

Burnout levels among Portuguese family doctors: a nationwide survey

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ABSTRACT

Aim: To characterise the prevalence of burnout syndrome in a sample of family doctors (FDs) working in the Portuguese National Health System.

Design: Cross-sectional survey.

Setting: Primary healthcare centres from the 18 continental districts and two archipelagos of Portugal.

Method: The Portuguese version of the Maslach Burnout Inventory—Human Services Survey was sent to 40 randomly selected healthcare centres and distributed to the FDs employed. Socio-demographic and work-related data were also collected. Participants were classified as having high, average or low levels of emotional exhaustion (EE), depersonalisation (DP) and personal accomplishment (PA) dimensions of burnout.

Results: 371 questionnaires were sent, of which 153 (83 women, age range 29–64 years; response rate 41%) returned. One-quarter (25.3%, 95% CI 18.6% to 33.1%) of FDs scored high for EE, 16.2% (10.7% to 23.2%) for DP and 16.7% (11.1% to 23.6%) for lack of PA. On multivariate analysis, being married, of older age, having many years of practice or working in a personalised healthcare unit tended to be associated with increased burnout components. Men tended to present higher EE and DP but lower lack of PA than women. Finally, the prevalence (95% CI) of burnout ranged between 4.1% (1.5% to 8.6%) and 32.4% (25.0% to 40.6%), depending on the definition used.

Conclusions: High burnout is relatively common among Portuguese FDs. Burnout relief measures should be developed in order to prevent a further increase of burnout syndrome among Portuguese FDs.

INTRODUCTION

In the last 3 decades, burnout syndrome increased to worrisome levels in doctors,^{1 2} including family doctors (FDs).³ Despite the presence of burnout, most FDs usually do not seek help,⁴ which might lead to a decrease in their performance and even compromise adequate treatment of patients.

Burnout is consequent to job-related chronic stress⁵ and is characterised by a symptomatic triad of emotional exhaustion (EE) (feelings of tiredness and emptiness), depersonalisation (DP) (empathy disappear-

ARTICLE SUMMARY

Article focus

- In the last 3 decades, burnout syndrome increased to worrisome levels in doctors, including FDs, and there are scarce data concerning this condition in Portuguese FDs.

Key messages

- The prevalence (95% CI) of burnout ranged between 4.1% (1.5% to 8.6%) and 32.4% (25.0% to 40.6%), depending on the definition used.

Strengths and limitations of this study

- First study assessing burnout among Portuguese FDs using a stratified random sample. The limitations of the study include the relatively low participation rate (but comparable to other similar studies) and the fact that the Portuguese version of the Maslach Burnout Inventory—Human Services Survey questionnaire has not been validated. Still, Cronbach's α values ranged between 0.64 (for DP) and 0.90 (for EE), in agreement with the literature.

ance, cynicism and automatism) and a lack of personal accomplishment (PA) (lack of self-esteem and frustration).⁵

In 2008, a European study on burnout among European FDs (the EGPRN study³) showed that 43% of respondents scored high for EE burnout, 35% for DP and 32% for PA, with 12% scoring high burnout in all three dimensions. Unfortunately, the EGPRN study did not include Portugal, so we conducted a study to assess the prevalence of burnout among Portuguese FDs, using the same methodology as the EGPRN.

METHODS

Sampling

This study was conducted between November 2010 and November 2011. A stratified and randomised sampling was conducted selecting two primary healthcare centres (HCCs) from each of the 18 Portuguese

continental districts and two archipelagos (Madeira and Azores) of Portugal as described in the site 'Portal da Saúde' from the Portuguese Ministry of Health.⁶ The districts and archipelagos constituted the strata and each primary HCC was considered as a cluster. Questionnaires were sent with pre-paid return envelopes to previously contacted HCC employees, who distributed the questionnaires with informed consent to every FD employed. Seventeen questionnaires were sent and received via email.

FDs in HCCs work in either family healthcare units (FHCUs) or personalised healthcare units (PHCUs). Beyond their organisational differences, the first provides healthcare to families, which have a FD, while the second one provides healthcare to those who have a FD and also to individuals who do not have a FD.

The study was approved by the Ethics Commissions of North, Algarve and Madeira and also by all corresponding Portuguese Regional Administrations.

Burnout

Burnout was assessed using the Portuguese translation of the Maslach Burnout Inventory—Human Services Survey (MBI-HSS).⁴ Answers to the MBI-HSS were used to classify the participants as having high, average or low levels in EE, DP and PA dimensions of burnout. In agreement with a previous study,³ the following cut-offs were used to define low, average or high levels of each dimension of the MBI-HSS—EE: low, ≤ 13 ; average, 14–26; high, ≥ 27 ; DP: low, ≤ 5 ; average, 6–9; high, ≥ 10 ; PA: low, ≤ 33 ; average, 32–39; high, ≥ 40 (inverse scale).³ As the definition of burnout is a controversial subject, we applied different definitions as described in the literature: (1) high levels of EE and DP combined with low PA (C Maslach, personal communication, 2008)⁷; (2) high EE and/or high DP^{8 9} and (3) high negative score on EE in combination with high DP or low PA.¹⁰ As to missing data, for each skipped MBI-HSS item, it was attributed the mean score calculated for that question's dimension. Two skipped questions were coded as missing value for

the whole dimension. Two answers for the same item were coded as one skipped question and replaced by the average of that dimension.

Data regarding socio-demographic and work-related questions were also collected.

Statistical analysis

Statistical analysis was performed using SPSS V.19.0 (IBM SPSS statistics). Results were expressed as median (interquartile interval), mean \pm SD or number of subjects (percentage). Bivariate comparisons were performed using Mann–Whitney or Kruskal–Wallis non-parametric tests for quantitative data and by χ^2 for qualitative data. Multivariate analysis was conducted using SPSS complex samples logistic regression analysis stratifying samples by district/archipelago and including as main effects all variables which reached an α level of at least 0.25. Conversely, we did not take into account the clustering as for many health centres the number of participants was very low (< 3). Results were considered significant if $p < 0.05$.

RESULTS

Overall, 371 questionnaires were sent, of which 153 (response rate 41%) were retrieved. From these, only 150 were considered valid for the analysis. No information could be obtained regarding the socio-demographic characteristics of non-responders.

The main results are summarised in tables 1 and 2. Men were older and had more years of professional activity than women. Overall, 25.3% (95% CI 18.6% to 33.1%) of participants scored high for EE, 16.2% (10.7% to 23.2%) for DP and 16.7% (11.1% to 23.6%) for low PA; 2.0% scored high for all three dimensions. Men had higher DP and PA scores than women, while no differences were found for EE (table 1).

No significant bivariate association was found between burnout components and most participants' characteristics (table 2), with the exception of marital status, and

Table 1 Main characteristics of the participants

Variables	All	Men	Women	Test
Age	54.5 (9.0) n=148	55.0 (5.0) n=67	53.0 (13.0) n=81	1813.0***
Years of professional activity	29.0 (10.3) n=150	30.0 (4.0) n=67	28.0 (5.0) n=83	2103.0*
Hours of work per week	42.0 (3.0) n=150	42.0 (3.4) n=68	42.0 (2.0) n=82	2744.0 ^{ns}
Hours of contact with patients per day	7.0 (1.5) n=138	7.0 (1.6) n=61	7.0 (1.6) n=77	2201.0 ^{ns}
Emotional exhaustion score	16.0 (19.0)	17.0 (22.0)	14.5 (16.3)	2584.5 ^{ns}
Depersonalisation score	4.0 (5.0)	6.0 (6.8)	3.0 (5.8)	2078.0*
Personal accomplishment score	41.0 (8.0)	42.5 (8.0)	40.0 (8.0)	2206.0*

* $p < 0.05$, *** $p < 0.001$.

Results are expressed as median (interquartile interval) or number (percentage) of the total subjects. Comparisons performed with Mann–Whitney non-parametric test for quantitative data and by χ^2 for qualitative data.
ns, not significant.

Table 2 Prevalence of burnout components according to selected participants' characteristics

	Emotional exhaustion	Test (p value)	Depersonalisation	Test (p value)	Personal accomplishment	Test (p value)
Gender						
Man	30.9 (20.2 to 43.3)	2.03 (0.16)	22.1 (12.9 to 33.8)	3.16 (0.08)	11.8 (5.2 to 21.9)	2.15 (0.14)
Woman	20.7 (12.6 to 31.1)		11.3 (5.3 to 20.3)		20.7 (12.6 to 31.1)	
Age (years)						
≤45	22.6 (9.6 to 41.1)	0.14 (0.71)	9.7 (2.0 to 25.8)	1.13 (0.29)	6.5 (0.1 to 21.4)	2.52 (0.11)
>45	25.9 (18.2 to 34.8)		17.5 (11.1 to 25.8)		18.1 (11.6 to 26.3)	
Children						
Yes	13.3 (1.7 to 40.5)	1.27 (0.26)	6.7 (0.2 to 31.9)	0.47§	26.7 (7.8 to 55.1)	0.28§
No	26.7 (19.4 to 35.0)		17.3 (11.3 to 24.8)		15.6 (9.9 to 22.8)	
Marital status						
Single/divorced	11.8 (3.3 to 27.5)	4.12 (0.04)	6.1 (0.1 to 20.2)	3.02 (0.08)	17.6 (6.8 to 34.5)	0.02 (0.89)
Married/union	28.9 (20.8 to 38.2)		18.6 (11.9 to 27.0)		16.7 (10.3 to 24.8)	
Practice years						
≤20	19.4 (8.2 to 36.0)	0.82 (0.34)	8.3 (1.8 to 22.5)	2.23 (0.14)	8.3 (1.8 to 22.5)	2.43 (0.12)
>20	27.4 (19.5 to 36.6)		18.9 (12.1 to 27.5)		19.5 (12.6 to 27.8)	
Hours/day patient						
≤7	25.6 (16.4 to 37.8)	0.04 (0.85)	19.2 (11.1 to 29.7)	0.70 (0.40)	15.4 (8.2 to 25.3)	0.26 (0.61)
>7	27.1 (16.4 to 40.3)		13.8 (6.1 to 25.4)		18.6 (9.7 to 30.9)	
Hours/week inst.						
≤40	25.0 (14.7 to 37.9)	0.01 (0.91)	16.7 (8.3 to 28.5)	0.01 (0.93)	18.3 (9.5 to 30.4)	0.17 (0.68)
>40	25.8 (17.1 to 36.2)		16.1 (9.1 to 25.5)		15.7 (8.9 to 25.0)	
Practice unit						
FHCU	16.3 (6.8 to 30.7)	1.92 (0.17)	18.6 (8.4 to 33.4)	0.41 (0.52)	9.3 (2.6 to 22.1)	2.26 (0.13)
PHCU	27.2 (18.4 to 37.4)		14.3 (7.8 to 23.2)		19.6 (12.0 to 29.1)	
Other inst.						
Yes	24.7 (16.5 to 34.5)	0.01 (0.92)	15.6 (9.0 to 24.5)	0.01 (0.95)	17.5 (10.6 to 26.6)	0.08 (0.78)
No	25.5 (14.3 to 39.6)		16.0 (7.2 to 29.1)		15.7 (7.0 to 28.6)	

Results are expressed as % and (95% CI). Comparisons were performed with χ^2 or Fisher's exact test (§). FHCU, family healthcare unit; inst, institution; PHCU, personalised healthcare unit.

similar findings were obtained when mean scores were computed, although men presented higher DP and PA scores than women (supplementary table 1).

The number of participants with low, average and high burnout scores in none, one, two or three subscales is summarised in table 3 and in figure 1. The prevalence (95% CI) of burnout among Portuguese FDs was 4.1% (1.5% to 8.6%) for definition 1, 32.4% (25.0% to 40.6%) for definition 2 and 13.5% (8.5% to 20.1%) for definition 3.

Multivariate logistic regression was conducted separately for each burnout component taking into account

stratification and including all variables, which were associated at $p < 0.025$. The results are summarised in table 4. Men showed a lower likelihood of presenting with low PA. Conversely, no other variable was significantly associated with burnout components, although positive (deleterious) trends were found for male sex (high EE and DP), being married (high EE and DP), older age (high PA), increased years of activity (high DP and low PA) and working in a PHCU (high EE and low PA). Similar findings were obtained when the analysis was conducted without taking into account sample stratification (supplementary table 2).

Table 3 Number of participants with low, average and high burnout scores in none, one, two or three subscales

	High burnout				Total
	0	1	2	3	
Average burnout					
0	29 (19.6)	13 (8.8)	6 (4.1)	6 (4.1)	54 (36.5)
1	42 (28.4)	16 (10.8)	10 (6.8)	—	68 (45.9)
2	15 (10.1)	7 (4.7)	—	—	22 (14.9)
3	4 (2.7)	—	—	—	4 (2.7)
Total	90 (60.8)	36 (24.3)	16 (10.8)	6 (4.1)	148 (100.0)

The possible combinations for the different subscales describing increasing burnout are shown in the table. Participants with low burnout scores in one dimension are represented by excluding average or high burnout. Results are expressed as number (percentage) of the total subjects.

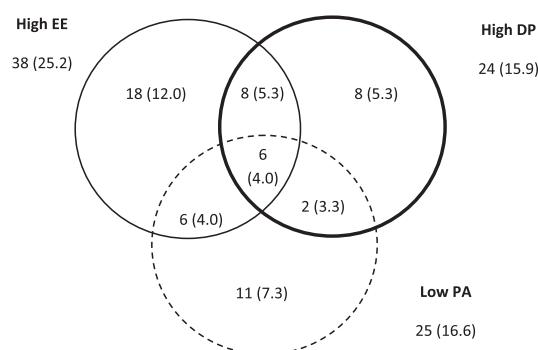


Figure 1 Venn's diagram with the number of participants with high burnout scores in one, two or three subscales, N=150. Results are expressed as number (percentage) of subjects. DP, depersonalisation; EE, emotional exhaustion; PA, personal accomplishment.

Table 5 compares the results of the current study with those reported from other countries. Overall, Portuguese FDs tended to present a lower prevalence of burnout components than in other countries.

DISCUSSION

To our knowledge, this is the first study ever to assess rates of burnout among FDs in Portugal. Our study also complements the previous findings of the EGPRN study,³ which assessed burnout among FDs from 12 European countries. Our results suggest that Portuguese FDs tend to present lower burnout levels for the three subscales EE, DP and PA than in other European countries.

Although men scored higher than women, no significant difference was found regarding the prevalence of high EE, high DP or low PA between genders. Still,

multivariate analysis showed that men had a lower likelihood of presenting with low PA after adjusting for years of activity, and a similar trend was found after adjusting for age. Conversely, men tended to present higher levels of EE and DP than women, and this trend persisted after multivariate adjustment. Overall, our results suggest that Portuguese male FDs are more likely to present with EE or DP than their female colleagues but that they feel more accomplished than women FDs. A possible explanation might be the greater female involvement with family and home organisation in comparison to men, since having children has been regarded as protective for burnout development,^{3 4} and that little time for family contact and support increases its risk.⁵ Many other recent studies regarding burnout on FDs have also found higher burnout trends among men FDs.^{3 12 13} Still, further investigation is warranted as different results and possible explanations have been described.¹⁴

Married or cohabitating FDs tended to present higher EE and DP than single colleagues. Still, having children was not associated with burnout components. These two findings compromise the hypothesis of the family workload as a factor of stress. Another possible explanation might be related to increased marital problems among Portuguese FDs since it is known that FDs who have marital problems tend to have negative emotional and behavioural changes.⁵

Older age (and also longer time of practice) tended to be associated with higher levels of burnout components. The responsibility of a FD within a HCC is no longer related to age due to medical career freezing for more than 14 years now.¹⁵ Moreover, burnout is described to be more common among younger FDs,^{3 14} so a possible hypothesis for these results might be a greater incidence of other clinical syndromes among older FDs and that

Table 4 Logistic regression to assess the factors individually and independently associated with burnout components

	High EE	High DP	Low PA (1)	Low PA (2)
Gender				
Female	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Male	1.45 (0.63 to 3.43)	2.06 (0.82 to 5.21)	0.40 (0.14 to 1.13)	0.33 (0.12 to 0.93)
Marital status				
Single/divorced	1 (ref.)	1 (ref.)	—	—
Married/union	3.06 (0.83 to 11.23)	2.88 (0.59 to 14.04)	—	—
Age category				
≤45	—	—	1 (ref.)	—
>45	—	—	3.31 (0.71 to 15.5)	—
Years of activity				
≤20	—	1 (ref.)	—	1 (ref.)
>20	—	1.78 (0.48 to 6.61)	—	3.07 (0.84 to 11.22)
Practice unit				
FHCU	1 (ref.)	—	1 (ref.)	1 (ref.)
PHCU	2.48 (0.89 to 6.93)	—	3.02 (0.82 to 11.18)	2.63 (0.83 to 8.38)

Results are expressed as OR (95% CI). For PA, two models were used as the variables years of activity and age categories were correlated and their simultaneous inclusion led to a non-estimable model. Statistical analysis by multivariate logistic regression taking into account sample stratification.

—, not included in the model; DP, depersonalisation; EE, emotional exhaustion; FHCU, family healthcare unit; PA, personal accomplishment; PHCU, personalised healthcare unit.

Table 5 Results for each burnout subscale in previous and recent European studies

European studies	EE	DP	PA
EGPRN study, overall (2008, n=1393) ³	24.0±16.0	7.0±7.0	37.0±11.0
Spanish FDs* (2005, n=86) ¹¹	21.0 (16.8–29.5)	21.0 (3.0–12.0)	39.0 (33.0–39.0)
Swiss FDs (2005, n=1584) ¹²	17.0 (10.0–24.0)	6.0 (3.0–9.0)	41.0 (36.0–45.0)
Portugal (this study) (n=150)	16.0 (8.0–27.0)	4.0 (2.0–7.0)	41.0 (36.0–44.0)
EGPRN study (2008) ³	High EE (%; 99% CI)	High DP (%; 99% CI)	Low PA (%; 99% CI)
Overall (n=1393)	43.0 (40.5 to 45.6)	35.3 (32.9 to 37.9)	32.0 (29.6 to 34.5)
Bulgaria (n=69)	62.3 (50.5 to 72.8)	30.4 (20.8 to 42.1)	18.8 (14.4 to 29.6)
Croatia (n=117)	41.9 (33.3 to 50.9)	12.0 (7.3 to 19.1)	13.7 (8.6 to 21.1)
France (n=178)	33.7 (27.2 to 40.9)	35.4 (28.7 to 42.7)	27.5 (21.5 to 34.5)
Greece (n=45)	31.8 (20.0 to 46.6)	73.3 (59.0 to 84.0)	93.2 (81.8 to 97.7)
Hungary (n=87)	36.8 (27.4 to 47.3)	35.6 (26.4 to 46.1)	26.4 (18.3 to 36.6)
Italy (n=147)	68.0 (60.1 to 75.0)	55.1 (47.0 to 62.9)	40.8 (33.2 to 48.9)
Malta (n=129)	36.4 (28.6 to 45.0)	31.0 (23.7 to 39.4)	24.8 (18.2 to 32.9)
Poland (n=150)	48.0 (40.2 to 55.9)	34.0 (26.9 to 41.9)	30.0 (23.2 to 37.8)
Spain (n=86)	30.2 (21.5 to 40.6)	34.9 (25.7 to 45.4)	25.6 (17.5 to 35.7)
Sweden (n=109)	45.9 (36.8 to 55.2)	34.9 (26.6 to 44.2)	11.9 (7.1 to 19.3)
Turkey (n=112)	15.2 (9.7 to 23.0)	15.2 (9.7 to 23.0)	69.4 (60.3 to 77.2)
England (n=164)	54.3 (46.6 to 61.7)	44.5 (37.1 to 52.2)	32.9 (26.2 to 40.4)
Portugal (this study) (n=150)	25.3 (16.7 to 35.5)	16.2 (9.3 to 25.4)	16.7 (9.7 to 25.7)

Results are expressed as mean±standard deviation, median (interquartile range) or percentage (99% CI).

*Corresponds to the year of publication, not to the time of survey.

DP, depersonalisation; EE, emotional exhaustion; FD, family doctor; PA, personal accomplishment.

can contribute to exhaustion,⁴ like depression, empty nest syndrome and middle age crisis.

The prevalence of burnout ranged from 4.1% to 32.4%, depending on the definition used. This wide range is due to the different combinations of EE, DP and PA subscales, as indicated in figure 1. Furthermore, the cut-offs used were those reported in the EGPRN study,³ which differ slightly from the cut-offs provided in the 'original' version of the MBI-HSS.¹⁶ This was done in order to compare our results with those from the literature. Still, using the cut-offs of the 'original' version led to similar conclusions (supplementary tables 3 and 4). Hence, it would be of interest that future studies on burnout report their results using one or several definitions and state the cut-offs used to facilitate comparisons.

Our results also show that working in PHCUs was related to higher burnout levels. This can be explained by the recent transfer of FDs to FHCUs from PHCUs that could have increased workload in PHCUs. Furthermore, the Portuguese Ministry of Health shows interest in transforming PHCUs into FHCUs, a fact that may leave PHCUs financially discriminated. Finally, teamwork is better established in FHCUs, and FDs in these units have more autonomy regarding schedules and clinical practice decisions—a burnout preventing trait.^{4 5}

Portuguese FDs tended to present lower burnout scores and also lower prevalence of burnout components than FDs from other European countries (see table 5). A possible explanation might be related to a slightly lower workload among Portuguese FDs compared with their colleagues from other countries. For instance, Portugal has 198.3 FDs per 100 000 inhabitants, a much higher

number in comparison with the UK, which only has 78.3 FDs per 100 000.¹⁷ Furthermore, a Portuguese FD has on average 1500¹⁸ patients, again a value lower than in the UK (1800).¹⁹ Still, further studies are advisable to better understand the lower burnout prevalence and scores among Portuguese doctors relative to their European counterparts.

This study has some limitations worth noting. First the response rate (41%) was rather low but identical to the one reported by the EGPRN study.³ Neither the Portuguese version of the MBI-HSS nor the questionnaire used to measure demographic variables were formally validated, although we are relatively confident that the responses related to demographic variables were adequately provided by the participants. Still, it would be of interest to validate the MBI-HSS so that future studies can rely upon an adequate instrument; still, Cronbach's α values ranged between 0.64 (for DP) and 0.90 (for EE), also in agreement with those reported in the EGPRN study.³ A pre-study sample size analysis indicated that a minimum sample size of 384 responders was necessary to achieve an absolute precision of 0.05 for the prevalence rates. Unfortunately, this sample size could not be obtained due to a low response rate. Furthermore, for logistic and financial reasons, it was not possible to send more questionnaires or to sample more health centres. Hence, it is likely that this study is underpowered to detect associations between burnout and the demographic variables studied. Still, it provides the first estimation of burnout syndrome among Portuguese doctors, and it would be of interest to confirm these findings by a larger adequately powered study. Finally,

only FDs present at the HCCs answered, thus excluding those on sick leave; hence, it is possible that the burnout rates reported are underestimated. Still, in the absence of other studies available, our results provide the first estimation of the burnout rates among FDs in Portugal.

The results of our study have important implications. In Portugal, there is currently no aid for dealing with burnout among health professionals. Hence, it would be of uttermost importance that the Portuguese Ministry of Health, the Portuguese College of Physicians or the Regional Health Administrations provide some support at institutional and individual levels. Finally, another study would be desirable to assess the progression of burnout among Portuguese FDs.

In summary, our results suggest that a significant percentage of Portuguese FDs present with burnout and that male gender, older age and being married tend to increase burnout. These values are nevertheless lower than reported in other European countries.

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Contributors We state that GM and JM-C have contributed equally, were responsible for the conception, design and acquisition of data. They both performed the statistical analysis and wrote the article. We also state that PM-V was the tutor of this research study and wrote part of the article. IC, JAC and ML helped with the acquisition of data and, along with NC, scientifically reviewed the paper and made major modifications regarding intellectual content. All authors have given their final approval of the version to be submitted.

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STROBE 2007 (v4) Statement—Checklist of items that should be included in reports of *cross-sectional studies*

Section/Topic	Item #	Recommendation	Reported on page #
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	Page 1
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Pages 3-4
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Page 5
Objectives	3	State specific objectives, including any prespecified hypotheses	Page 5
Methods			
Study design	4	Present key elements of study design early in the paper	Page 5
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Page 5
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	Pages 5-6
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Page 6
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Page 6
Bias	9	Describe any efforts to address potential sources of bias	Page 6

Study size	10	Explain how the study size was arrived at	Page 5-6
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	Page 6
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	Page 6
		(b) Describe any methods used to examine subgroups and interactions	Page 6
		(c) Explain how missing data were addressed	Pages 6-7
		(d) If applicable, describe analytical methods taking account of sampling strategy	
		(e) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Pages 8-9
		(b) Report category boundaries when continuous variables were categorized	
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	

Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Page 9
Discussion			
Key results	18	Summarise key results with reference to study objectives	Page 10
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	Page 9
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	Pages 8-9
Generalisability	21	Discuss the generalisability (external validity) of the study results	Pages 9-10
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at www.strobe-statement.org.

Supplementary table 1: Burnout mean scores according to selected participants' characteristics.

	Emotional Exhaustion	<i>Test</i>	Depersonal- ization	<i>Test</i>	Personal Accomplish- ment	<i>Test</i>
Gender						
Male	19.7 ± 13.1	2584.5 ^{ns}	6.6 ± 4.7	2078.0*	40.5 ± 7.1	2206.0*
Female	17.7 ± 12.1		4.7 ± 4.8		38.5 ± 7.4	
Age						
≤45	16.5 ± 11.6	1596.0 ^{ns}	4.8 ± 3.6	1713.5 ^{ns}	40.1 ± 4.4	1704.0 ^{ns}
>45	19.1 ± 12.8		5.8 ± 5.7		39.4 ± 7.9	
Children						
Yes	19.0 ± 12.5	801.0 ^{ns}	5.8 ± 5.2	678.0*	39.7 ± 7.0	794.5 ^{ns}
No	15.2 ± 12.9		3.9 ± 5.9		36.6 ± 9.8	
Marital status						
Single/Divorced	14.9 ± 12.6	1452.0*	4.6 ± 5.8	1479.0 ^{ns}	39.6 ± 8.5	1786.5 ^{ns}
Married/Union	19.6 ± 12.4		5.8 ± 5.0		39.4 ± 7.1	
Practice years						
≤20	15.9 ± 11.1	1688.5 ^{ns}	4.6 ± 3.5	1879.5 ^{ns}	39.9 ± 4.6	1912.5 ^{ns}
>20	19.6 ± 12.9		5.9 ± 5.7		39.2 ± 8.0	
Hours/day patien.						
≤5	17.4 ± 7.8	0.7 ^{ns}	5.1 ± 4.1	3.3 ^{ns}	30.8 ± 11.5	6.1 *
6-8	19.2 ± 13.2		5.8 ± 5.5		39.6 ± 6.9	
≥9	23.1 ± 13.4		9.1 ± 5.9		36.6 ± 8.6	
Hours/week inst.						
≤40	17.9 ± 13.7	2368.5 ^{ns}	5.4 ± 5.8	2234.5 ^{ns}	39.5 ± 8.8	2356.5 ^{ns}
>40	19.3 ± 11.7		5.8 ± 4.9		39.3 ± 6.2	
Practice unit						
FHCU	16.1 ± 10.8	1701.0 ^{ns}	5.3 ± 4.6	1915.5 ^{ns}	41.0 ± 5.7	1663.5 ^{ns}
PHCU	19.4 ± 12.9		5.6 ± 5.1		38.8 ± 7.8	
Other inst.						
Yes	16.8 ± 12.0	2174.0 ^{ns}	5.5 ± 5.3	2211.5 ^{ns}	40.2 ± 7.1	2237.5 ^{ns}
No	19.3 ± 12.9		5.6 ± 5.3		39.0 ± 7.6	

Results are expressed as mean ± standard deviation. Comparisons were performed with Mann-Whitney or Kruskal-Wallis: NS, not significant. *, p <0.05. FHCU, Family Health Care Unit. PHCU, Personalized Health Care Unit.

Supplementary table 2: logistic regression to assess the factors individually and independently associated with burnout components.

	High EE	High DP	Low PA (1)	Low PA (2)
Gender				
Woman	1 (ref.)	1 (ref.)	1 (ref.)	1 (ref.)
Man	1.45 (0.63-3.35)	2.06 (0.79-5.39)	0.40 (0.14-1.14)	0.33 (0.12-0.95)
Marital status				
Single/Divorced	1 (ref.)	1 (ref.)	-	-
Married/Union	3.06 (0.84-11.19)	2.88 (0.62-13.29)	-	-
Age category				
≤45	-	-	1 (ref.)	-
>45	-	-	3.02 (0.82-11.17)	-
Years of activity				
≤20	-	1 (ref.)	-	1 (ref.)
>20	-	1.78 (0.47-6.67)	-	3.07 (0.81-11.67)
Practice unit				
FHCU	1 (ref.)	-	1 (ref.)	1 (ref.)
PHCU	2.48 (0.92-6.71)	-	3.31 (0.70-15.74)	2.63 (0.81-8.55)

EE, emotional exhaustion; DP, depersonalization; PA, personal accomplishment; FHCU, Family Health Care Unit; PHCU, Personalized Health Care Unit; -, not included in the model. Results are expressed as Odds ratio and (95% confidence interval). For low PA, two models were used as the variables years of activity and age categories were correlated and their simultaneous inclusion led to a non-estimable model. Statistical analysis by multivariate logistic regression not taking into account sample stratification.

Supplementary table 3: Prevalence of burnout among Portuguese general practitioners, using original cut-offs for the Maslach Burnout Inventory – Human Services Survey (MBI-HSS)

Variables	All	Male	Female	Test
High emotional exhaustion score	38 (25.3) (<i>n</i> = 150)	21 (30.9) (<i>n</i> = 68)	17 (20.7) (<i>n</i> = 82)	2.08 ^{ns}
High depersonalization score	38 (25.3) (<i>n</i> = 150)	21 (30.9) (<i>n</i> = 68)	17 (20.7) (<i>n</i> = 82)	2.08 ^{ns}
Low personal accomplishment score	18 (12.0) (<i>n</i> = 150)	6 (8.8) (<i>n</i> = 68)	12 (14.6) (<i>n</i> = 82)	4.28 ^{ns}
Burnout [§]	3 (2.0) (<i>n</i> = 148)	2 (2.9) (<i>n</i> = 68)	1 (1.3) (<i>n</i> = 80)	NA
Burnout ^{§§}	41 (27.7) (<i>n</i> = 148)	22 (32.4) (<i>n</i> = 68)	19 (23.8) (<i>n</i> = 80)	1.36 ^{ns}
Burnout ^{§§§}	18 (12.2) (<i>n</i> = 148)	9 (13.2) (<i>n</i> = 68)	9 (11.3) (<i>n</i> = 80)	0.14 ^{ns}

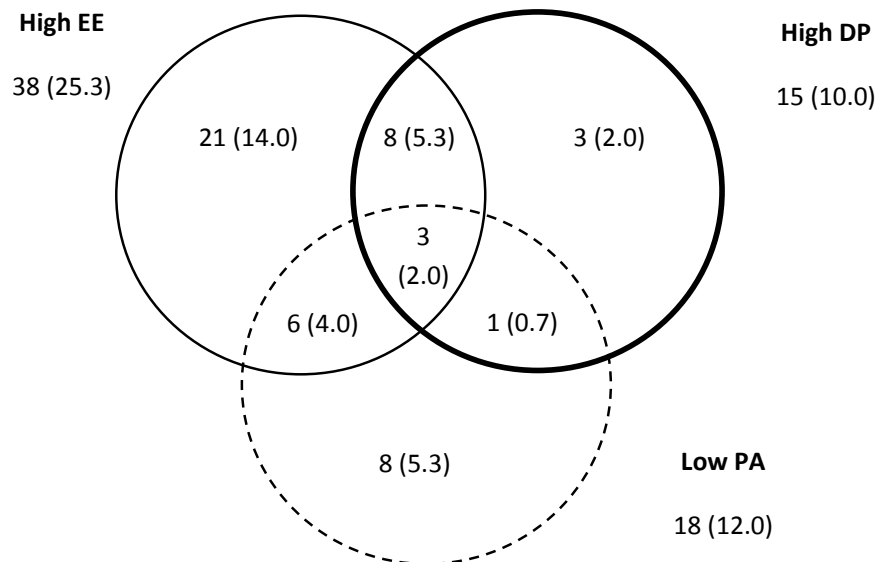
Results are expressed as number of participants and (percentage). Statistical analysis by chi-square: ns, not significant, NA, not assessable. Burnout defined as § high levels of emotional exhaustion and depersonalization, combined with low personal accomplishment; §§ high emotional exhaustion and/or high depersonalization and §§§ high score on emotional exhaustion in combination with high depersonalization or low personal accomplishment.

Supplementary table 4: Number of participants with low, average and high burnout scores in none, one, two or three subscales, using original cut-offs for the Maslach Burnout Inventory – Human Services Survey (MBI-HSS)

High Burnout					
	0	1	2	3	Total
Average burnout					
0	46 (31.1)	15 (10.1)	5 (3.4)	3 (2.0)	69 (46.6)
1	39 (26.4)	14 (9.5)	10 (6.8)	-	63 (42.6)
2	12 (8.1)	2 (1.4)	-	-	14 (9.5)
3	2 (1.4)	-	-	-	2 (1.4)
Total	99 (66.9)	31 (20.9)	15 (10.1)	3 (2.0)	148 (100)

The possible combinations for the different subscales describing increasing burnout are shown in the table. Participants with low burnout scores in one dimension are represented by excluding average or high burnout. Results are expressed as number (percentage) of the total subjects.

Supplementary figure 1 - Venn's diagram with the number of participants with high burnout scores in one, two or three subscales, using, original cut-offs for the Maslach Burnout Inventory – Human Services Survey (MBI-HSS). N = 150.



Results are expressed as number (percentage) of subjects.