences were found for action/inexperience errors in *post hoc* testing.

Finally, residents in different specialties reported different rates of action/inexperience errors and errors due to lack of time. A Bonferroni *post hoc* test revealed that surgical residents reported the highest rates of action/inexperience errors, significantly higher than residents in obstetrics/gynecology, a medical specialty and a supportive specialty (all $p \leq 0.001$). Internal medicine residents reported significantly more errors in action/inexperience than residents in a medical or supportive specialty (both $p \leq 0.001$). On errors due to lack of time, psychiatry residents scored the highest, reporting significantly more errors than residents in surgery, a surgical specialty, a medical specialty, and obstetrics/gynecology (all $p \leq 0.002$). Residents in a supportive specialty reported the fewest errors due to lack of time, reporting significantly fewer errors than those in a surgical specialty, internal medicine, a medical specialty, pediatrics, and psychiatry (all $p \leq 0.001$).

Errors and burnout (Table 4)

Action/inexperience errors were significantly, but weakly positively related to emotional exhaustion and depersonalization. Errors due to lack of time were moderately strongly positively related to emotional exhaustion and depersonalization, and weakly negatively related to personal accomplishment. An ANOVA with a Bonferroni *post hoc* test revealed that residents with either moderate or severe burnout reported more action/inexperience errors ($F = 35.6, p < 0.001$) and more errors due to lack of time ($F = 155.1, p < 0.001$) than residents without burnout. Severely burned out residents additionally reported more errors due to lack of time than those with moderate burnout ($t = 2.53, p = 0.013$).

Errors and engagement (Table 4)

Action/inexperience errors were significantly negatively related to vigor and dedication ($r = -0.09, -0.07; p < 0.002$). Errors due to lack of time were significantly negatively related to all three dimensions of engagement: vigor, dedication, and absorption ($r = -0.23, -0.23, -0.11, p < 0.001$). Both action/inexperience errors and errors due to lack of time were significantly negatively related to the total engagement score ($r = -0.07, -0.21, p < 0.001$). Highly engaged residents reported significantly fewer action/inexperience errors and errors due to lack of time than residents who were not highly engaged ($t = 2.48, p = 0.013$ and $t = 6.54, p < 0.001$, respectively).

Discussion

The first aim of this study was to examine errors made by specialists in training in The Netherlands. Ninety-four percent of residents reported having made one or more mistake(s) that did not have negative consequences for the patient. Moreover, more than half of the residents reported having made one or more mistake(s) with negative consequences for the patient. First year residents reported fewer errors than those in the later years. This may be due to several reasons. Firstly, senior residents have been working longer and have simply performed more procedures; the probability of them reporting an error is higher than that of a first year resident. Secondly, as residents progress in their training and are able to work more independently, they receive less supervision from a more experienced physician who may correct them. Thirdly, it might be that younger residents feel more fearful of admitting errors. Almost three-quarters of all residents reported that they perform procedures for which they are not properly trained. The demand for health care in The Netherlands has increased in recent years (Statistics Netherlands, 2008), while the number of attending physicians has not increased accordingly. It is possible that residents are being asked to work more independently than they feel comfortable. Lack of supervision was found to be one of the leading causes of medical errors involving trainees (Singh, Thomas, Petersen, & Studdert, 2007).

When asked whether they fell short in the quality of care they provided, more than 75% said it occurred at least once, with 10% reporting it happened multiple times or often. The moderately strong correlation between this question and emotional exhaustion could be explained in two ways. Residents may feel they are not providing the best care they could, which may demotivate or emotionally

Table 4. Correlation coefficients, relationships between self-reported errors and burnout and engagement subscales.

	Emotional exhaustion	Depersonalization	Personal accomplishment	Moderate Burnout	Severe Burnout	Vigor	Dedication	Absorption	Total engagement score
Factor 1: action/inexperience errors	0.20**	0.29**	-0.05**	0.18**	0.10**	0.09	-0.07	-0.03	-0.07**
I make mistakes without negative consequences for the patient.	0.12**	0.23**	-0.00			-0.05*	-0.03	-0.03	
I perform procedures for which I am not properly trained.	0.23**	0.25**	-0.10**			-0.12**	-0.11**	-0.05*	
I make mistakes that have negative consequences for the patient.	0.09**	0.17**	0.00			-0.02	-0.02	-0.01	
Factor 2: errors due to lack of time	0.43**	0.42**	-0.08**	0.36**	0.23**	-0.23**	-0.24**	-0.11**	-0.22**
I discharge patients later because my workload is too heavy.	0.24**	0.28**	-0.09**			-0.19**	-0.20**	-0.11**	
I fall short in the quality of care I provide.	0.36**	0.31**	-0.09**			-0.20**	-0.22**	-0.10**	
I do not have enough time/attention for my patients.	0.36**	0.36**	-0.04			-0.15**	-0.15**	-0.07**	

* $p \leq 0.01$.** $p \leq 0.001$.

exhaust people who generally choose this profession to help people. However, residents may not be able to treat patients optimally because they are emotionally exhausted. The cross-sectional design of this study unfortunately limits our understanding of the causal relationship between these two variables. With regard to the amount of time the residents have for their patients, the overwhelming majority (91%) feel they do not have enough time. There is a moderately strong relationship between the feeling of not having enough time for patients and emotional exhaustion and depersonalization. Again, the direction is unknown. Residents may be frustrated by not being allowed as much time as they want. However, it is also possible that residents who are suffering from emotional exhaustion or depersonalization may not work as efficiently as those without those symptoms and feel pressure to work more hurriedly.

In examining risk factors for the perception of making errors, we found that men reported more errors in action/judgment than women. This is surprising, as literature has suggested that female health care providers are more likely to disclose errors than males (Mrayyan, Shishani, & Al-Faouri, 2007). However, that study focused on nursing staff (nursing, a predominant female occupation). It is possible that women in a traditionally male specialty felt less comfortable to disclose their errors. We also found an effect of specialty on the frequency of errors. To date, studies on resident error have been in single-specialty, making comparisons between studies difficult. A possible reason for our finding differences in errors between specialty groups is the varying degree to which a resident directly treats a patient. While surgical and internal medicine residents regularly treat patients directly as part of their daily tasks, other residents such as those in pathology or clinical genetics do not regularly treat patients. The nature of their jobs is dissimilar; types of errors and the direct risk for negative consequences for the patient may be different. Furthermore, the time constraints may be very different for one resident running an out-patient clinic and another sitting behind a microscope.

Clinical setting seems to play a role in residents' reports of errors. Residents in a rehabilitation center reported fewer action/inexperience errors than those working in other settings. There may be a couple of explanations for this finding. Organizational factors have been found to affect patient safety (Hickam et al., 2003). The organizational structure of a rehabilitation center may be different from the structure in a general hospital. The size of the setting may play a role as well. Rehabilitation centers are not as large as university clinics generally are. The smaller scale may mean that residents working in rehabilitation centers receive more personal attention from supervisors or that their workload is lighter.

The second aim of this study was to explore relationships between self-reported errors and burnout; our hypothesis that burnout would be related to the perception of making more errors was supported. Burnout is positively related to self-reported errors. Emotional exhaustion and depersonalization seem to play a larger role in reporting making errors than personal accomplishment, in line with literature (Taris, 2006). Additionally, burnout is more strongly related to perceived errors due to lack of time than to perceived errors in judgment/inexperience. Logically, residents who have less time to perform their work are more likely to make and report an error. This may lead them to feel "overwhelmed", which has been found to be related to making errors (Baldwin, Dodd, & Wrate, 1997). As stated above, the cross-sectional design of this study prevents us from fully understanding the causal nature of this relationship. However, given that personal accomplishment is less strongly related to

self-reported errors than emotional exhaustion and depersonalization, it is plausible that residents who are emotionally exhausted and cynical toward their work are less attentive to patients, which, in turn, leads to making errors. Curiously severe burnout was less correlated to both action/inexperience errors and errors due to lack of time when compared to moderate burnout. We cannot offer a good explanation for this and recommend further research on this specific point.

Our third hypothesis, that engagement is related to the perception of making fewer errors, was also supported. Highly engaged residents reported both fewer action/inexperience error and errors due to lack of time than those not highly engaged, although relationships were weak. Vigor and dedication seem to be more strongly related to making fewer errors, especially due to lack of time, than absorption is. Vigor is characterized by feeling energetic and being able to persevere, dedication by being passionate about work. It may be that highly engaged residents are more willing to sacrifice extra, even personal time to get their work done. Besides this, the way of experiencing the organizational environment may play a part. Being engaged may lead to a more positive subjective perception to the working environment, which may influence the way in one reports errors. Looking at “the bright side of life” may effect the reporting of less negative perceptions.

There are a few limitations to this study. The factor analysis showed that the six error items had a high factor value on one factor and a low value on the other. Unfortunately, the α values of these factors are low, indicating somewhat limited internal consistency in the answers to the items. One of the reasons for the low reliabilities is the limited number of items included in both scales. The two error factors were used in analyses with burnout and engagement scales, but many analyses were performed with all six items, and the correlation coefficients for all the six questions are listed in Table 3. A second limitation was the response rate of 41%, which could indicate a sample bias in our data. Individuals who are burned out may be less likely to return questionnaires (Taris & Schreurs, 2007). Eleven percent of residents who returned a non-response form stated lack of energy as the reason for non-participation; 22% stated lack of time. We can, therefore, not be sure whether errors have been over- or under-reported by residents with burnout. Thirdly, admitting to having made a mistake is difficult for residents. One study reported that only half of residents who described their mistakes in a questionnaire had told the attending physician about it (Wu et al., 1991). It is possible that residents did not fully disclose their errors in this study. Another limitation is recall bias. Residents were asked to report how often errors had occurred within a non-specific time frame, it could be that they can only recall recent incidents and may have forgotten about the mistakes they made early on. Finally, the study’s cross-sectional design limits our understanding of the causal nature of the relationships between self-reported errors and burnout and engagement.

Despite its limitations, this is the first study to examine the resident physicians’ self-reported errors on a national level. Making a mistake can be very distressful for a resident. One way to help residents is to focus on prevention of errors. This is not as simple as reducing the number of residents’ work hours (Vidyarathi et al., 2007). Residents may need to be more closely supervised than they have been (Feinstein, 1997; Singh et al., 2007). One university medical center in The Netherlands has implemented a safety management system in which mistakes are analyzed carefully to prevent them from being repeated (Leistikow, Plaisier, Blijham, 2006). This is a wonderful step, but it is also vital to meet residents’ emotional needs in cases where

an error has occurred. It has been suggested that doctors should be allowed to speak openly about their errors, to be able to learn constructively from them (Wu et al., 1991; Christensen, Levinson, Dunn, 1992; Wu, 2000; Goldberg, Kuhn, Andres, Thomas, 2002). Supervisors may need to provide residents with more emotional support as dissatisfaction with emotional support was shown to be the strongest predictor of burnout among residents (Prins et al., 2007c). Further research should consider ways to prevent residents from developing burnout, to keep them highly engaged and to limit the consequences errors may have on them. One possible way to do this is to decrease job demands and increase job resources (Bakker & Demerouti, 2007).

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