Supplementary Appendix

Association of Burnout with the Career Engagement of Physicians and the Quality of Patient Care: A Systematic Review and Meta-analysis

Supplementary Appendix

Contents

Appendix 1: Checklists

MOOSE Statement - Reporting Checklist for Authors, Editors, and Reviewers of Meta-analyses of Observational Studies

Reporting Criteria	Reported (Yes/No)	Reported on Page
Reporting of Background		
Problem definition	Yes	4
Hypothesis statement	Yes	5
Description of Study Outcome(s)	Yes	5
Type of exposure or intervention used	Yes	5
Type of study design used	Yes	5
Study population	Yes	5
Reporting of Search Strategy		
Qualifications of searchers (eg, librarians and investigators)	Yes	5
Search strategy, including time period included in the synthesis and keywords	Yes	5-6
Effort to include all available studies, including contact with authors	Yes	6
Databases and registries searched	Yes	5
Search software used, name and version, including special features used (eg, explosion)	Yes	6
Use of hand searching (eg, reference lists of obtained articles)	Yes	6
List of citations located and those excluded, including justification	Yes	6
Method for addressing articles published in languages other than English	N/A	N/A
Method of handling abstracts and unpublished studies	Yes	6
Description of any contact with authors	Yes	6
Reporting of Methods		
Description of relevance or appropriateness of studies assembled for assessing the hypothesis to be tested	Yes	6
Rationale for the selection and coding of data (eg, sound clinical principles or convenience)	Yes	6-7
Documentation of how data were classified and coded (eg, multiple raters, blinding, and interrater reliability)	Yes	6-7
Assessment of confounding (eg, comparability of cases and controls in	N/A	N/A

studies where appropriate		
Assessment of study quality, including blinding of quality assessors; stratification or regression on possible predictors of study results YES 5	Yes	7
Assessment of heterogeneity	Yes	6-7
Description of statistical methods (eg, complete description of fixed or random effects models, justification of whether the chosen models account for predictors of study results, dose-response models, or cumulative meta-analysis) in sufficient detail to be replicated	Yes	6-7
Provision of appropriate tables and graphics	Yes	7
Reporting of Results		
Table giving descriptive information for each study included	Yes	7
Results of sensitivity testing (eg, subgroup analysis)	Yes	10
Indication of statistical uncertainty of findings	Yes	9-10
Reporting of Discussion		
Quantitative assessment of bias (eg, publication bias)	Yes	10
Justification for exclusion (eg, exclusion of non–English-language citations)	N/A	N/A
Assessment of quality of included studies	Yes	8-9
Reporting of Conclusions		
Consideration of alternative explanations for observed results	Yes	10
Generalization of the conclusions (ie, appropriate for the data presented and within the domain of the literature review)	Yes	13
Guidelines for future research	Yes	13
Disclosure of funding source	Yes	3, 7

PRISMA 2020 Checklist

Section and Topic	Item #	Checklist item	Location where item is reported (page)
TITLE			
Title	1	Identify the report as a systematic review.	1
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	2-3
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	4
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	5
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	5
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	5-6
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	5-6
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	6
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	6
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	5-6
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	6-7
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	7
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	6
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	6-7
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	6-7
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	6-7
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	6-7
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	6-7

Section and Topic	Item #	Checklist item	Location where item is reported (page)
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	6-7
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	7
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	7
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	7
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	7
Study characteristics	17	Cite each included study and present its characteristics.	7-8
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	9
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	8
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	9
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	9
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	9-10
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	10
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	10
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	9-10
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	11
	23b	Discuss any limitations of the evidence included in the review.	12
	23c	Discuss any limitations of the review processes used.	12-13
	23d	Discuss implications of the results for practice, policy, and future research.	11-12
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	5
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	5
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	N/A
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	3, 7
Competing interests	26	Declare any competing interests of review authors.	14

Section and Topic	Item #	Checklist item	Location where item is reported (page)
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	14

Appendix 2: Definition of outcomes

Definitions for the career engagement and quality of patient care outcomes associated with physician burnout and used in this review and meta-analysis.

Outcome	Description
Career Choice Regret	Includes any of the following: *"Would not choose to work in medicine again"*, *"Strong feeling of wanting to change speciality", "Would not encourage others to pursue medicine"* or *"Career as physician came with unmet expectations"*.
Career Development	Includes any of the following: *"Years working in current job (Tenure)", "Worried about limited job opportunities", "Adequate time for personal development"* or *"Proposal of another work post"*.
Job Satisfaction	Job satisfaction includes any of the following: *"Career satisfaction", "practice satisfaction and likes working environment", "work-engagement", "finds work rewarding", "task satisfaction", "satisfied with workload", "structural aspects, and humaneness", "opportunity to consult with peers", "trusted advisor", "physician feels they have a good relationship with patients", "organisational management satisfaction"* or *"satisfied with decreased working hours"*.
Patient Safety Incidents	"Any unintended events or hazardous conditions resulting from the process of care, rather than due to the patient's underlying disease, that led or could have led to unintended health consequences for the patient or health care processes associated with safety outcomes" [1]. Examples of patient safety incidents are adverse events, adverse drug events, or other therapeutic and diagnostic incidents.
Patient Satisfaction	Patient satisfaction was based on patient-reported measures, such as satisfaction and perceived enablement scores.
Productivity	Includes: *"Absenteeism", "Intention to reduce working hours", "Presenteeism or sickness", "Enjoy coming to work"* or *"Time off for illness"*.
Professionalism	Professionalism operationalized was based on Stern's 4 core principles: excellence, accountability, altruism, and humanism [2]. As indicators of low professionalism, we included suboptimal adherence to treatment guidelines (e.g., US Preventive Services Task Force guidelines on prescription of recommended treatments and medications, test-ordering practices, referrals to treatment or other services, and discharge), reduced professional integrity (e.g., malpractice claims), poor communication practices (e.g., provision of suboptimal information to patients), and low empathy. We viewed reduced professionalism as an indicator of suboptimal quality of care and a precursor of patient safety incidents [3] because it involves some type of omission or commission error with potential to result in-patient safety incident.
Turnover Intention	Includes: *"Early retirement", "Intention to change speciality", "Intention or thoughts of leaving medicine", "Intention to migrate", "Intention to quit", "Considered resigning as physician"* or *"Litigation with patient"*.

[1] Vincent C. *Patient Safety*. Edinburgh,UK: Churchill Livingstone; 2005.

[2] Kanter MH, Nguyen M, Klau MH, Spiegel NH, Ambrosini VL. What does professionalism mean to the physician? *Perm J*. 2013;17(3):87-90. doi:10.7812/TPP/12-120.

[3]Panagioti M, Stokes J, Esmail A, et al. Multimorbidity and patient safety incidents in primary care: a systematic review and meta-analysis. *PLoS One*. 2015;10(8):e0135947. doi:10.1371/journal.pone.0135947

Appendix 3: Search Strategy

Ovid Medline 1946 to June 2021

#	Terms	Number of citations
1	Internship and Residency/	53247
2	physician.mp. or exp Physicians/	358096
3	general practitioner.mp. or General Practitioners/	24271
4	doctor.mp.	48549
5	surgeon*.mp. or Surgeons/	184520
6	(intent* adj1 (leave or quit or retir*)).tw.	213
7	Personnel Turnover/	5432
8	quit*.tw.	116124
9	retent*.tw.	160896
10	Absenteeism/ or Presenteeism/	9560
11	((leave or quit) adj2 (practice or patient care or clinical or medical)).tw.	641
12	(leaving adj2 (practice or patient care or clinical or medical)).tw.	373
13	(retention adj2 (physician* or doctor*)).tw.	219
14	((stay or retain) adj2 (physician* or doctor*)).tw.	296
15	((reduce* or low or decrease*) adj1 (productiv* or work* hours)).mp.	2161
16	(presenteeism* or absenteism*).mp.	1279
17	(retire* or turnover).mp.	116185
18	Efficiency/	14225
19	Job Satisfaction/	26088
20	((job or career or work) adj1 (satisfaction or choice or regret*)).mp.	50399
21	exp patient safety/	22710
22	exp adverse drug reaction/	121063
23	exp iatrogenic disease/	78362
24	exp medical error/	116770
25	exp malpractice/	31899
26	patient safety.tw.	25358
27	safety culture.tw.	1762
28	(safe$ adj2 (practice$ or manage$)).tw.	11639
29	iatrogenic disease$.tw.	699
30	malpractice$.tw.	9493
31	(patient adj2 harm$).tw.	2000
32	human error$.tw.	1982
33	((service$ or system$ or communication$ or organisation$ or organization$) adj2 (weak$ or fail$)).tw.	9766
34	(latent adj1 (threat$ or cause$ or fail$)).tw.	229
35	((adverse or avoidable or preventable or unsafe or safet$) adj2 (event$ or outcome$ or complication$ or death$ or effect$ or reaction$ or accident$ or injur$)).tw.	434748
36	((medica$ or diagnostic or therapeautic or administration or dispensing or prescri$) adj2 (error$ or mistake$ or fault$)).tw.	14710
37	(patient$ adj2 (risk$ or incident$ or accident$)).tw.	117645
38	near miss$.tw.	2018
39	never event$.tw.	309

40	untoward incident*.tw.	52
41	serious incident*.tw.	192
42	serious report* event*.tw.	18
43	((Quality & safety in health care or International Journal for Quality in Health Care).jn. or (Qual Saf Health Care or IJQHC).ja.) and safe$2.mp.	934
44	polypharmacy/	5505
45	polypharmacy.tw.	6455
46	(patient adj1 satisf*).tw.	32512
47	Quality of Health Care/ or quality of care.mp.	109295
48	Stress, Psychological/ or Burnout, Professional/	137017
49	burnout.tw.	10751
50	Depression/ or depression.mp.	378633
51	Stress, Psychological/	126222
52	(emotion* adj distress*).tw.	6258
53	(psychological adj distress*).tw.	17847
54	or/1-5	603715
55	or/6-20	457877
56	or/21-47	1035334
57	or/48-53	502990
58	54 and 55 and 57	2032
59	54 and 56 and 57	2549
60	**58 or 59**	**4210**

PsycInfo (1806 to July 2021)

#	Terms	Number of citations
1	exp Internship Programs/ or exp Medical Internship/ or exp Psychiatrists/ or exp Psychiatric Training/ or exp Psychiatry/	66298
2	physician.mp. or exp Physicians/	67199
3	general practitioner.mp. or General Practitioners/	8458
4	doctor.mp.	14724
5	surgeon*.mp. or Surgeons/	4274
6	Depression/ or depression.mp.	348003
7	burnout.mp. or Burnout, Psychological/	15328
8	(intent* adj1 (leave or quit or retir*)).tw.	298
9	Personnel Turnover/	5541
10	quit*.tw.	46850
11	retent*.tw.	47054
12	Absenteeism/ or Presenteeism/	2294
13	((leave or quit) adj2 (practice or patient care or clinical or medical)).tw.	262
14	(leaving adj2 (practice or patient care or clinical or medical)).tw.	118
15	(retention adj2 (physician* or doctor*)).tw.	60
16	((stay or retain) adj2 (physician* or doctor*)).tw.	52
17	((reduce* or low or decrease*) adj1 (productiv* or work* hours)).mp.	721
18	(presenteeism* or absenteism*).mp.	608
19	(retire* or turnover).mp.	29714
20	Efficiency/	742
21	Job Satisfaction/	20350
22	((job or career or work) adj1 (satisfaction or choice or regret*)).mp.	30381
23	exp patient safety/	2383
24	exp medical error/	2383
25	exp malpractice/	2141
26	patient safety.tw.	3994
27	safety culture.tw.	696
28	(safe$ adj2 (practice$ or manage$)).tw.	3700
29	iatrogenic disease$.tw.	52
30	malpractice$.tw.	1695
31	(patient adj2 harm$).tw.	373
32	human error$.tw.	1002
33	((service$ or system$ or communication$ or organisation$ or organization$) adj2 (weak$ or fail$)).tw.	3796
34	(latent adj1 (threat$ or cause$ or fail$)).tw.	66
35	((adverse or avoidable or preventable or unsafe or safet$) adj2 (event$ or outcome$ or complication$ or death$ or effect$ or reaction$ or accident$ or injur$)).tw.	46454
36	((medica$ or diagnostic or therapeautic or administration or dispensing or prescri$) adj2 (error$ or mistake$ or fault$)).tw.	2303
37	(patient$ adj2 (risk$ or incident$ or accident$)).tw.	7504
38	near miss$.tw.	559
39	never event$.tw.	9
40	untoward incident*.tw.	30
41	serious incident*.tw.	105

42	serious report* event*.tw.	1
43	polypharmacy/	1270
44	polypharmacy.tw.	2194
45	(patient adj1 satisf*).tw.	5111
46	Quality of Health Care/ or quality of care.mp.	22223
47	or/1-5	133757
48	6 or 7	361695
49	or/8-22	149161
50	or/23-46	96643
51	47 and 48 and 49	580
52	47 and 48 and 50	988
53	**51 or 52**	**1486**

Embase (1974 to June 2021)

#	Terms	Number of citations
1	residency education/ or medical education/	249074
2	physician.mp. or physician/	545620
3	general practitioner.mp. or General Practitioner/	115801
4	doctor.mp.	188101
5	surgeon*.mp. or Surgeon/	382096
6	Depression/ or depression.mp.	724479
7	Stress, Psychological/	75102
8	((emotion* or psychological) adj1 distress*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword, floating subheading word, candidate term word]	38627
9	burnout.mp.	25283
10	professional burnout/ or burnout/ or Maslach Burnout Inventory-General Survey/ or Maslach Burnout Inventory/ or Maslach Burnout Inventory-Human Services Survey/	21738
11	(intent* adj1 (leave or quit or retir*)).tw.	277
12	turnover rate/	5222
13	quit*.tw.	181428
14	retent*.tw.	240589
15	Absenteeism/ or Presenteeism/	18584
16	((leave or quit) adj2 (practice or patient care or clinical or medical)).tw.	932
17	(leaving adj2 (practice or patient care or clinical or medical)).tw.	657
18	(retention adj2 (physician* or doctor*)).tw.	279
19	((stay or retain) adj2 (physician* or doctor*)).tw.	427
20	((reduce* or low or decrease*) adj1 (productiv* or work* hours)).mp.	3500
21	(presenteeism* or absenteism*).mp.	2952
22	(retire* or turnover).mp.	157798
23	productivity/	42389
24	Job Satisfaction/	31831
25	((job or career or work) adj1 (satisfaction or choice or regret*)).mp.	37071
26	exp patient safety/	136900
27	exp adverse drug reaction/	555738
28	exp iatrogenic disease/	893173
29	exp medical error/	148259
30	exp malpractice/	32613
31	patient safety.tw.	44977
32	safety culture.tw.	2951
33	(safe$ adj2 (practice$ or manage$)).tw.	21594
34	iatrogenic disease$.tw.	672
35	malpractice$.tw.	11143
36	(patient adj2 harm$).tw.	3869
37	human error$.tw.	3857
38	((service$ or system$ or communication$ or organisation$ or organization$) adj2 (weak$ or fail$)).tw.	15924
39	(latent adj1 (threat$ or cause$ or fail$)).tw.	360

40	((adverse or avoidable or preventable or unsafe or safet$) adj2 (event$ or outcome$ or complication$ or death$ or effect$ or reaction$ or accident$ or injur$)).tw.	809015
41	((medica$ or diagnostic or therapeautic or administration or dispensing or prescri$) adj2 (error$ or mistake$ or fault$)).tw.	25346
42	(patient$ adj2 (risk$ or incident$ or accident$)).tw.	227532
43	near miss$.tw.	3783
44	never event$.tw.	649
45	untoward incident*.tw.	148
46	serious incident*.tw.	446
47	serious report* event*.tw.	26
48	((Quality & safety in health care or International Journal for Quality in Health Care).jn. or (Qual Saf Health Care or IJQHC).ja.) and safe$2.mp.	1238
49	polypharmacy/	18699
50	polypharmacy.tw.	14059
51	(patient adj1 satisf*).tw.	57165
52	Quality of Health Care/ or quality of care.mp.	259429
53	or/1-5	1302589
54	or/6-10	822902
55	or/11-25	664328
56	or/26-52	2263498
57	53 and 54 and 55	3462
58	53 and 54 and 56	6640
59	**57 or 58**	**8284**

Appendix 4: Formulae for converting among effect sizes

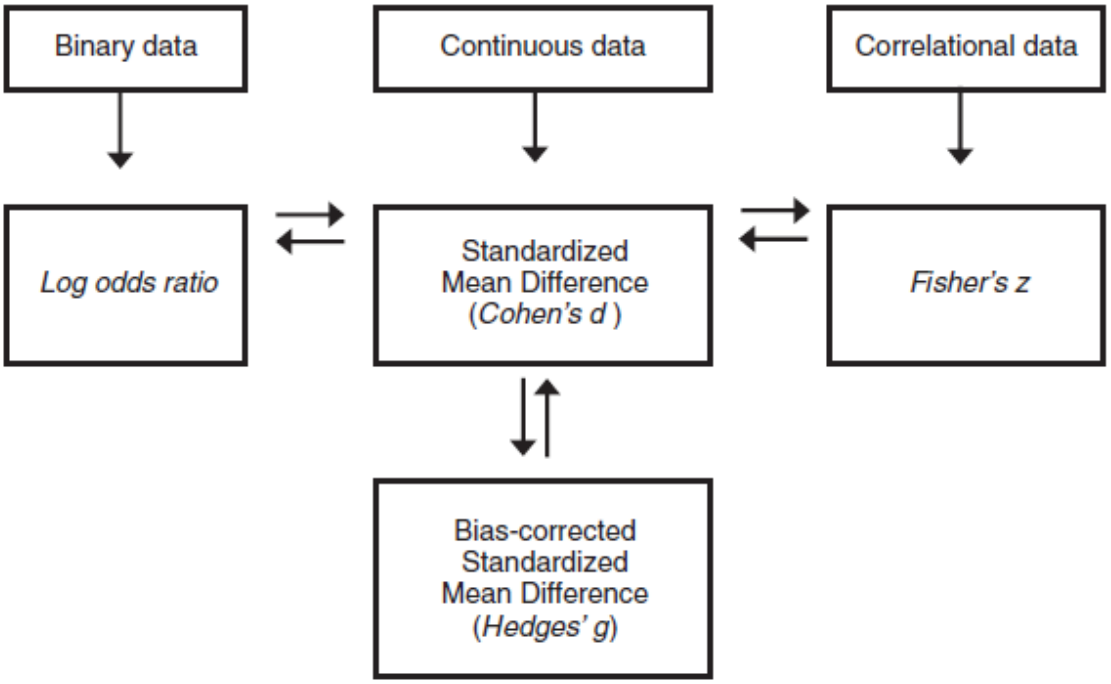

Figure obtained from Introduction to Meta-Analysis. Michael Borenstein, L. V. Hedges, J. P. T. Higgins and H. R. Rothstein © 2009 John Wiley & Sons, Ltd. ISBN: 978-0-470-05724-7

- **Converting from effect size Standardised Mean Difference (*d*) to Log Odds Ratio**

Log Odd Ratio

$$LogOddsRatio = d\frac{\pi}{\sqrt{3}}$$

Variance of the Log Odds Ratio

$$V_{LogOddsRatio} = V_d\frac{\pi^2}{3}$$

- **Converting from correlation (*r*) to *d***

Standardised mean difference (*d*)

$$d = \frac{2r}{\sqrt{1-r^2}}$$

Variance of *d*

$$V_d = \frac{4V_r}{(1 - r^2)^3}$$

Using these formulae, we can conveniently convert 'correlations', 'standardised beta (β) scores', 'continuous (i.e., effects size (MD/SMD) with the 95% CI or arm level means and SDs)' data to the log odds ratio using the statistical software comprehensive meta-analysis. Cohort (binary) data can be used to simply calculate the log odds and odds ratio effect sizes with their 95% CIs can also easily be converted to the log odds ratio.

Appendix 5: Study Authors Confirming Data

Study Author and Date	Title of Publication	Response	Data Correct
Al dubai 2013	Emotional burnout, perceived sources of job stress, professional fulfillment, and engagement among medical residents in Malaysia	Y	Y
Alrawashdeh 2021	Occupational burnout and job satisfaction among physicians in times of COVID-19 crisis: a convergent parallel mixed-method study	Y	Y
Baer 2017	Pediatric resident burnout and attitudes toward patients	Y	Y
Bahadirli 2021	Burnout, job satisfaction, and psychological symptoms among emergency physicians during COVID-19 outbreak: A cross-sectional study	Y	Y
Blanchard 2010	Prevalence and causes of burnout amongst oncology residents: a comprehensive nationwide cross-sectional study	Y	Y
Bourne 2019	Burnout, well-being and defensive medical practice among obstetricians and gynaecologists in the UK: Cross-sectional survey study	Y	Y
Brunsberg 2019	Association of Pediatric Resident Physician Depression and Burnout With Harmful Medical Errors on Inpatient Services	Y	Y
Busis 2017	Burnout, career satisfaction, and well-being among US neurologists in 2016	Y	Y
Coombs 2019, 2020	Professional burnout in united states plastic surgery residents: Is it a legitimate concern?	Y	Y
Ding 2019	Physicians as Teachers and Lifelong Learners	Y	Y
Dominguez 2018, 2019	Taking control: Is job crafting related to the intention to leave surgical training?	Y	Y
Gilles 2014	Factors associated with healthcare professionals' intent to stay in hospital: A comparison across five occupational categories	Y	Y
Glasheen 2011	Career satisfaction and burnout in academic hospital medicine	Y	Y
Golub 2007	Burnout in residents of otolaryngology-head and neck surgery: a national inquiry into the health of residency training	Y	Y
Golub 2008	Burnout in academic faculty of otolaryngology-head and neck surgery	Y	Y
Grover 2018	Psychological problems and burnout among medical professionals of a tertiary care hospital of North India: A cross-sectional study	Y	Y
Gyorffy 2016	Workload, mental health and burnout indicators among female physicians	Y	Y
Gyorffy 2018	Willingness to migrate-a potential effect of burnout? A survey of Hungarian physicians	Y	Y
Hansen 2011	General practitioner characteristics and delay in cancer diagnosis. a population-based cohort study	Y	Y
Hewitt 2020	Evaluating the Association of Multiple Burnout Definitions and Thresholds With Prevalence and Outcomes	Y	Y
Janko 2019	Burnout, depression, perceived stress, and self-efficacy in vascular surgery trainees	Y	Y
Karayurek and Demirci 2021	Reasons for the relocation of contracted family physicians and job satisfaction	Y	Y
Kelker 2021	Prospective study of emergency medicine provider wellness across ten academic and community hospitals during the initial surge of the COVID-19 pandemic	Y	Y

Kemper 2020	Burnout in Pediatric Residents: Three Years of National Survey Data	Y	Y
Khalafallah 2020a	Burnout and career satisfaction among attending neurosurgeons during the COVID-19 pandemic	Y	Y
Khan 2018	Psychosocial work characteristics, burnout, psychological morbidity symptoms and early retirement intentions: a cross-sectional study of NHS consultants in the UK	Y	Y
Klein 2010	Burnout and perceived quality of care among German clinicians in surgery	Y	Y
Kriss 2021	National Early Career Transplant Hepatologist Survey: Compensation, Burnout, and Job Satisfaction	Y	Y
Kuerer 2007	Career satisfaction, practice patterns and burnout among surgical oncologists: report on the quality of life of members of the Society of Surgical Oncology	Y	Y
Kumar 2007	Burnout and job satisfaction in New Zealand psychiatrists: A national study	Y	Y
Kumar 2011	Stresses experienced by psychiatrists and their role in burnout: A national follow-up study	Y	Y
Kwah 2016	The Effect of Burnout on Medical Errors and Professionalism in First-Year Internal Medicine Residents	Y	Y
Lall 2020	Intention to Leave Emergency Medicine: Mid-career Women Are at Increased Risk	Y	Y
Leung 2015	Stress, satisfaction and burnout amongst Australian and New Zealand radiation oncologists	Y	Y
Levin 2017	Burnout, career satisfaction, and well-being among US neurology residents and fellows in 2016	Y	Y
Linzer 2009	Working conditions in primary care: physician reactions and care quality	Y	Y
Linzer 2017	Joy In Medical Practice: Clinician Satisfaction In The Healthy Work Place Trial	Y	Y
Lu 2015	Impact of Burnout on Self-Reported Patient Care Among Emergency Physicians	Y	Y
McAbee 2015	Factors associated with career satisfaction and burnout among US neurosurgeons: results of a nationwide survey	Y	Y
Mehta 2019	Burnout and Career Satisfaction Among U.S. Cardiologists	Y	Y
Messerotti 2020	Investigating the association between physicians self-efficacy regarding communication skills and risk of "burnout"	Y	Y
Mohammed 2018	Job satisfaction and burnout among Iraqi physicians: Insight from university hospital surveys	Y	Y
Moreno-Jimenez 2012	A study of physicians' intention to quit: the role of burnout, commitment and difficult doctor-patient interactions	Y	Y
Ochoa 2018	Impact of burnout on organizational outcomes, the influence of legal demands: The case of Ecuadorian physicians	Y	Y
O'Connor 2017	A longitudinal and multicentre study of burnout and error in Irish junior doctors	Y	Y
O'Connor 2019	Internal Medicine Residency Program Director Burnout and Program Director Turnover: Results of a National Survey	Y	Y
Park 2016	A Multicenter Study Investigating Empathy and Burnout Characteristics in Medical Residents with Various Specialties	Y	Y
Pit 2014, 2016	Factors influencing early retirement intentions in Australian rural general practitioners	Y	Y
Prins 2009	Burnout, engagement and resident physicians' self-reported errors	Y	Y
Qureshi 2015	Burnout phenomenon in U.S. plastic surgeons: risk factors and impact on quality of life	Y	Y
Rabatin 2016	Predictors and Outcomes of Burnout in Primary Care Physicians	Y	Y

Roy 2017	Relationships of work characteristics to job satisfaction, turnover intention, and burnout among doctors in the district public private mixed health system of Bangladesh	Y	Y
Salles 2019	Social Belonging as a Predictor of Surgical Resident Well-being and Attrition	Y	Y
Schaufeli 2009	Workaholism, burnout and well-being among junior doctors: The mediating role of role conflict	Y	Y
Sinsky 2017	Professional Satisfaction and the Career Plans of US Physicians	Y	Y
Sliwa 2019	Burnout in Diplomates of the American Board of Physical Medicine and Rehabilitation-Prevalence and Potential Drivers: A Prospective Cross-Sectional Survey	Y	Y
Sonmez 2021	Occupational burnout, job satisfaction and anxiety among emergency medicine doctors in Turkey	Y	Y
Sulaiman 2017	Burnout syndrome among non-consultant hospital doctors in Ireland: relationship with self-reported patient care	Y	Y
Surgenor 2009	Burnout in hospital-based medical consultants in the New Zealand public health system	Y	Y
Tak 2017	Association of Intrinsic Motivating Factors and Markers of Physician Well-Being: A National Physician Survey	Y	Y
Tawfik 2018	Physician Burnout, Well-being, and Work Unit Safety Grades in Relationship to Reported Medical Errors	Y	Y
Taycan 2012	The impact of compulsory health service on physicians and burnout in a province in Eastern Anatolia	Y	Y
Tokuda 2009	The interrelationships between working conditions, job satisfaction, burnout and mental health among hospital physicians in Japan: a path analysis	Y	Y
Torres 2015	Association between Sick Leave Prescribing Practices and Physician Burnout and Empathy	Y	Y
Umene-Nakano 2013	Nationwide survey of work environment, work-life balance and burnout among psychiatrists in Japan	Y	Y
Vanhaecht 2019	Duration of second victim symptoms in the aftermath of a patient safety incident and association with the level of patient harm: a cross-sectional study in the Netherlands	Y	Y
vanWulfftenPalthe 2016	Among Musculoskeletal Surgeons, Job Dissatisfaction Is Associated With Burnout	Y	Y
Walocha 2013	Empathy and burnout among physicians of different specialities	Y	Y
Ward 2020	Family Physician Burnout Does Not Differ With Rurality	Y	Y
Watson 2018	Impact of physician workload on burnout in the emergency department	Y	Y
Weigl 2015	Associations of work characteristics, employee strain and self-perceived quality of care in Emergency Departments: A cross-sectional study	Y	Y
Weigl & Schneider (2017)	Associations of work characteristics, employee strain and self-perceived quality of care in Emergency Departments: A cross-sectional study	Y	Y
Weng 2011	Associations between emotional intelligence and doctor burnout, job satisfaction and patient satisfaction	Y	Y
West 2006	Association of perceived medical errors with resident distress and empathy: a prospective longitudinal study	Y	Y
West 2009	Association of resident fatigue and distress with perceived medical errors	Y	Y
Whitebird 2017	Clinician burnout and satisfaction with resources in caring for complex patients	Y	Y

Willard-Grace 2019	Burnout and Health Care Workforce Turnover	Y	Y
Williams 2007	The relationship of organizational culture, stress, satisfaction, and burnout with physician-reported error and suboptimal patient care: results from the MEMO study	Y	Y
Wright 2011	Burnout among faculty physicians in an academic health science centre	Y	Y
Xiao 2014	Psychological distress, burnout level and job satisfaction in emergency medicine: A cross-sectional study of physicians in China	Y	Y
Yost 2014	Burnout among osteopathic otolaryngology residents: identification during formative training years	Y	Y
Zhou 2017	Burnout, psychological morbidity, job stress, and job satisfaction in Chinese neurologists	Y	Y

Appendix 6: Characteristics of Included Studies

Study setting and physician characteristics.

Study	Country	Healthcare setting	Research design	Sample size	Age	Mean/Median Age*	Males (%)	Speciality of physician*	Years of Experience as reported	Working experience*
Adarkwah 2018	Germany	Primary care	Cross-Sectional	85	Mean: 53.5	53.5	75.30%	GPs	Experienced	Experienced
Al-Dubai 2013	Malaysia	Hospital	Cross-Sectional	191	65.4% were aged between 25-27	n/r	44.50%	Interns/Residents	Residents	Resident
Alrawashdeh 2021	Jordan	Mixed	Cross-Sectional	973	Mean: 34.6 (SD 9.9)	34.6	69.80%	Mixed	Mixed	Mixture
Anagnostopoulos 2012	Greece	Primary care	Cross-Sectional	30	Median: 48, range of 36-50 yrs.	48	85%	GPs	n/r	n/r
Appelbaum 2019	US	hospital	Cross-Sectional	166	n/r	n/r	63%	Surgery	Residents	Resident
Arora 2014	Australia	hospital	Cross-Sectional	51	n/r	n/r	86%	Surgery	Registrars/Residents	Resident
Asai 2008	US	End of life care (Hospitals and cancer centres)	Cross-Sectional	697	Mean: 45 (SD 8.2)	45	92%	Cancer	Mean: 16 (SD 8.1)	Experienced
Attenello 2018	US	Hospital	Cross-Sectional	395	Mode: 26-30	n/r	78%	Neurosurgery	Residents	Resident
Baer 2017	US	Paediatric residents	Cross-Sectional	258	Mean: 29 (SD 2.3)	29	21%	Paediatrics	35% postgraduate year [PGY] -1, 34% PGY-2, and 31% PGY-3	Resident
Baghdadi 2020	Saudi Arabia	Hospital	Cross-Sectional	136	64 (47%) were aged 25-34. 43 (32%) were 35-44. 19 (14%) were 45-54. 10 (7%) were 55-65 (no mean provided)	n/r	70%	Mixed	n/r	n/r
Bahadirli 2021	Turkey	Emergency department	Cross-Sectional	331	Median: 29 (Range 27-35)	29	57%	Emergency medicine & ICU	Median: 5 yrs. (Range 2-10 yrs.), 46.2% residents	Mixture
Balch 2011	US	Survey based on registration to the American College of Surgeons (Hospitals)	Cross-Sectional	7164	mean age for private: 51 yrs. and for academic: 50 yrs.	50.5	89% private, 83.5% academic	Surgery	Median: 20 (Range 10 to 28) yrs.	Experienced
Blanchard 2010	France	Hospital	Cross-Sectional	204	Mean: 28 yrs.	28	40%	Cancer	Residents	Resident
Bourne 2019	UK	Hospital	Cross-Sectional	3102	Mean age for each category: 50 yrs. Consultants, 33 yrs. Trainees, and 47 yrs. SAS	n/r	Consultant: 58%, Trainee: 80%, SAS: 68%	Obstetrics and gynaecology	Mixed (Trainees, SAS and Consultants)	Mixture
Bressi 2009	Italy	Hospital	Cross-Sectional	91	Mean: 47 yrs.	47	42%	Psychiatry	Experienced	Experienced
Brown 2009	Australia	Hospitals	Cross-Sectional	24	Mean: 42 (SD 8) yrs.	42	60%	Mixed	Novices: 1-3 years; Experts: over 3 years (70% had more than 10 years' experience)	Experienced
Brunsberg 2019	US	Paediatric academic centres	Prospective Cohort	388	Mean: 28.4 yrs.	28.4	30%	Paediatrics	Paediatric residents	Resident

Busis 2017	US	Hospital	Cross-Sectional	1671	Median: 51 yrs.	51	65.30%	Neurology	Mixed	Mixture
Campbell 2001	US	Hospital	Cross-Sectional	582	Mean age 50-51 depending on category	50.5	92-96%	Surgery	Experienced	Experienced
Chen 2013	Taiwan	Several settings	Cross-Sectional	839	Mean: 36; 58% were up to 40 years and 42% were above 40 years	36	79%	Mixed	n/r	n/r
					26 to 30: yrs. 170, (37%)					
					31 to 35: yrs. 241, (52%)					
					36 to 40: yrs. 46, (10%)					
					40 to 45: yrs. 5, (1%)					
Cooke 2013	Australia	Primary care (GP registrars)	Cross-Sectional	128	Mean: 35; 85% up to 39 years and 15% over 40 years	35	33%	GPs	n/r	n/r
Cydulka 2008	US	Hospital	Prospective Cohort	945	Mean: 49.9 yrs. in 2004	49.9	86.2 in 2004	Emergency medicine & ICU	Experienced	Experienced
de Oliveira 2013	US	Hospitals	Cross-Sectional	1508	Mean: 33 yrs.	33	54%	Anaesthesiology	Anaesthesiology trainees	Resident
Dewa 2014	Canada	Mixed- hospital and community	Cross-Sectional (economic evaluation using survey data)	70700	means by grp: <45yrs: FP: 38, S: 39, OS: 38;	n/r	Unclear	Mixed	n/r	n/r
					45-54yrs: FP: 50, S: 49, OS: 50; grp 55-64yrs: FP: 59, S: 59, OS: 59					
Ding 2019	Canada	Mixed- hospital and community	Cross-Sectional	202	Mode: 25-39	n/r	34%	Mixed	n/r	n/r
					16% are 24–29 years old,				15.5% have 2–3 years of experience,	
					22% are 30–38 years old,				21.5% have 4–6 years of experience,	
					36% are 39–47 years old,				24% have 7–9 years of experience,	
					18% are 48–55 years old,				37.5% have 10 years or more experience as a physician	
					4.5% are 56 years old and above					
Dirvar 2021	Turkey	Hospital	Cross-Sectional	353	n/r	n/r	98.60%	Surgery	Experienced	Experienced
Djulbegovic 2019	US	Internal medicine programme	Cross-Sectional	166	Median: 29 yrs.	29	52	Internal medicine	Trainees	Resident
Doan-Wiggans 1995	US	Hospital	Cross-Sectional	785	Mean: 37.1/42.5 yrs. depending on category	n/r	87.1%/91% depending on category	Emergency medicine & ICU	Experienced	Experienced
Dominguez 2018, 2019	Columbia	Surgery	Cross-Sectional	202	Mean: 28 yrs.	28	63.90%	Surgery	Residents	Resident
Duan 2019	China	Hospitals	Cross-Sectional	1257	Majority (64.7%) were aged between 31-50 yrs.; 27.4% were below 31 yrs. and 7.9% were above 50 yrs.	n/r	54%	Physician	Mostly experienced (37.3% above 11 yrs.); 29.6% between 5-10 yrs.; 33.1% less than 5 yrs.	Experienced
Estryn-Behar 2011	France	Emergency physician	Cross-Sectional	3196	<35yrs. = 25%; 35-44yrs. = 33.8%; 45-54yrs. = 34.5%; >= 55yrs. = 23.6%	n/r	58%	Emergency medicine & ICU	Mixed	Mixture

Faivre 2018	France	Hospital	Cross-Sectional	107	<= 25yrs. = 13%; 25-29yrs. = 75%; >= 30yrs. = 12%	n/r	65%	Surgery	Residents with at least 6/12 of training	Experienced
Fahrenkopf 2008	US	Hospitals	Prospective Cohort	123	Mean: 29 yrs.; 62% were up to 30 yrs. and 38% over 30 yrs.	29	30%	Paediatrics	Residents in paediatrics (1-3 yrs. experience)	Resident
Freeborn 2001	US	Mixed	Prospective Cohort	526	n/r	n/r	n/r	Mixed	Mixture	Mixture
Garrouste-Orgeas 2015	France	Intensive Care Units	Prospective Cohort	540	Median: 33 (Range 28-44) yrs.	33	58%	Emergency medicine & ICU	n/r	n/r
Gilles 2014	Switzerland	Mixed	Cross-Sectional	5013	<30 yrs. = 18.1; 30-39 yrs. = 25.9; 40-49 yrs. = 24.1; >=50 yrs. = 23.6	n/r	27%	Mixed	34.4% >10 yrs.	Experienced
Glasheen 2011	US	Academic medical centres	Cross-Sectional	266	70% aged between 31 and 40 yrs.	n/r	54%	Internal medicine	Internal medicine	Experienced
Goldberg 1996	US	Emergency physician	Cross-Sectional	1272	47% between ages 30 to 39 yrs.; 35% between ages 40 to 49 yrs.	n/r	74%	Emergency medicine & ICU	38% between 0 to 5 yrs.	Experienced
Golub 2007	US	Mixed	Cross-Sectional	1364	Mean: 31 (Range 24-45) yrs.	31	79%	Academics	Mixture	Mixture
Golub 2008	US	Mixed	Cross-Sectional	514	Mean: 52 (range 33-87) yrs.	52	87%	Academics	19 (5-51) yrs.	Experienced
Govardhan 2012	US	Obstetrics and gynaecology residents	Cross-Sectional	57	Mean: 30.1 (SD 3) yrs.	30.1	8.80%	Obstetrics and gynaecology	Mixture	Mixture
Grover 2018	India	Resident and faculty members in a tertiary centre	Cross-Sectional	445	Mean: 31.6 (SD-7.45) yrs.	31.6	69.20%	Mixed	Residents and faculty members	Resident
Gyorffy 2016, 2018	Hungary	Mixed (members of medical chamber)	Cross-Sectional	5607	Mean: 45.1 yrs.	45.1	0%	Mixed	n/r	n/r
Halbesleben 2008	US	Hospital	Cross-Sectional	178	Mean: 45.70 (SD 12.99) yrs.	45.7	47%	Mixed	Mixed	Mixture
Hamidi 2018	US	Hospital	Retrospective Cohort	472	n/r	n/r	n/r	Physician	Mixed	Mixture
Hansen 2011	Denmark	Primary Care	Cross-Sectional	334	n/r	n/r	70%	GPs	GPs	Experienced
Hartwell 2010	US	Hospital	Cross-Sectional	94	Mean: 40 (SD 5.12) yrs.	40	0%	Physician	Mean: 10 yrs.	Experienced
Hayashino 2012	Japan	Hospital	Prospective Cohort	836	Mean: 46 yrs.; 23% were up to 39 years, 47% were in the age range of 40-49 and 30% were above 50 yrs.	46	92%	Mixed	n/r	n/r
Hewitt 2020	US	General surgery residents - hospital	Cross-Sectional	6956	n/r	n/r	57%	Surgery	Less than 6 years still resident training	Resident
Huang 2019	Taiwan	Hospital	Cross-Sectional	1014	66.6% between 20 to 30 yrs.	n/r	71.90%	Mixed	Residents (mostly R1 to R3)	Resident
Hyman 2017	US	Mostly hospital (community or teaching)	Cross-Sectional	266	Mostly above 40 yrs. (83.1%)	n/r	74.10%	Physician	n/r	n/r
Jager 2017	US	Mixed	Cross-Sectional	2263	Mean: 52.6 (SD 11.2) yrs.	52.6	67.50%	Mixed	n/r	n/r
Janko 2019	US	Surgeons in hospital	Cross-Sectional	177	Mean: 32 yrs.	32	64%	Surgery	Mixed	Mixture
Kang 2013	Korea	Hospitals	Cross-Sectional	86	78% were up to 30 yrs. and 22% over 30 yrs.	n/r	74%	Interns/Residents	n/r	n/r
Karaoglu 2015	Turkey	Hospital	Cross-Sectional	74	Mean: 27.60 (SD 2.25) yrs.	27.6	41%	Paediatrics	n/r	n/r

Karayurek and Demirci 2021	Turkey	Primary care	Cross-Sectional	407	Mean: 48 yrs.	48	67%	GPs	n/r	n/r
Kassam 2021	US	Hospital	Cross-Sectional	77	Median: 34 (IQR 33-37) yrs.	34	65%	Surgery	Fellows	Experienced
Kelker 2021	US	Emergency departments	Prospective Cohort	231	Mean = 40.8 (SD: 9.39) yrs.	40.8	40%	Emergency medicine & ICU	42% 1-5 yrs.; 29% over 16 yrs.	Mixture
Kemper 2020	US	Paediatric departments	Cross-Sectional	9653	Yr. 2016: mean 29.3 (SD 3.3) yrs.; yr. 2017: mean 29 (SD 2.4) yrs.; yr. 2018: mean 29 (SD 2.5) yrs.	29	Yr. 2016: 28%; Yr. 2017: 27%; Yr. 2018: 26%	Paediatrics	Residents	Resident
Khalafallah 2020a	US	Participants were non-resident neurosurgeons from both academic and non-academic institutions who were members of the AANS	Cross-Sectional	407	No mean or median age reported. 10% were 30-40; 29% were 40-50; 36% were 50-60; 22% were 60-70 and 2% were over 70.	n/r	89%	Neurosurgery	Experienced: Attending neurosurgeons (65% over 15 years of experience)	Experienced
Khan 2018	UK	12 NHS Hospital Trusts in Wales	Cross-Sectional	593	No mean or median age reported. 20% of participants were 30-40; 46% were 41-50; 31% were 51-60 and 4% were 60+	n/r	63%	Mixed	Experienced: All consultants	Experienced
Khorfan 2021	US	Resident's training surgery at Hospital	Cross-Sectional	6956	n/r	n/r	57%	Surgery	Unclear but less than 6 yrs. with being postgraduate	Resident
Kimo Takayesu 2014	US	Emergency residents in eight programs in Northeast, Midwest and Southern US were invited to participate.	Cross-Sectional	218	No mean or median age reported. 53% of participants were 25-29; 34% of participants were 30-34; 10% of participants were 35-39; 4% of participants were 40+	n/r	59%	Emergency medicine & ICU	Residents	Resident
Klein 2010	Germany	General hospitals	Cross-Sectional	1311	n/r	n/r	60%	Obstetrics and gynaecology	Mean: 11.4 yrs.	Experienced
Koleck 2000	France	General practitioners in an urban community setting	Cross-Sectional	226	n/r	n/r	100%	GPs	n/r	n/r
Kriss 2021	US	Hospital	Cross-Sectional	256	University hospital clinical: 38 (36-40) yrs.; non-University hospital clinical: 39 (37-41) yrs.; Research: 39 (36-40) yrs.	n/r	51-60%	Surgery	Only 4/5 years across groups	Resident
Kuerer 2007	US	72% of participants worked in an academic practice setting; 27% worked in private practice	Cross-Sectional	549	No mean or median age reported. 23% were under 40 yrs.; 44% were 40-50 yrs.; 23% were 51-60 yrs.; 10% were over 60 yrs..	n/r	80%	Surgery	Mostly experienced. 11% had completed less than 2 years since training; 16% had completed 2-5 years since training; 17% had completed 6-10 years since training; 32% had completed 11-20 years since training and 24% had completed over 20 years since training.	Experienced
Kuhn 2009	US	Emergency department	Cross-Sectional	193	Median: 41 (IQR = 36–51) yrs.	41	72%	Emergency medicine & ICU	Mean years practising in Emergency	Experienced

									Medicine: 12.3 (SD 8.6) yrs.	
Kumar 2007	New Zealand	Psychiatry but specific health setting not reported. Could be assumed that as psychiatrists are specialists, this would not be primary care.	Cross-Sectional	239	Mean and median age not reported. 18% were 40 yrs. and under. 48% were 41-50 yrs., 23% were 51-60 yrs. 9% were 61-70 yrs. 3% were over 70 yrs.	n/r	63%	Psychiatry	18% had been practising for 10 years or less. 43% had been practising for 11-20 years. 28% had been practising for 21-30 years. 9% had been practising for 31-40 years and 2% had been practising for over 40 years.	Experienced
Gupta 2018	US	Multiple settings	Cross-Sectional	5782	No overall mean reported	n/r	0%	Mixed	Mostly experienced physicians (89.9%)	Experienced
Kushnir 2006	Israel	Paediatric primary care community centres	Cross-Sectional	126	Mean: 45.8 (SD 12.47) yrs.	45.8	48%	Paediatrics	Unclear. But 25 (20.7 %) of the participants were clinic directors and of these, 87% were Israeli-board certified paediatricians	Mixture
Kushnir 2014	Israel	Primary care	Cross-Sectional	136	Mean: 52.2 (Range: 33-68; SD 7.02) yrs.	52.2	32%	Internal medicine	Average years of practising medicine was 25.5 years	Experienced
Kwah 2017	US	1 Hospital, Mount Sinai Hospital and Elmhurst Hospital Centre	Prospective Cohort	54	n/r	n/r	n/r	Internal medicine	1st Year residency	Resident
Lafreniere 2016	US	Resident continuity clinic in a large urban academic medical centre	Cross-Sectional	44	Mean: 51 (SD 14) yrs.	51	43%	Internal medicine	PGY 1-3, Inexperienced	Resident
Lall 2020	US	Hospital	Longitudinal Cohort	882	Men: Mean 52.7 (11.9) yrs.; Women: Mean 44.9 (10.4) yrs.	n/r	77.40%	Emergency medicine & ICU	Women: 57.1% over 10 years' experience; Men: 77.2% over 10 years' experience.	Experienced
Lavanchy 2004	Canada	Family physicians in rural settings; primary/secondary care settings not reported although it seems likely that they are probably primary care based (by virtue of being 'family physicians')	Cross-Sectional	131	n/r	n/r	n/r	Physician	n/r	n/r
Lemkau 1994	US	The majority (47 out of 50) were practising as family physicians	Cross-Sectional	50	n/r	n/r	78%	Physician	Practicing family physicians who had previously graduated from a family practice residency.	Resident
Leung 2014	Australia and New Zealand	80% predominantly worked in public practice, 15% predominantly in private practice and 5% in an equal mix of both. It can be presumed they worked in hospitals due to the nature of the work.	Cross-Sectional	220	Median age was 45.4 yrs.	45.4	60%	Cancer	All participants were consultant radiation oncologists (Fellow, Educational Affiliate or Life) members of the Royal Australian and New Zealand College of Radiologists.	Experienced
Levin 2017	US	Not explicitly stated but work which is measured refers to inpatients and outpatients so presume it is all hospital work	Cross-Sectional	938	Median age was 32 yrs.	32	49%	Neurology	Participants were all neurology trainees (two thirds of responders were residents and one third were fellows)	Resident

Li 2018	China	Hospitals	Cross-Sectional	2873	Mean or median not reported. 25% were under 30 yrs. 48% were aged 30-39 yrs. 19% were 40-49 yrs. 6% were 50-59 yrs. and 1% were 60 yrs. or older.	n/r	45%	Anaesthesiology	38% were residents, 38% were attendings and 24% were academic professors	Mixture
Linzer 2009	US	119 ambulatory clinics in New York, New York, and in the upper Midwest.	Cross-Sectional	422	Mean: 42.9 (SD 9.58) yrs.	42.9	56%	Physician	n/r	n/r
Linzer 2017	US	34 practices in three geographic regions of the US.	Cross-Sectional	146	No overall mean or median age provided for the sample. However, the mean age of physicians classed as 'satisfied' with work was 47 yrs. and those classed as 'not satisfied' was 49 yrs.	n/r	48%	Physician	Mean years in practice was 13 yrs.	Experienced
Loerbroks 2017	Germany	Hospitals	Cross-Sectional	416	Mean: 40.1 (SD 2.9) yrs.	40.1	49%	Mixed	Experienced: 10 years after being junior doctors in 2004	Experienced
Lu 2015	US	Emergency department	Cross-Sectional	77	n/r	n/r	62%	Emergency medicine & ICU	Mostly experienced attendings (60%)	Experienced
Makara-Studzinska 2020	Poland	Hospital	Cross-Sectional	318	Mean: 47 (SD 11.21) yrs.	47	34%	Mixed	Varied from 1-56 years (Mean: 20.18 (SD 11.5) yrs.)	Experienced
Marchalik 2019	US, Italy, Portugal, France, and Belgium	Urology trainees	Cross-Sectional	211	n/r	n/r	63%	Urology	All participants were urology trainees	Resident
McAbee 2015	US	All surgeons	Cross-Sectional	750	No mean or median age reported. 12% were 40 yrs. or under; 19% were 41-45 yrs.; 18% were 46-50 yrs.; 19% were 51-55 yrs.; 16% were 56-60 yrs.; 10% were 61-65 yrs.; 6% were over 65 yrs.	n/r	87%	Neurosurgery	All experienced neurosurgeons. 10% had less than 5 years practising; 16% 5-10 years; 20% 11-15 years; 16% 16-20 years; 17% 20-25 years; 22% more than 25 years	Experienced
McNearney 2008	US	Presume hospitals as all participants were rheumatologists	Cross-Sectional	285	Mean: 51.3 (Range 33–89) yrs.	51.3	76%	Rheumatology	Experienced. 60% were more than 10 years past their fellowship training	Experienced
Mehta 2019	US	Presume hospitals as all participants were cardiologists	Cross-Sectional	2313	n/r	n/r	58%	Cardiology	Included fellows in training and more experienced cardiologists	Mixture
Messerotti 2020	Italy	Hospital	Cross-Sectional	226	n/r, only reports yrs. from graduation	n/r	44.00%	Mixed	Mixture of experience from graduation ranging from <3 to >16 yrs.	Mixture
Mohammed 2018	Iraq	Three hospitals based on the Medical City University Campus	Cross-Sectional	310	Mean: 34.75 (SD 7.5) yrs.	34.75	50%	Mixed	Various: 9% had been practicing for less than 5 years; 77% for 5-14 years; 14% for over 15 years	Experienced

		Employed by non-academic hospital or medical centre 55 (28.2%) Private practice 28 (14.4%) Veterans Affairs Medical Centres 2 (1.0%) Other 13 (6.7%)							1–10 years post-training 164 (77.4%) 11–20 years post-training 19 (9.0%) >20 years post-training 6 (2.8%)	
Moreno-Jimenez 2012	Spain	Random stratified sample of the primary care centres and hospitals of the community of Madrid	Cross-Sectional	485	Mean: 44.3 yrs.	44.3	53.80%	Physician	18.3 average years of experience (SD 8.5), and 12.2 average years of seniority (SD 8.1), 54.8% of the physicians had a master's degree, and 36.3% had a doctorate degree	Experienced
Nguyen 2021	US	Hospital	Cross-Sectional	166	22 (13.3%) were 32-40 yrs.; 55 (33.1%) were 41-50 yrs.; 42 (25.3%) were 51-60 yrs.; 37 (22.3%) were 61-70 yrs.; 10 (6%) were 71-75 yrs.	n/r	73%	Emergency medicine & ICU	Mixed (from less than 5 years to over 20 years of experience)	Mixture
Nwosu 2020	Nigeria	Hospital	Cross-Sectional	535	n/r	n/r	73.80%	Mixed	Mixed	Mixture
Ochoa 2018	Ecuador	67.6% were in surgical medical departments, 28.1% in critical care departments, and 4.4% in administrative units	Cross-Sectional	435	24 to 34 years (32.3%), 35 to 45 years (37.7%), 45 to 56 years (21.8%), 57 years and above (8.2%)	n/r	58%	n/r	n/r	n/r
O'Connor 2017	Ireland	Hospital based	Prospective Cohort	172	81% were up to 30 years and 19% over 30 years	n/r	44%	Surgery	Inexperienced	Resident
O'Connor 2019	US	Internal medicine residency programs	Cross-Sectional	245	<45 yrs. - 73 (30%); 45-54 yrs. - 84 (34%); 55+ yrs. - 81 (33%) n/r - 7 (3%)	n/r	59%	Internal medicine	Tenure ≤2 yrs. - 89 (36%) 3-6 yrs. - 74 (30%) ≥7 yrs. - 82 (33%)	Resident
Opoku 2014	Ghana	Mainly urban government practices	Cross-Sectional	200	18–29 years, 99 (49.5%); 30–39 years, 82 (41.0%); 40–49 years, 10 (5.0%); 50–59 years, 8 (4.0%); 60 years and above, 1 (0.5%)	n/r	66.50%	Mixed	<2 years, 47 (23.5%) 2–5 years, 103 (51.5%) 6–10 years, 30 (15.0%) 11–15 years, 9 (4.5%) 16–20 years, 5 (2.5%) >20 years 6, (3.0%)	Resident
Ozvacic Adzic 2012	Croatia	Family Practices	Cross-Sectional	125	Mean: 46 (SD 7) yrs.	46	18%	Physician	13.3 years at current position	Experienced
Ozyurt 2006	Turkey	Four public	Cross-Sectional	598	<29 yrs., 84 (14.2%);	n/r	64%	Mixed	Years in profession:	Experienced

		hospitals, four private hospitals, one university hospital and ten public health centres were included			30–39 yrs., 189, (31.9%);				0–9 yrs. - 160 (27.2%)	
					40–49 yrs., 243 (41.0%);				10–19 yrs. - 231 (39.3%)	
					>50 yrs., 77 (13.0%)				20–29 yrs. - 160 (27.2%)	
									>30 yrs. - 37 (6.3%)	
Pantenburg 2016	Germany	83% in inpatient setting (of these 85% were based in a hospital with more than 100 beds). 27% in outpatient setting (50% of those worked as primary care physicians).	Cross-Sectional	2357	Mean: 32.9 yrs.	32.9	34%	Mixed	Length of work experience (years) [mean (SD; range)] 5.6 (3.8; 0 - 17)	Mixture
Park 2016	Korea	4 university hospitals in4 different cities	Cross-Sectional	317	Mean: 30.4 (SD 2.9) yrs.	30.4	68%	Mixed	PGY: 1-4, Inexperienced	Resident
Passalacqua 2012	US	Residents in internal medicine rotating between 3 hospitals	Cross-Sectional	93	Mean: 29.6 (SD 3.19) yrs.	29.6	70%	Internal medicine	Mostly inexperienced residents	Resident
Pedersen 2016	Denmark	Primary care	Cross-Sectional	129	Mean: 48.9 (SD 17.1) yrs., Range: 20-103	48.9	100%	GPs	Experienced	Experienced
Pei 2020	China	Medium and large sized hospitals from across China	Cross-Sectional	1376	Most were aged: 25-44 yrs. (70.8%)	n/r	53.10%	Internal medicine	55% had worked for more than 10 years, and more than 70% had junior or middle professional titles	Experienced
Pit 2014, 2016	Australia	GP's	Cross-Sectional	92	Mean: 51 (SD 10.7) yrs.	51	60%	GPs	Years in general practice 20 (SD 12.4) yrs.	Experienced
Prins 2009	Netherlands	Residents training for a referral specialty	Cross-Sectional	2115	Mean: 31.5 (SD 3.5)	31.5	39%	Interns/Residents	Mostly inexperienced residents	Resident
Prudenzi 2021	UK	n/r - but recruited through primary care managers	Cross-Sectional	98	Mean: 42.97 (SD 10.18) yrs.	42.97	9.20%	n/r	n/r	n/r
Pu 2017	China	Hospitals	Cross-Sectional	5558	Age, Women N (%), Men N (%):	n/r	46%	Neurology	n/r	n/r
					20–35 yrs., 1247 (41.8%), 833 (32.8%);					
					35–50 yrs., 1514 (50.7%), 1380 (54.4%);					
					>50 yrs., 224 (7.5%), 324 (12.8%)					
Qureshi 2015	US	Plastic surgeons' members of the American Society of Plastic Surgeons	Cross-Sectional	1691	Mean: 50.8, (Range 33-74) yrs.	50.8	75%	Surgery	Mean: 11.5 yrs.	Experienced
Rabatin 2016	US	Primary care	Cross-Sectional and Longitudinal	422	n/r	n/r	56%	GPs	n/r	n/r
Rafferty 1986	US	Primary care	Cross-Sectional	67	Mean: 29.09 (SD 3.78) yrs.	29.09	79%	Physician	31.3% were in their first year of residency training; 34.3% were in their second year; 34.3% were in their third year of training	Resident
Rao 2020	US	Hospital doctors	Cross-Sectional	1882	n/r	n/r	51.10%	Mixed	Mixture of early to late career doctors	Mixture
Ratanawongsa 2008	US	Primary care	Prospective Cohort	40	Mean: 41.9 (SD 8.7)	41.9	34%	Physician	Mean: 11.2 yrs.	Experienced

Rath 2015	Canada	Hospital	Cross-Sectional	369	Mean: 48 yrs.	48	62.40%	Cancer	Senior doctors	Experienced
Ripp 2010a	US	1 Hospital, Mount Sinai Hospital and Elmhurst Hospital Centre	Cross-Sectional	145	n/r	n/r	50%	Interns/Residents	1st Year residency	Resident
Ripp 2010b	US	5 Hospital institutions	Prospective Cohort	253	Mean: 28 yrs.	28	54%	Interns/Residents	1st Year residency	Resident
Roy 2017	Bangladesh	District areas mixed setting	Cross-Sectional	354	Mean: 39.2 yrs.	39.2	70%	Mixed	Mixed	Mixture
Ruggieri 2014	Italy	Hospital	Cross-Sectional	167	Mean: 42 yrs.	42	51.50%	Cancer	Mixed	Mixture
Sahin 2019	Turkey	Hospital	Cross-Sectional	158	n/r	n/r	60.70%	Mixed	Mixed	Mixture
Salles 2019	US	Hospital	Cross-Sectional	146	Mean: 30.4 yrs.	30.4	58%	Surgery	Residents, 1-5 years postgrad	Resident
Schaufeli 2009	Netherlands	Mixed	Cross-Sectional	2115	Mean: 31.5 yrs.	31.5	39.30%	Interns/Residents	Up to 6 years post med school experience	Experienced
Shanafelt 2002	US	University of Washington Affiliated Hospitals Internal Medicine Residency program	Cross-Sectional	115	n/r	n/r	47%	Interns/Residents	1-3 years	Resident
Shanafelt 2009	US	University/Academic-Clinical staff	Cross-Sectional	465	38.5% were 45-54 years, 34.1% were 35-44 years of age. No mean reported	n/r	77%	Mixed	Mixed	Mixture
Shanafelt 2010	US	Members of the American College of Surgeons	Cross-Sectional	7905	Mean: 51 (Range 43-59) yrs.	51	87%	Internal medicine	1-3 years	Resident
Shanafelt 2014	US	Hospital	Cross-Sectional	1117	Mean: 52 yrs.	52	50%	Cancer	Mixed	Mixture
Sinsky 2017	US	Multiple settings	Cross-Sectional	6880	Median: 56 yrs.	56	67%	Mixed	n/r	n/r
Siu 2012	Hong Kong	Hospital	Cross-Sectional	226	Mean: 37 (Range 30.5-44.0) yrs.	37	67%	Mixed	Experienced: 12.0 yrs. (6.0-20.0)	Experienced
Sliwa 2019	US	Mixed	Cross-Sectional	1536	n/r	n/r	58%	Physician	n/r	n/r
Soler 2008	Europe - various countries	Family physicians	Cross-Sectional	1393	Mean: 45.4 (SD 8.5) yrs.	45.4	55%	Physician	Experienced – Mean: 19 (SD 8.5) yrs.	Experienced
Sonmez 2021	Turkey	Hospital	Cross-Sectional	141	Mean: 33.3 (SD 7.3) yrs.	33.3	58.20%	Emergency medicine & ICU	Mixed - residents, specialists and GPs and faculty members	Mixture
Stafford 2010	Australia	Hospital	Cross-Sectional	29	n/r	n/r	82.80%	Cancer	n/r	n/r
Sulaiman 2017	Ireland	Teaching hospitals	Cross-Sectional	265	Mean: 28.5 (SD 0.26) yrs.	28.5	53%	Mixed	96% had less than 10 years' experience	Resident
Sun 2017	US	36 Primary care practices	Cross-Sectional	102	n/r	n/r	49%	Internal medicine	Mostly experienced, median: 15 yrs.	Experienced
Sun 2021	China	Hospital	Cross-Sectional	842	≤ 30 yrs.: 23.3%; 31–40 yrs.: 29%; 41–50 yrs.: 26.1%; ≥ 51 yrs.: 11.6%	n/r	46.40%	Mixed	Mixture	Mixture
Surgenor 2009	New Zealand	Hospital	Cross-Sectional	267	Mean: 48 (SD 7.7) yrs.	48	73%	Mixed	Experienced – Mean 17.0 (SD 8.6) years as consultant	Experienced
Tak 2017	US	Mixed	Cross-Sectional	1289	n/r	n/r	63.20%	Mixed	n/r	n/r
Tawfik 2018	US	All healthcare settings	Cross-Sectional	6695	Median: 56 yrs.	56	67%	Mixed	Mixed	Mixture

Taycan 2012	Turkey	Mixed	Cross-Sectional	139	CHS – Mean: 29.6 (SD 4.0) yrs.; non CHS – Mean: 34.8 (SD 4.8) yrs.	n/r	CHS (65%); non CHS (72%)	n/r	Mixed	Mixture
Tian 2019	China	Hospital	Cross-Sectional	2008	n/r	n/r	32.70%	Neurology	Mixed	Mixture
Tokuda 2009	Japan	Hospital	Cross-Sectional	236	Mean: 40.9 (SD 7.8) yrs. (Range 26 to 67 yrs.)	40.9	75%	Physician	3 to 42 years (mean 15.8, SD 7.4)	Mixture
Toral-Villanueva 2009	Mexico	Three hospitals: a specialty hospital (tertiary level), a general zone hospital (secondary level) and a national health institute.	Cross-Sectional	312	Mean 28 (SD 2)	28	57%	Interns/Residents	Inexperienced	Resident
Torppa 2015	Finland	Primary care	Cross-Sectional	165	n/r (age of emotionally/not emotionally exhausted GPs reported but not av. age of sample)	n/r	25%	GPs	Mixed	Mixture
Torres 2015	Spain	22 primary care centres	Cross-Sectional	108	Mean: 49.1 (SD 8.07) yrs.	49.1	46%	GPs	n/r	n/r
Trockel 2018	US	Academic medical centre	Prospective Cohort	250	51.2% were 30 to 39 yrs., 33.2% were < 30 yrs., 8.8% were 40 to 49 yrs., 6.0% were ≥ 50 yrs.	n/r	50%	Mixed	Mixed	Mixture
Umene-Nakano 2013	Japan	Medical schools	Cross-Sectional	704	Mean: 37.2 (SD 7.5) yrs.	37.2	77%	Psychiatry	Mean 9.6 (SD 8.2) yrs.	Mixture
Vanhaecht 2019	Netherlands	32 Dutch hospitals that participate in the 'Peer Support Collaborative'	Cross-Sectional	1619	n/r	n/r	44%	Mixed	Mostly experienced, mean: 11 years	Experienced
vanWulfftenPalthe 2016	International	Academic medicine	Cross-Sectional	210	n/r	n/r	90%	Surgery	Mixed	Mixture
Visser 2003	Netherlands	Mixed	Cross-Sectional	1573	Mean: 46.9 (SD 7.8) yrs.	46.9	82%	Mixed	n/r	n/r
Voultsos 2020	Greece & Cyprus	Hospital	Cross-Sectional	80	Range: 32-65 yrs.	43	40.20%	Emergency medicine & ICU	n/r	n/r
Walocha 2013	Poland	Surgical, non-surgical and primary care	Cross-Sectional	71	Range: 25-68 yrs.	n/r	64%	Physician	Not specified but presume mixture	Mixture
Ward 2020	US	Primary care	Cross-Sectional	2,740	n/r	n/r	55%	Physician	n/r	n/r
Watson 2018	US	Emergency department	Cross-Sectional	84	n/r	n/r	n/r	Emergency medicine & ICU	Experienced	Experienced
Weigl 2015	Germany	Paediatric hospital	Cross-Sectional	96	Mean: 37.46 (SD 8.55) yrs.	37.46	47%	Paediatrics	Mixed: 44.3% Junior physicians	Mixture
Weigl & Schneider 2017	Germany	Emergency Department	Cross-Sectional	29	n/r	n/r	n/r	Emergency medicine & ICU	Mixture	Mixture
Welle 2020	US	Mixed	Retrospective Cohort	429	n/r	n/r	n/r	Physician	n/r	n/r
Welp 2014	Switzerland	Intensive Care Units	Cross-Sectional	243	Mean: 39.13 (SD 10.14)	39.13	50%	Emergency medicine & ICU	Mixed	Mixture
Wen 2016	China	12 tertiary, 9 secondary, and 25 primary hospitals were included	Cross-Sectional	1537	Mean: 38 (SD 9) yrs.; Range 30-50 yrs.	38	56%	Mixed	Mixture	Mixture
Weng 2011	Taiwan	Hospital	Prospective Cohort	110	Mean: 40.78 (SD 6.91) yrs.	40.78	86%	Internal medicine	Mixture	Mixture
West 2006	US	Internal Medicine Residency program in Mayo Clinic	Prospective Cohort	184	70% were up to 30 years and 16% over 30 years	n/r	51%	Interns/Residents	Inexperienced	Resident

West 2009	US	Internal Medicine Residency program in Mayo Clinic	Prospective Cohort	380	72% were up to 30 years and 28% over 30 years	n/r	62%	Interns/Residents	Inexperienced	Resident
Whitebird 2017	US	172 primary care clinics in 18 health care systems across 8 states prior to the implementation of a collaborative model of care for patients with depression and diabetes and/or cardiovascular disease	Cross-Sectional	709	n/r	n/r	51%	Physician	Mostly experienced (75% over 10 years of experience)	Experienced
Willard-Grace 2019	US	Primary care	Longitudinal Cohort	252	n/r	n/r	n/r	Physician	n/r	n/r
Williams 2007	US	Ambulatory clinics	Cross-Sectional	426	Mean: 43 (Range 29 to 89) yrs.	43	55%	Physician	n/r	n/r
Williamson 2018	US	Hospital	Cross-Sectional	261	Mean: 29 yrs.	29	71%	Emergency medicine & ICU	Mixed	Mixture
Wright 2011	Canada	Hospital	Cross-Sectional	212	nr	n/r	59%	Paediatrics	n/r	n/r
Xiao 2014	China	Hospital	Cross-Sectional	205	n/r	n/r	61%	Emergency medicine & ICU	Male: Mean 9.3 (SD 4.1); Female: 8.7 (SD 3.9)	Mixture
Yost 2014	US	Hospital	Cross-Sectional	48	Mean: 30.9 yrs.	30.9	67%	Surgery	Mixed	Mixture
Zhang 2011	China	Hospital	Cross-Sectional	1451	n/r	n/r	66%	Mixed	Mixed	Mixture
Zhou 2017	China	Hospital	Cross-Sectional	6111	n/r	n/r	46%	Neurology	Mixed	Mixture

*Data for these variables were coded by the core research team into suitable groups. For age we used mean which was most commonly reported, otherwise median when reported. The overall median for age across studies was calculated combining both the mean and median (where mean was not available) values of the studies. The meta-regression and subgroup analysis for age thus also involved some median values rather than means. SD: standard deviation; yrs.: years; n/r: not reported.

Appendix 7: Citations for included studies

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Citations for excluded studies with non-amenable data (as denoted in PRISMA flow diagram)

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Appendix 8: Subgroup analysis of the different burnout measures used

Breakdown of the type of burnout measures used across the 170 studies

Burnout measure used	Number of studies (%)
Full MBI	81 (48%)
MBI abbreviated*	50 (29%)
Copenhagen	5 (3%)
Other*	34 (20%)

*See full details of the measure used for each study in appendix 9.

Subgroup meta-analysis for the measure of burnout used for outcomes job satisfaction, patient safety incidents, professionalism and turnover intention

	Burnout Measure (OR (95% CI), I^2)*			
Outcome	**Full MBI**	**MBI abbreviated**	**Copenhagen**	**Other**
Job satisfaction	3.39 (2.69, 4.29), I^2=83%	4.62 (3.21, 6.65), I^2=99%	2.59 (2.22, 3.01), I^2=95%	4.06 (3.04, 5.43), I^2=88%
Patient safety incidents	2.12 (1.68, 2.67), I^2=96%	1.68 (1.16, 2.43), I^2=79%	3.59 (2.92, 4.42), I^2=95%	1.99 (0.85, 4.63), I^2=95%
Professionalism	2.42 (1.93, 3.04), I^2=97%	2.91 (1.65, 5.13), I^2=87%	1.89 (1.69, 2.12), I^2=43%	1.91 (1.15, 3.18), I^2=95%
Turnover Intention	2.68 (1.75, 4.11), I^2=65%	2.53 (1.39, 4.59), I^2=98%	2.77 (2.25, 3.40), I^2=96%	7.23 (5.93, 8.81), I^2=77%

MBI: Maslach Burnout Inventory; OR: odds ratio; CI: confidence interval.

*All of the above ORs between the burnout measures groups were assessed for significant differenced using the Ratio of Odds Ratio (ROR) statistic. Applying this approach we did not find any significant differences.

Appendix 9: NOS Critical Appraisal and Descriptions for Measure of Wellness

				Newcastle Ottawa assessment							
				Selection				Comparability	Outcome		
Study	**Description for Measure of wellness**	**MBI**	**Subgroups**	**Representativeness of sample**	**Sample size**	**Non-respondents**	**Ascertainment of the exposure**	**Confounding factors**	**Assessment of outcome**	**Statistical test**	**Total Score**
Adarkwah 2018	22 item MBI	1	Full MBI	1	1	0	0	0	1	1	4
Al dubai 2013	9 item EE	1	MBI Abbreviated	1	0	1	0	1	1	1	5
Alrawashdeh 2021	10-item Burnout Measure-Short version (BMS) by Maslach-Pines	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Anagnostopoulos 2012	Burnout measured using Maslach Burnout Inventory full 22-item version	1	Full MBI	1	0	1	0	1	1	1	5
Appelbaum 2019	9 items from the MBI	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Arora 2014	22 item MBI	1	Full MBI	1	1	0	0	0	0	0	2
Asai 2013	Burnout measured using Maslach Burnout Inventory; Emotional distress using the General health questionnaire	1	Full MBI	1	1	1	0	1	1	1	6
Attenello 2018	22 item MBI	1	Full MBI	1	1	0	0	1	1	1	5
Baer 2017	2-single item measure adapted from Maslach Burnout Inventory	1	Full MBI	1	1	0	0	1	1	1	5
Baghdadi 2020	Adapted version of the MBI	1	MBI Abbreviated	0	1	1	0	0	1	0	3
Bahadirli 2021	22 item MBI	1	Full MBI	1	1	0	0	0	1	1	4
Balch 2011	22-item of Maslach Burnout Inventory; Depression using the 2-item Primary Care Evaluation of Mental Disorders (PRIME MD)	1	Full MBI	1	1	0	0	1	1	1	5
Blanchard 2010	22 item MBI	1	Full MBI	0	1	0	0	1	1	1	4
Bourne 2019	22 item MBI	1	Full MBI	1	1	0	0	1	1	1	5
Bressi 2009	22 item MBI	1	Full MBI	1	0	1	0	0	1	1	4
Brown 2009	Burnout measured using Maslach Burnout Inventory;	1	Full MBI	1	0	0	1	0	1	0	3

	Depression/anxiety using the Depression Anxiety Stress Scale (DASS)										
Brunsberg 2019	burnout MBI, depression HANDS	1	Full MBI	1	1	1	1	0	1	1	6
Busis 2017	22 item MBI	1	Full MBI	1	1	0	0	1	1	1	5
Campbell 2001	22 item MBI	1	Full MBI	0	0	0	0	0	1	0	1
Chen 2013	22 item MBI	1	Full MBI	0	1	1	0	0	1	1	4
Cooke 2013	Burnout measured using a single item measure of MBI which was validated against the emotional exhaustion subscale	1	Full MBI	1	1	1	0	0	1	0	4
Coombs 2019, 2020	22 item MBI	1	Full MBI	1	0	0	0	0	1	0	2
Cydulka 2008	1 question on burnout	0	Other	1	1	1	0	1	1	1	6
de Oliveira 2013	Burnout measured using MBI but shortened to 12-items	1	Full MBI	1	0	1	0	0	1	1	4
Dewa 2014	9 item burnout MBI	1	MBI Abbreviated	1	1	0	0	0	1	1	4
Ding 2019	1 question on burnout	0	Other	1	0	0	0	0	1	0	2
Dirvar 2021	MBI- 22 item	1	Full MBI	0	1	1	0	1	1	0	4
Djulbegovic 2019	Adapted Burnout Scale used	0	MBI Abbreviated	1	0	1	0	0	1	0	3
Doan-Wiggans 1995	1 question on burnout	0	Other	1	1	0	0	0	1	0	3
Dominguez 2018, 2019	MBI 22 item	1	Full MBI	1	1	0	0	0	1	0	3
Duan 2019	15 items of the MBI-GS	1	MBI Abbreviated	1	0	0	0	0	1	0	2
Estryn-Behar 2011	Inventory, the Maslach Burnout Inventory, Copenhagen Burnout Inventory	0	Copenhagen	1	1	0	0	1	1	1	5
Faivre 2018	Full 22-item MBI	1	Full MBI	1	0	0	0	1	1	1	4
Frahrenkopf 2008	Harvard national depression screening day scale + Maslach burnout inventory	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Freeborn 2001	Burnout (Tedium index)	0	Other	1	1	0	0	0	1	0	3
Garrouste-Orgeas 2015	Maslach Burnout Inventory (MBI), CES-Depression scale	1	MBI Abbreviated	1	1	0	1	1	1	0	5
Gilles 2014	Copenhagen Burnout Inventory	0	Copenhagen	1	1	0	0	0	1	0	3

Glasheen 2011	n/r	0	Other	0	0	0	0	0	1	0	1
Goldberg 1996	Full 23-item MBI	1	Full MBI	0	0	0	0	0	1	0	1
Golub 2007	Full 22-item MBI-HSS	1	Full MBI	1	1	0	0	0	1	0	3
Golub 2008	MBI HSS	1	Other	1	0	0	0	0	1	0	2
Govardhan 2012	Full 22-item MBI-HSS	1	Full MBI	1	0	0	0	0	1	0	2
Grover 2018	MBI and PSS	1	MBI Abbreviated	1	0	0	0	0	1	0	2
Halbesleben 2008	Maslach Burnout Inventory	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Hamidi 2018	Full 22-item MBI-HSS	1	Full MBI	1	0	0	0	1	1	1	4
Hansen 2011	The Warr-Cook-Wall job satisfaction scales, the Maslach Burnout Inventory and survey items on working hours and participation in continuing medical education	1	MBI Abbreviated	1	0	0	1	1	1	0	4
Hartwell 2010	16 items of the MBI modified by Barnett	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Hayashino 2012	HOPE scale + Maslach Burnout Inventory + WHO depression index	1	MBI Abbreviated	1	1	0	0	1	1	0	4
Hewitt 2020	Modified abbreviated MBI-HSS	1	MBI Abbreviated	1	1	0	0	1	1	0	4
Huang 2019	Chinese version of Copenhagen burnout inventory	0	Copenhagen	1	1	0	0	0	1	1	4
Hyman 2017	Full 22-item MBI-HSS	1	Full MBI	0	0	0	0	0	1	0	1
Jager 2017	Full 22-item MBI	1	Full MBI	1	1	1	0	1	1	1	6
Janko 2019	Oldenburg burnout inventory	0	Other	1	0	0	0	0	1	1	3
Kang 2013	Maslach Burnout Inventory; Two item measure of depression	1	MBI Abbreviated	0	0	0	0	0	1	1	2
Karaoglu 2015	Full 22-item MBI	1	Full MBI	0	0	0	0	0	1	0	1
Karayurek and Demirci 2021	MBI 22 item (Turkish adaption)	1	Full MBI	1	1	0	0	0	1	0	3
Kassam 2021	Full 22-item MBI	1	Full MBI	1	0	0	0	0	1	0	2
Kelker 2021	Wellbeing index; physician work life study item; Brief resilience scale (BRS)	0	Other	1	0	0	0	1	1	1	4
Kemper 2020	Full 22-item MBI-HSS	1	Full MBI	1	1	1	0	1	1	1	6

Khalafallah 2020a	9-item abbreviated measure of the MBI contains all three subscales. Two burnout indexes were created for the purposes of analysis: one named 'burnout' where participants scored as high on either EE or DP; one named 'career satisfaction' which reflected PA scores.	1	MBI Abbreviated	1	0	0	0	1	1	1	4
Khan 2018	The Maslach Burnout Inventory was used to measure emotional exhaustion (nine items) and depersonalisation (five items). Scores on the two measures were combined to stratify participants as ‘high’ and ‘low’ burnout. Depression and anxiety were measured using the State Trait Personality Inventory. These scales were also stratified to class participants as 'high' or 'low' depression and anxiety.	1	MBI Abbreviated	0	1	0	0	1	1	1	4
Khorfan 2021	abbreviated Maslach Burnout Inventory includes three questions for each of the three subscales (emotional exhaustion, depersonalization, and personal accomplishment) and has been shown to be a valid and reliable screening tool for burnout	1	Full MBI	1	1	1	0	1	1	1	6
Kimo Takayesu 2014	The 22-item version of the Maslach Burnout Inventory was used to measure exhaustion,	1	Full MBI	1	0	1	0	0	1	0	3

	depersonalisation, and personal accomplishment. Participants were categorised into 'high/low/moderate' for each subscale and allocated an overall score on burnout as 'high' or 'low'.										
Klein 2010	Copenhagen Burnout Inventory	0	Copenhagen	1	1	0	0	1	1	0	4
Koleck 2000	The French translation of the 22-item Maslach Burnout Inventory was used. Unclear how closely this maps onto the original MBI as factor analysis was conducted to produce three factors of emotional exhaustion, personal accomplishment and distance towards others.	1	Full MBI	0	0	0	0	0	1	0	1
Kriss 2021	Single item from the MBI-EE	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Kuerer 2007	Burnout was measured using the 22-item Maslach burnout inventory, which captured all three domains of burnout. Participants were categorised as 'low', 'moderate' or 'high' for each of the subscale scores and were assigned an overall low/high burnout categorisation based on whether they were high on either/both exhaustion and depersonalisation subscales. Symptoms of depression were measured using the Primary Care Evaluation of	1	Full MBI	1	1	0	0	1	1	1	5

	Mental Disorders a two-item standardized depression-screening tool. Mental and physical Quality of Life was measured using the Medical Outcomes Study Short Form.										
Kuhn 2009	The 22-item Maslach Burnout Inventory was used to measure all 3 domains of burnout. Participants were categorised as low, moderate, or high on each subscale. “Career burnout” was created as a dichotomous yes/no variables based on whether respondents scored in the highest category for any of the 3 subscales.	1	Full MBI	1	0	0	0	1	1	0	3
Kumar 2007	The 22-item Maslach Burnout Inventory was used to measure all 3 domains of burnout. Participants were categorised as low, moderate or high on each subscale.	1	Full MBI	1	0	0	0	0	1	1	3
Gupta 2018	Self-reported burnout using a single item from the widely used Mini Z Burnout Survey which is validated against MBI	1	Other	0	1	0	0	0	1	1	3
Kushnir 2006	Burnout was measured using a scale by Kushnir and Melamed. This measure views burnout as comprising of emotional exhaustion, physical fatigue, and cognitive weariness. It includes four parts: emotional and	0	Other	0	0	0	0	0	1	0	1

	physical exhaustion, listlessness, tension, and cognitive weariness. The measure used was the total of the points in all four sub-scales divided by the total number of items.										
Kushnir 2014	The 22-item Maslach Burnout Inventory was used to measure all 3 domains of burnout. Participants were categorised as low, moderate or high on each subscale. Participants were also given an overall burnout score based on the average of the responses to the EE and DE scales and these two subscales were used to give an overall categorisation as 'high burnout'.	1	Full MBI	1	0	1	0	0	1	0	3
Kwah 2017	22-item Maslach Burnout Inventory	1	MBI Abbreviated	1	0	1	0	0	1	0	3
Lafreniere 2016	Maslach burnout inventory (EE and DP components), 4 screening tests for depression and anxiety	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Lall 2020	Not MBI, adapted questionnaire used	0	Other	1	1	1	0	1	1	1	6
Lavanchy 2004	Maslach Burnout Inventory used to measure burnout; Beck Depression Inventory used to measure depression	1	MBI Abbreviated	1	0	1	0	1	1	0	4
Lemkau 1994	25-item Maslach Burnout Inventory was used to measure all three dimensions of burnout. Participants were categorized into 'low',	1	Full MBI	1	0	1	0	0	1	0	3

	'moderate' and 'high' for each subscale.										
Leung 2014	The 22-item Maslach Burnout Inventory was used to measure all 3 domains of burnout. Participants were categorised as low, moderate and high on each subscale.	1	Full MBI	1	0	1	0	0	1	0	3
Levin 2017	The 22-item Maslach Burnout Inventory was used to measure all 3 domains of burnout. Participants were categorised as low, moderate, and high on each subscale. High scores on either EE or DP were indicative of burnout. Overall quality of life also measured.	1	Full MBI	1	0	0	0	1	1	1	4
Li 2018	Chinese version of the 22-item Maslach Burnout Inventory-Human Service Survey. Participants were categorised as low, moderate, and high on each subscale. High scores on either EE or DP were indicative of burnout.	1	Full MBI	1	1	1	0	0	1	1	5
Linzer 2009	Physician burnout (Rohland et al. 2004); Physician job stress scale	0	Other	1	0	0	0	1	1	0	3
Linzer 2017	Single item Burnout measure from Physician Work life study	0	Other	1	0	0	0	1	1	1	4
Loerbroks 2017	6-item version of the MBI measuring emotional exhaustion and depersonalisation	1	MBI Abbreviated	1	1	1	0	1	1	0	5
Lu 2015	Maslach Burnout Inventory	1	MBI Abbreviated	0	0	0	0	0	1	0	1
Makara-Studzinska 2020	Link Burnout Questionnaire (LBQ) was	0	MBI Abbreviated	1	0	0	0	1	1	1	4

	used to measure the variable of burnout, and the Perceived Stress Scale (PSS-10) was used to measure the variable describing the current stress level. The LBQ questionnaire is an adaptation of a 24-item tool by Massimo Santinello, developed by Jaworowska [41]. The examined person uses a 6-point scale to assess feelings related to their professional work. Each item is scored on a 6-point Likert scale ranging from 1 (never) – 6 (very often) The tool examines four domains: psychophysical exhaustion (Exhaustion-Energy), involvement in relationships with patients (Lack of Commitment – Commitment), effectiveness in performed work (Lack of Efficacy – Effectiveness) and existential expectations (Disappointment – Satisfaction).										
Marchalik 2019	Burnout measured through the validated two single-item measures of the Maslach Burnout Inventory (MBI). Burnout was assessed as a binary variable with those reporting 'once a week' or 'more', on either the emotional exhaustion or depersonalisation domains considered 'burnt-out'. Quality of life	1	Other	1	0	0	0	0	1	1	3

	(QoL) was also measured via linear analogue self-assessment										
McAbee 2015	22-item Maslach burnout inventory.	1	Full MBI	1	0	0	0	1	1	1	4
McNearney 2008	Burnout measured via two items derived from the MBI: "" "I feel emotionally drained by my work," and "I feel I am positively influencing other peoples' lives through my work."	1	Other	1	1	0	0	1	1	1	5
Mehta 2019	Emotional exhaustion component of burnout measured via a single item	0	MBI Abbreviated	0	0	0	0	1	1	1	3
Messerotti 2020	Maslach burnout inventory 22 items	1	Full MBI	0	1	1	0	0	1	1	4
Mohammed 2018	22-item MBI used to measure all three subscales of burnout. Burnout defined as high scores on the EE and DP combined with low scores on PA.	1	Full MBI	1	1	1	0	0	1	1	5
Moreno-Jimenez 2012	Physician Burnout Questionnaire (PBQ) (Moreno-Jiménez, et al., 2006)	0	Other	1	1	0	0	0	1	1	4
Nguyen 2021	Adapted version of the MBI	1	MBI Abbreviated	1	0	0	0	0	1	1	3
Nwosu 2020	Oldenburg burnout inventory	0	Other	1	1	1	1	1	1	1	7
Ochoa 2018	Spanish adaptation of the Maslach Burnout Inventory (MBI) developed by Bresó et al. (2007)	0	MBI Abbreviated	0	0	0	0	0	0	0	0
O'Connor 2017	Maslach burnout inventory	1	MBI Abbreviated	1	1	1	0	1	1	1	6
O'Connor 2019	Two questions from the Maslach Burnout Inventory: 1 "How often do you feel burned out from work?" (Emotional exhaustion) and "How	0	Other	1	1	1	0	1	1	1	6

	often do you feel you've become more callous toward people since you took this job?" (depersonalization)										
Opoku 2014	the 9-item Abbreviated Maslach's Burnout Inventory in its entirety	1	MBI Abbreviated	1	1	0	0	1	1	1	5
Ozvacic Adzic 2012	Maslach Burnout Inventory	1	MBI Abbreviated	1	1	0	0	1	1	1	5
Ozyurt 2006	Turkish version of the Maslach Burnout Inventory (MBI).	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Pantenburg 2016	German version of the Maslach Burnout Inventory - Human Services Survey (MBI)	1	MBI Abbreviated	1	1	0	0	1	1	1	5
Park 2016	Maslach burnout inventory	1	Full MBI	1	1	0	0	1	1	1	5
Passalacqua 2012	Maslach Burnout Inventory; Perceived Stress Scale	1	MBI Abbreviated	1	1	0	0	0	1	1	4
Pedersen 2016	anxiety caused by uncertainty, concern about bad outcomes, Maslach burnout inventory	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Pei 2020	The Chinese version of the 15-item Maslach Burnout Service Inventory (MBI-GS) with 1 of the 5 "cynicism" questions deleted	1	MBI Abbreviated	1	0	0	0	1	1	1	4
Pit 2014, 2016	MBI shortened	1	MBI Abbreviated	1	1	0	0	1	1	1	5
Prins 2009	Utrecht Burn-Out Scale (UBOS-C/Maslach Burnout Inventory for Health and Social Services)	1	Other	1	1	0	0	1	1	1	5
Prudenzi 2021	Shirom melamed burnout measure and GHQ12	0	Other	0	1	0	0	0	1	1	3
Pu 2017	Maslach Burnout Inventory (MBI) to measure burnout	1	MBI Abbreviated	1	1	0	0	1	1	1	5

	(Maslach, Jackson, & Leiter, 1986)										
Qureshi 2015	Maslach Burnout Inventory	1	MBI Abbreviated	1	1	0	0	1	1	1	5
Rabatin 2016	Single question that correlates with the Maslach Burnout Inventory emotional exhaustion scale taken from the MEMO (Minimizing Error, Maximizing outcome)	1	Other	0	1	0	0	1	1	1	4
Rafferty 1986	The Maslach Burnout Inventory (MBI)	0	Full MBI	1	0	0	0	1	1	1	4
Rao 2020	MBI-GS % & Mass Survey 2017 scales: he 2017 four domains (1) career and compensation satisfaction; (2) well-being; (3) administrative workload; and (4) leadership and diversity.24	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Ratanawongsa 2008	six-item scale previously derived from the Maslach Burnout Inventory (MBI)	1	MBI Abbreviated	0	0	0	0	1	1	1	3
Rath 2015	MBI & Medical Outcomes Study Short Form (Sf-12) for physical and mental and QoL & Depression screened using 2-itemPRIME MD/PHQ2 & Alcohol abuse was evaluated using the CAGE	1	MBI Abbreviated	0	1	0	0	0	1	1	3
Ripp 2010a	Maslach Burnout Inventory	1	Full MBI	1	1	0	1	0	0	1	4
Roy 2017	Global satisfaction scale of Lichtenstein; turnover intention (using the scale described by Houkes et al. & burnout (using the inventory of West et al.	0	Other	1	1	1	0	1	1	1	6
Ruggieri 2014	Job Satisfaction Scale (JSS) and the Link Burnout Questionnaire (LBQ).	0	Other	0	0	0	0	0	1	0	1

Sahin 2019	Minnesota Satisfaction-IWS \ & MBI & Beck Depression Score & ach Personal Accomplishment Score (MPAS). Results: Mean (±SD) Total work satisfaction score w	1	MBI Abbreviated	1	1	1	0	1	1	1	6
Salles 2019	Social belonging (a 10-item scale adapted from previous studies), well-being (the Dupuy Psychological General Well-Being Scale, Beck Depression Inventory Short Form, and Maslach Burnout Inventory), and risk of attrition (indicated by frequency of thoughts of leaving the program).	1	MBI Abbreviated	0	0	1	0	1	1	1	4
Schaufeli 2009	Workaholism - 10-item DUWAS (Dutch Workaholism Scale; Schaufeli et al.; & Work demands via 3 scales & Role Conflict & Burnout via Dutch version of MBI-HSS & Perceived Happiness/Health/Well-being via scales	1	Other	1	1	0	0	0	1	1	4
Shanafelt 2002	Maslach Burnout Inventory	1	Full MBI	1	1	1	0	1	1	1	6
Shanafelt 2009	MBI-22 & satisfaction survey - effort % to work and what was meaningful via survey	1	Full MBI	1	1	0	0	1	1	1	5
Shanafelt 2010	Maslach Burnout Inventory	1	Full MBI	1	1	0	0	1	1	1	5
Shanafelt 2014	MBI-22 & satisfaction survey	1	Full MBI	1	1	0	0	1	1	1	5
Sinsky 2017	Full 22-item MBI	1	Full MBI	1	1	0	0	1	1	1	5
Siu 2012	Full 22-item MBI	1	Full MBI	1	0	0	0	1	1	1	4
Sliwa 2019	Mini-Z Burnout Survey	0	Other	1	1	0	0	0	1	1	4
Soler 2008	Full 22-item MBI	1	Full MBI	1	1	0	0	1	1	1	5

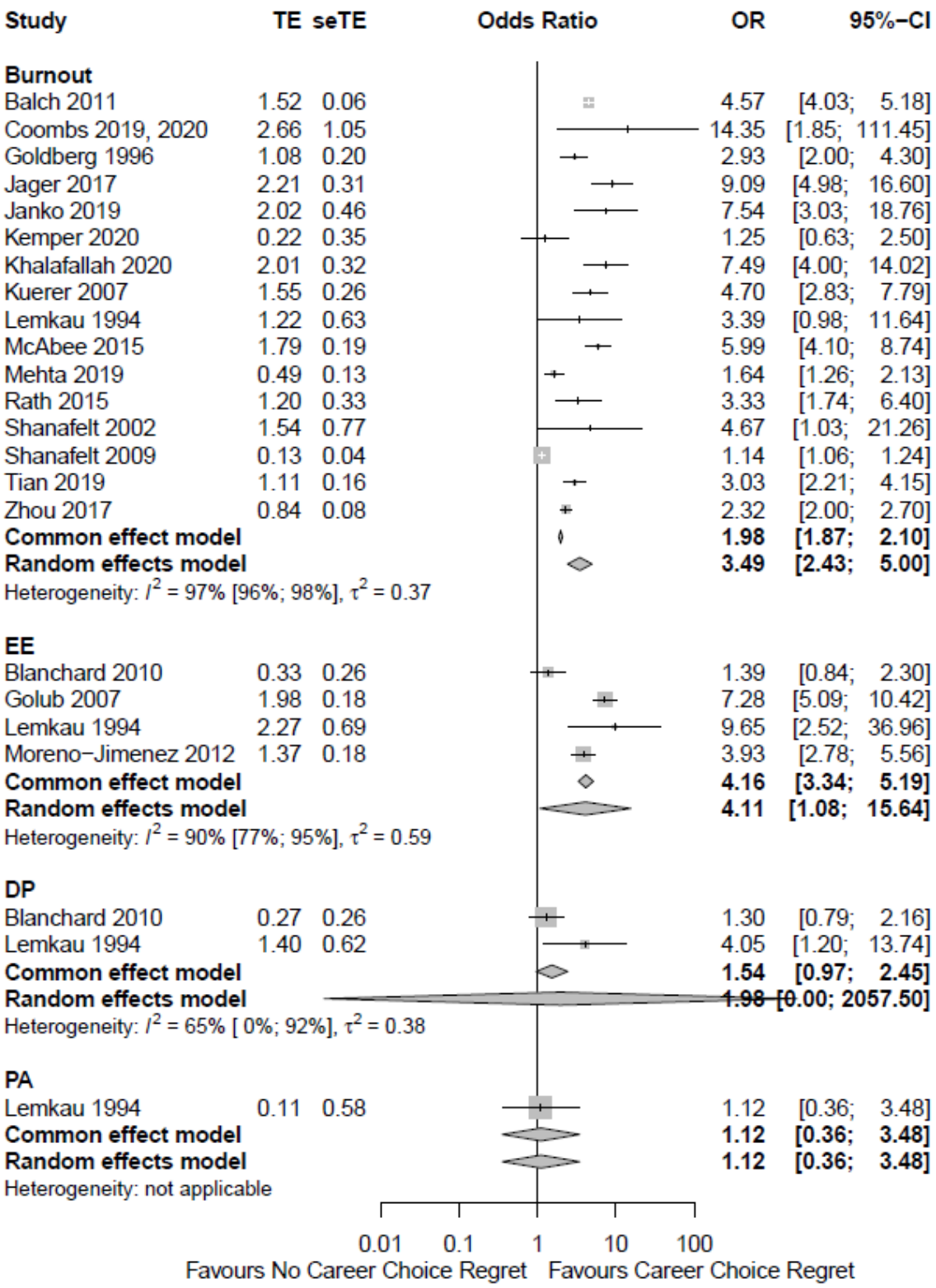
Sonmez 2021	Maslach burnout inventory, state trait anxiety inventory	1	MBI Abbreviated	1	0	0	0	1	1	0	3
Stafford 2010	Full 22-item MBI; GHQ (12-item); AUDIT	1	Full MBI	1	0	0	0	0	1	0	2
Sulaiman 2017	Full 22-item MBI	1	Full MBI	1	1	1	0	0	1	0	4
Sun 2017	Full 22-item MBI	1	Full MBI	1	1	0	0	0	0	1	3
Sun 2021	single item, no validated measures included professional reputation, perceived stress, burnout, withdrawal behaviour (defensive- medicine", "turnover intention", and "participants' attitudes toward the idea of their offspring becoming a physician) reputation damage	1	Other	0	1	0	0	0	0	1	2
Surgenor 2009	Full 22-item MBI	1	Full MBI	1	1	0	0	0	1	1	4
Tak 2017	2-item MBI	1	Other	1	1	1	0	1	1	1	6
Tawfik 2018	Full 22-item MBI	1	Full MBI	1	1	1	0	1	1	1	6
Taycan 2012	Full 22-item MBI; GHQ (12-item); Beck Depression Inventory (21-item); Pro-QOL)	1	Full MBI	1	0	0	0	1	1	1	4
Tian 2019	Full 22-item MB	1	Full MBI	0	1	0	0	1	1	1	4
Tokuda 2009	Full MBI; GHQ-12; Hospital Physicians Satisfaction Scale)	1	Full MBI	1	0	0	0	1	1	1	4
Toral-Villanueva 2009	Maslach Burnout Inventory	1	Full MBI	1	1	1	0	1	1	1	6
Torppa 2015	Full 22-item MBI	1	Full MBI	0	1	1	0	1	1	1	5
Torres 2015	Maslach Burnout Inventory	1	Full MBI	0	0	1	1	1	1	1	5
Trockel 2018	Full 22-item MBI; Abbreviated 2-item MBI; Self-defined single item	1	Full MBI	0	1	0	0	0	1	1	3
Umene-Nakano 2013	full 22-item MBI; Work-life balance satisfaction - 1 item	1	Full MBI	1	1	1	1	1	1	1	7
Vanhaecht 2019	One symptom/item for stress as part of an 11-item questionnaire	0	MBI Abbreviated	1	1	0	1	0	1	1	5

	developed based on the literature										
vanWulfftenPalthe 2016	Global Job Satisfaction instrument, Shirom-Malamed Burnout Measure	0	Other	1	1	0	0	1	1	1	5
Visser 2003	Consultants' Mental Health Questionnaire	0	Other	1	1	1	1	1	1	1	7
Voultsos 2020	MBI-22; STAI Form Y-1-20	1	Full MBI	1	0	1	1	1	1	1	6
Walocha 2013	Maslach burnout inventory	1	Full MBI	0	0	0	0	0	1	1	2
Ward 2020	MBI 2-item; Mini-Z survey	1	Other	1	1	1	1	1	1	1	7
Watson 2018	Full 22-item MBI	1	Full MBI	0	0	0	1	1	1	1	4
Weigl 2015	Maslach Burnout Inventory	1	Full MBI	0	0	1	1	1	1	1	5
Weigl & Schneider 2017	German version of the Maslach Burnout Inventory - Human Services Survey (MBI)	1	MBI Abbreviated	0	1	1	0	0	1	1	4
Welle 2020	Stanford Professional Fulfilment Index; Short Form-12 (SF-12)	1	Other	1	1	0	1	1	1	1	6
Welp 2014	Maslach Burnout Inventory	1	Full MBI	1	1	0	1	1	1	1	6
Wen 2016	Maslach burnout inventory	1	Full MBI	1	1	1	1	1	1	1	7
Weng 2011	MBI-22 item	1	Full MBI	0	0	0	0	1	1	0	2
West 2006	Maslach Burnout Inventory	1	Full MBI	1	1	1	1	1	1	1	7
West 2009	Maslach Burnout Inventory; 2-question approach for depression	1	Full MBI	1	1	1	1	1	1	1	7
Whitebird 2017	A single item from the Minimizing Error, Maximizing Outcomes (MEMO) provider survey	0	Other	1	1	0	1	0	1	1	5
Willard-Grace 2019	MBI- 10 item	1	MBI Abbreviated	1	1	1	1	1	1	1	7
Williams 2007	One item burnout inventory (Bachman & Freeborn, 1999);	0	Other	1	0	1	1	1	1	1	6
Williamson 2018	MBI - 22 item; PRIME-MD PHQ-2; Y/N Do you have depression; positive work-	1	Full MBI	0	1	1	1	0	1	1	5

	life balance 2 item (Shanafelt).										
Wright 2011	Copenhagen Burnout Inventory (CBI) - 19 item	0	Copenhagen	0	1	1	0	1	1	1	5
Xiao 2014	Hospital Anxiety and Depression Scale (HADS), Maslach Burnout Inventory-General Survey and Minnesota Satisfaction Questionnaire	1	MBI Abbreviated	0	1	1	0	0	1	1	4
Yost 2014	MBI-22 item	1	Full MBI	1	1	0	0	1	1	1	5
Zhang 2011	Chinese Maslach Burnout Inventory (CMBI) - 15 item; Chinese Physicians' Job Satisfaction Questionnaire (CPJSQ) - 62 items	1	MBI Abbreviated	0	1	0	0	0	1	1	3
Zhou 2017	MBI-22 item; GHQ-12; Consultants' Mental Health Questionnaire	1	Full MBI	0	1	0	1	1	1	1	5

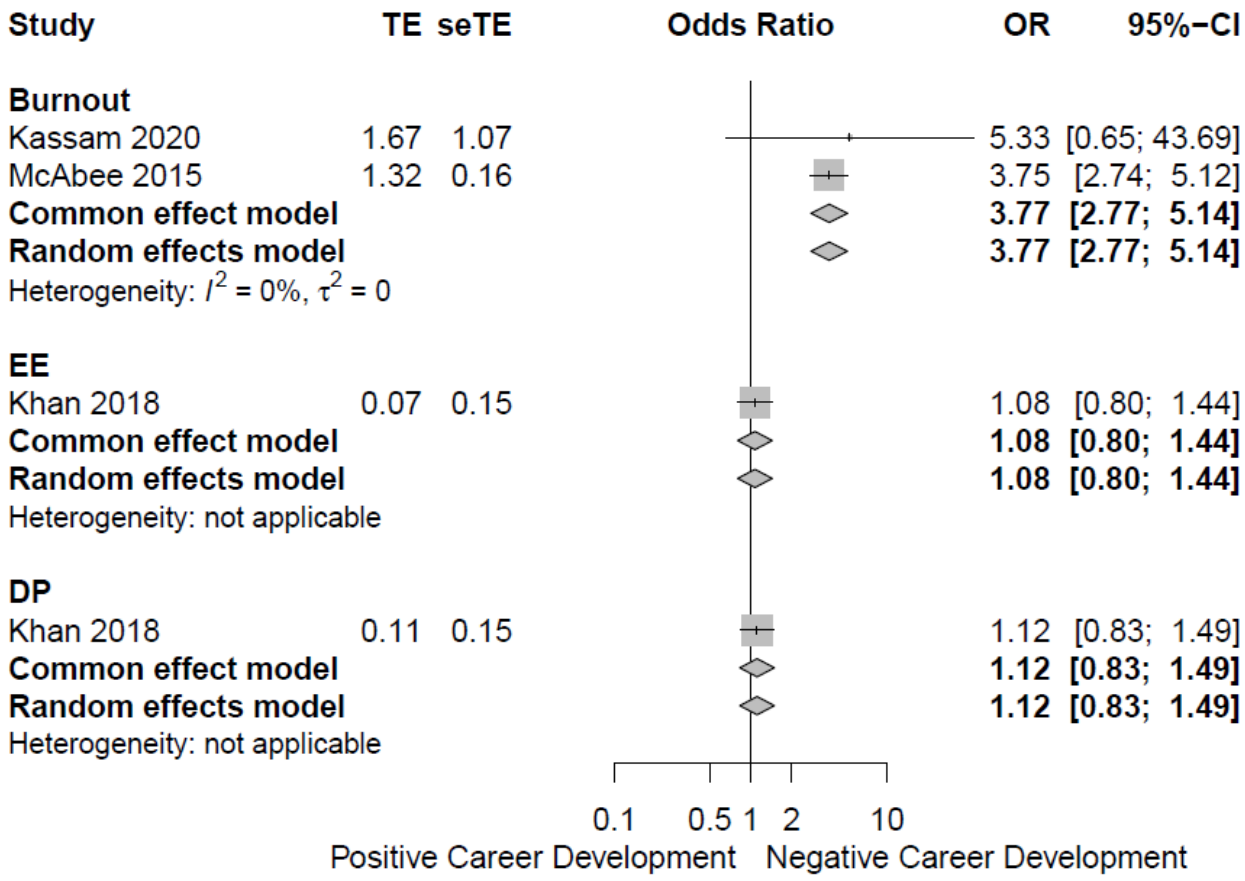
Appendix 10: Forest Plots of All Outcomes with Odd Ratio

Career Choice Regret

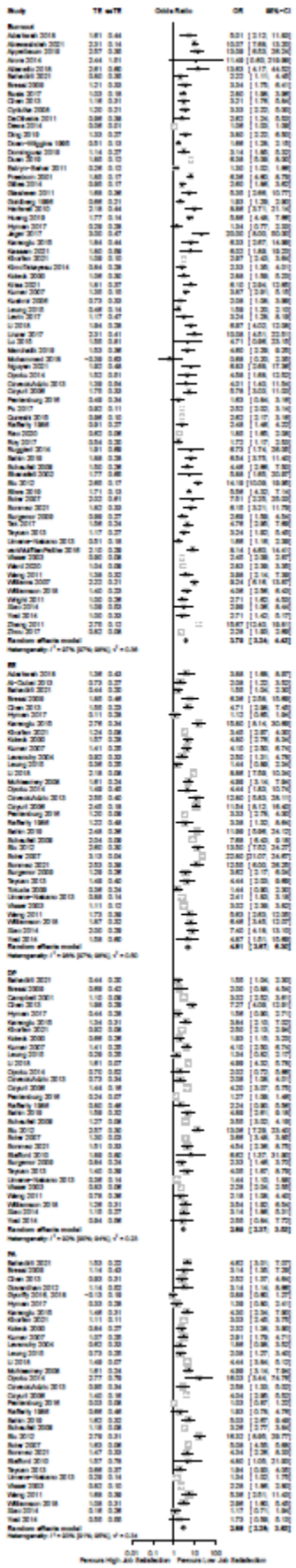


TE: Log odds ratio; seTE: standard error of log odds ratio; OR: odds ratio; CI: confidence interval; EE: emotional exhaustion; DP: depersonalisation; PA: Personal accomplishment.

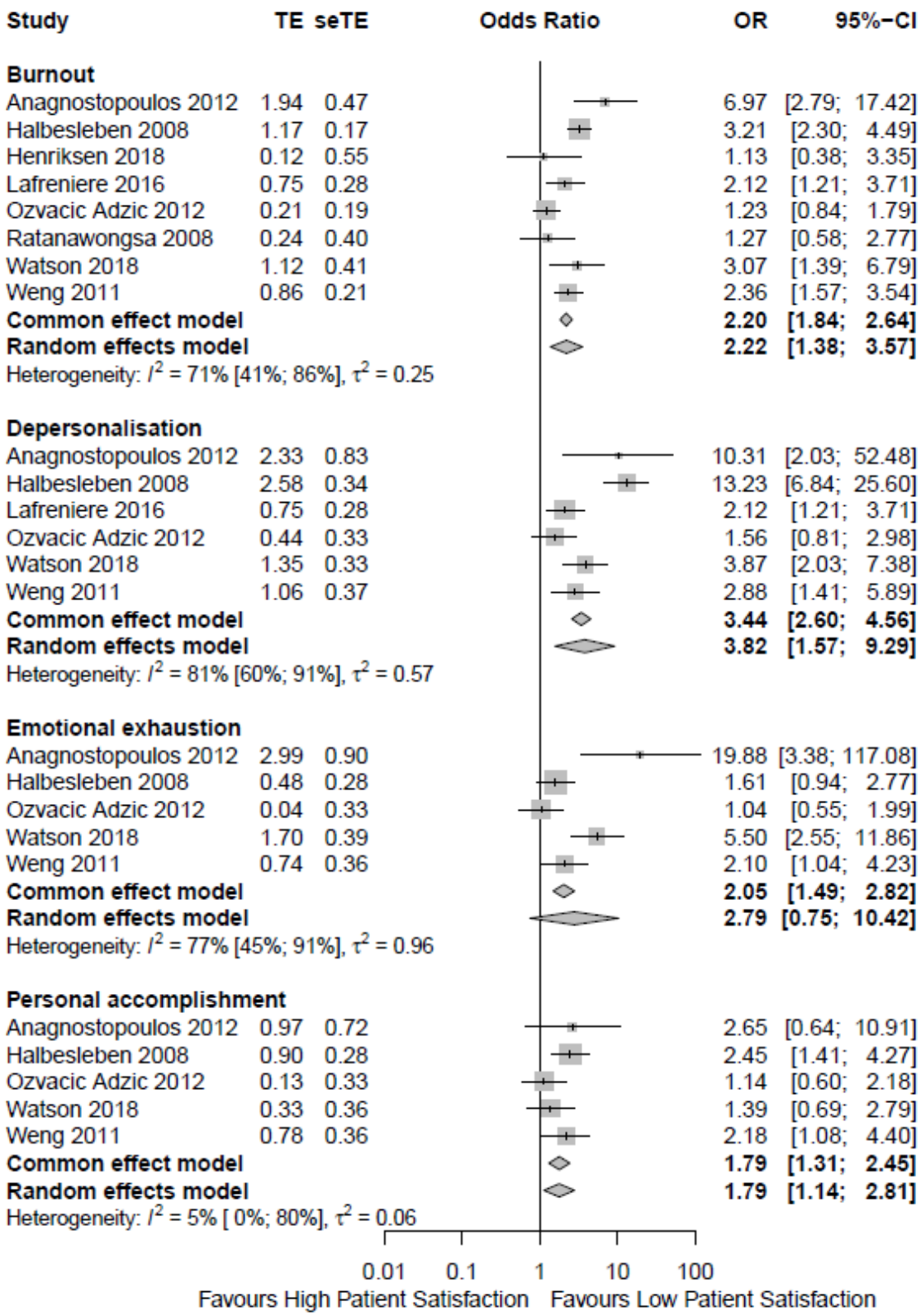
Career Development



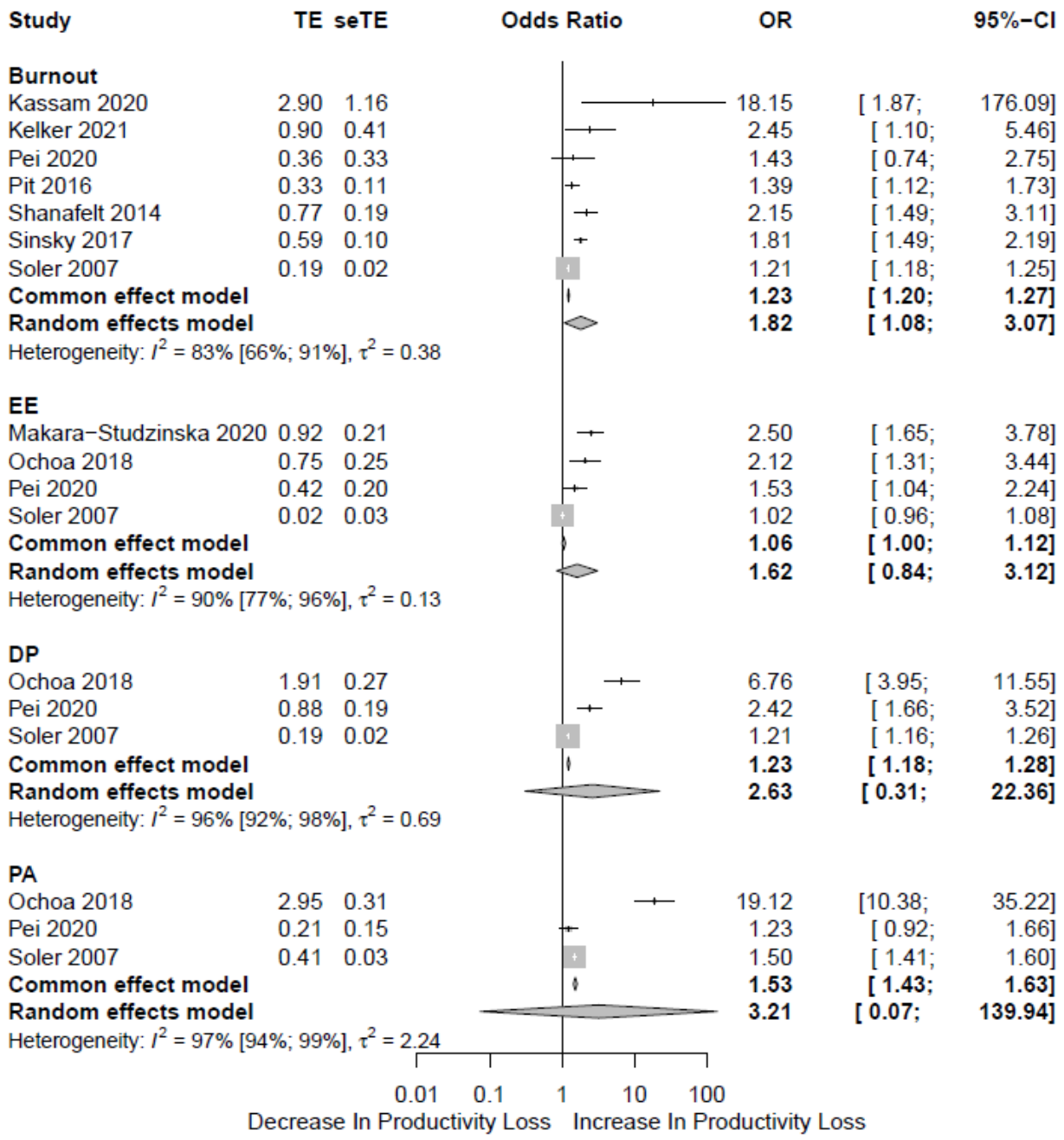
Job Satisfaction



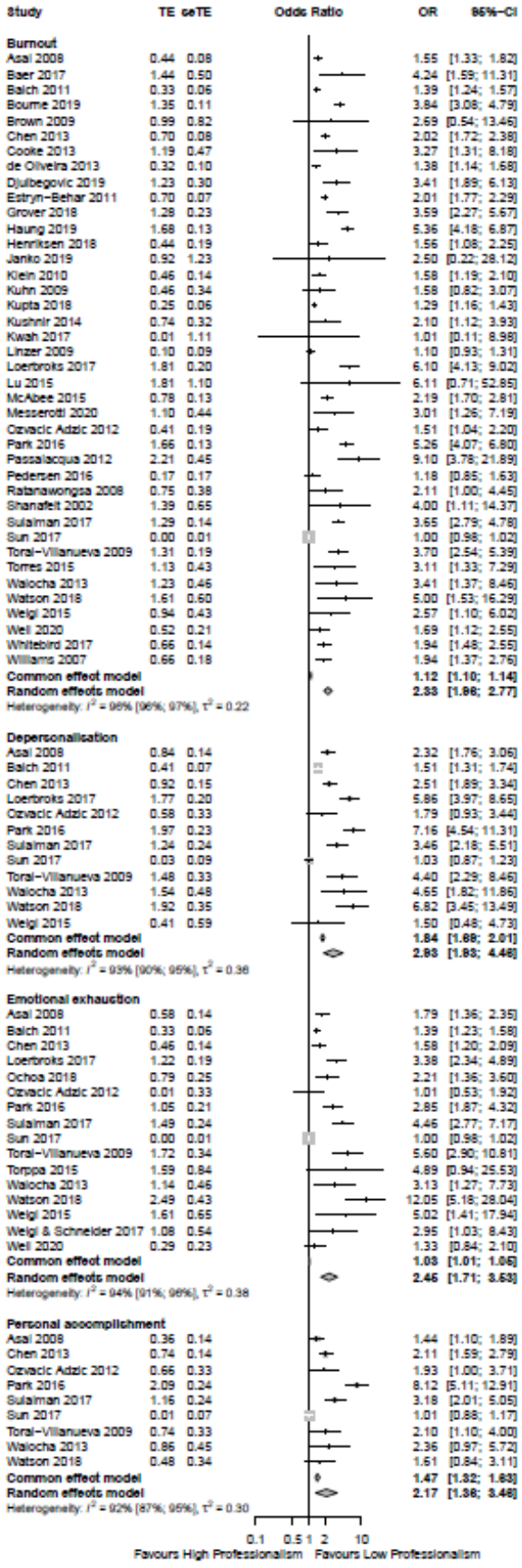
Patient Satisfaction



Productivity



Professionalism



Sensitively analysis for professionalism after removing 'Welle 2020' due to their use of the 1-point % change in results.

	K	OR	95% CI	I^2 (95% CI)
Burnout	39	2.35	1.97 to 2.81	96 (96 to 97) %
EE	15	2.57	1.76 to 3.75	94 (92 to 96) %
DP	12	2.93	1.93 to 4.46	93 (90 to 95) %
PA	9	2.17	1.36 to 3.46	92 (87 to 95) %

Appendix 11: Outcomes analysed using SMD

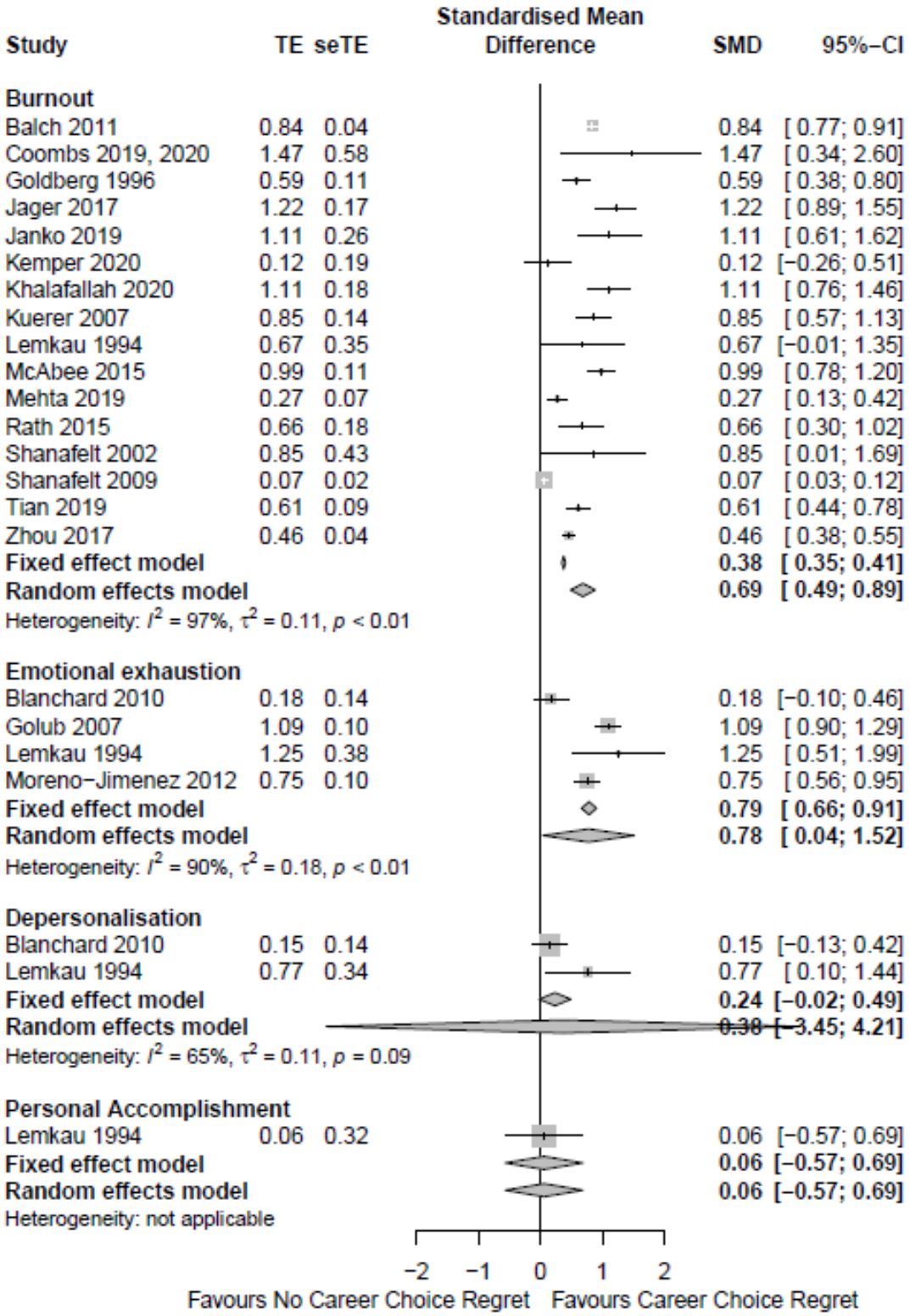
Burnout & sub-measure	No. of studies (No. of physicians)	SMD	95% CI [95% PI]
Career Engagement of Physicians			
Career Choice Regret¥			
Burnout	16 (33,871)	**0.69**	**0.49 to 0.89** [-0.06 to 1.43]
EE*	4 (2,014)	**0.79**	**0.66 to 0.91**
DP*	2 (274)	0.24	-0.02 to 0.49
PA*	1 (147)	0.06	-0.57 to 0.69
Career Development			
Burnout*	2 (3411)	0.73	-0.27 to 2.08
EE*	1 (593)	0.04	-0.12 to 0.20
DP*	1 (593)	0.06	-0.10 to 0.22
PA	No data	NA	NA
Job Satisfaction¥			
Burnout	73 (146,980)	**0.73**	**0.65 to 0.82 [0.07 to 1.40]**
EE	33 (22,699)	**0.87**	**0.72 to 1.02 [0.06 to 1.68]**
DP	30 (22,002)	**0.59**	**0.47 to 0.70 [0.04 to 1.13]**
PA	32 (27,374)	**0.58**	**0.46 to 0.71** [-0.09 to 1.25]
Productivity Loss			
Burnout	7 (9,581)	**0.33**	**0.04 to 0.62**
EE*	4 (3,421)	0.03	0.00 to 0.06
DP*	3 (2,969)	**0.11**	**0.09 to 0.14**
PA*	3 (2,969)	**0.23**	**0.20 to 0.27**
Turnover Intention			
Burnout	25 (32,271)	**0.62**	**0.46 to 0.79** [-0.19 to 1.44]
EE	16 (23,625)	**0.57**	**0.32 to 0.82** [-0.43 to 1.57]
DP	11 (23,257)	**0.33**	**0.13 to 0.53** [-0.35 to 1.01]
PA	5 (11,028)	0.14	-0.01 to 0.28
Quality of Patient Care			
Professionalism			
Burnout	40 (32,321)	**0.47**	**0.37 to 0.56** [-0.07 to 1.00]
EE	16 (11,861)	**0.49**	**0.29 to 0.69** [-0.26 to 1.25]
DP	12 (10,488)	**0.59**	**0.36 to 0.82** [-0.18 to 1.37]
PA	9 (2,992)	**0.43**	**0.17 to 0.68**
Patient Safety Incidents			
Burnout	35 (41,059)	**0.39**	**0.29 to 0.49** [-0.19 to 0.97]
EE	17 (20,213)	**0.42**	**0.33 to 0.51** [0.10 to 0.75]
DP	14 (19,616)	**0.49**	**0.34 to 0.65** [-0.04 to 1.03]
PA	14 (19,616)	**0.21**	**0.10 to 0.32** [-0.14 to 0.56]
Patient Satisfaction			
Burnout	8 (1,002)	**0.44**	**0.18 to 0.70**
EE	5 (527)	0.57	-0.16 to 1.29
DP	6 (571)	**0.74**	**0.25 to 1.23**

PA	5 (527)	**0.32**	**0.07 to 0.57**

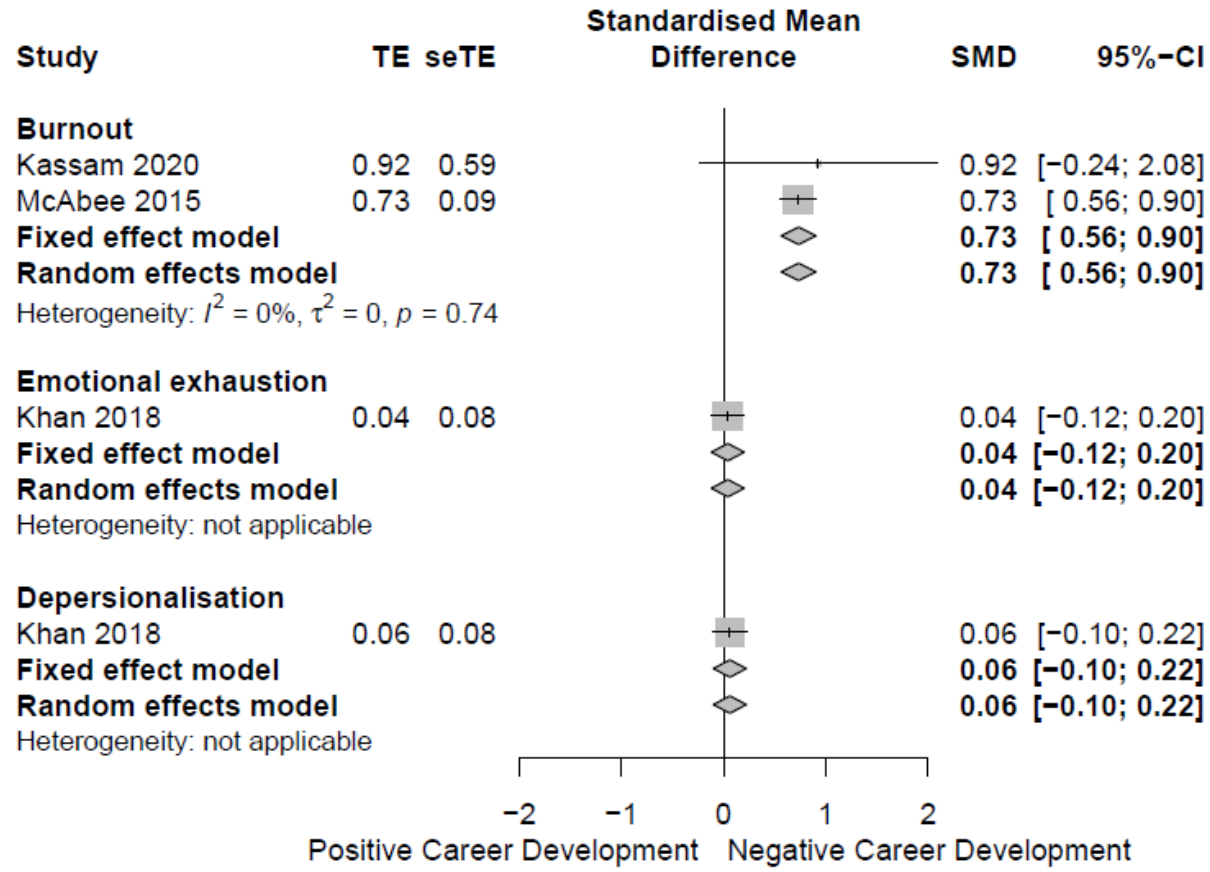
SMD: standardised difference; EE: emotional exhaustion; DP: depersonalisation; PA: personal accomplishment; CI: confidence interval; PI: prediction interval. *Analysed with fixed effects due to the varied sample sizes involved and with the being less than 5 studies.

See forest plots below for each outcome pooling with SMD.

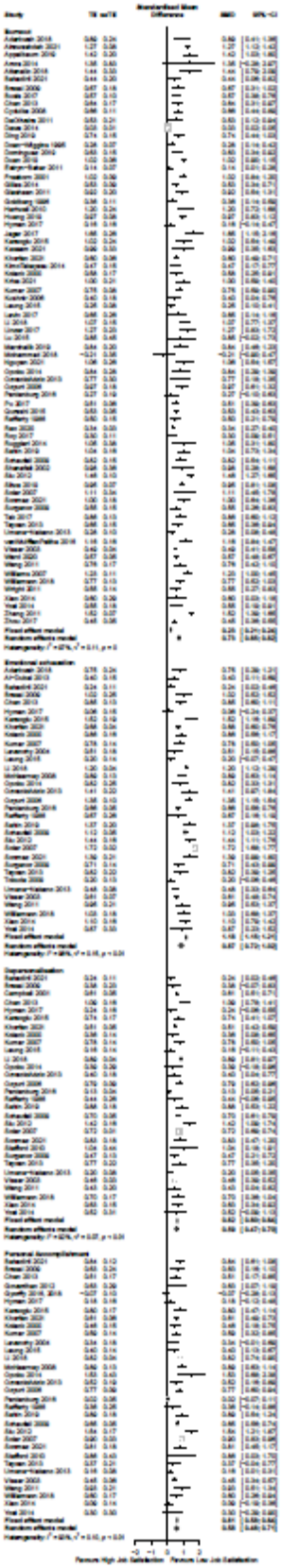
Career Choice Regret



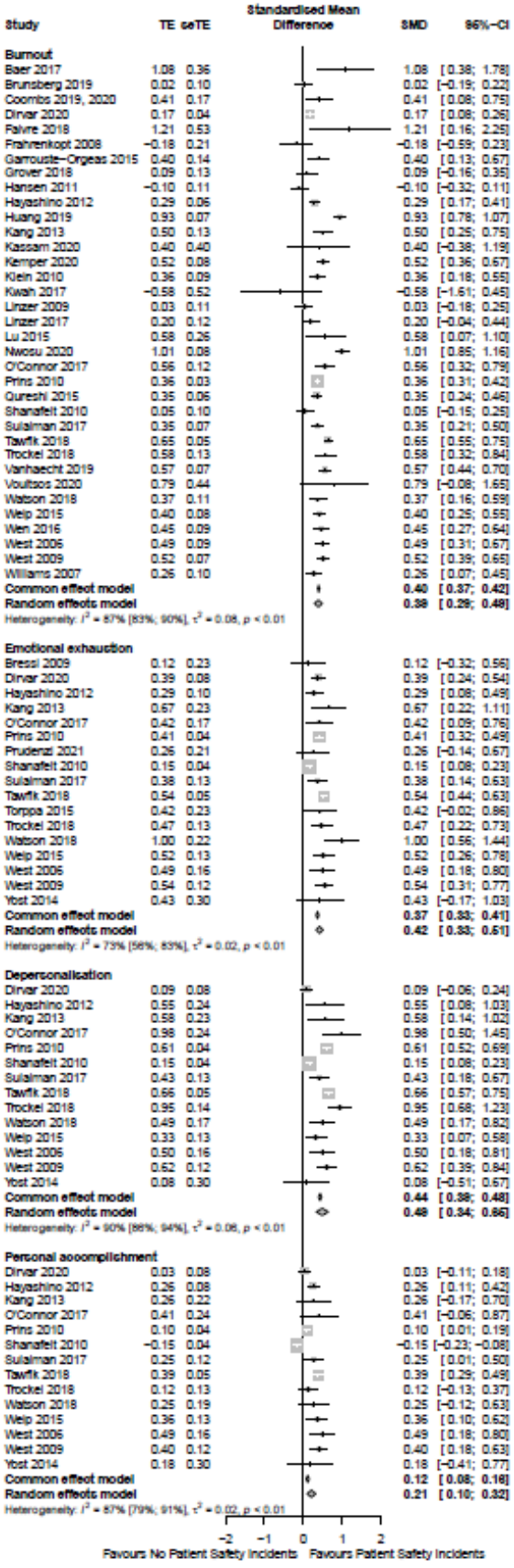
Career Development



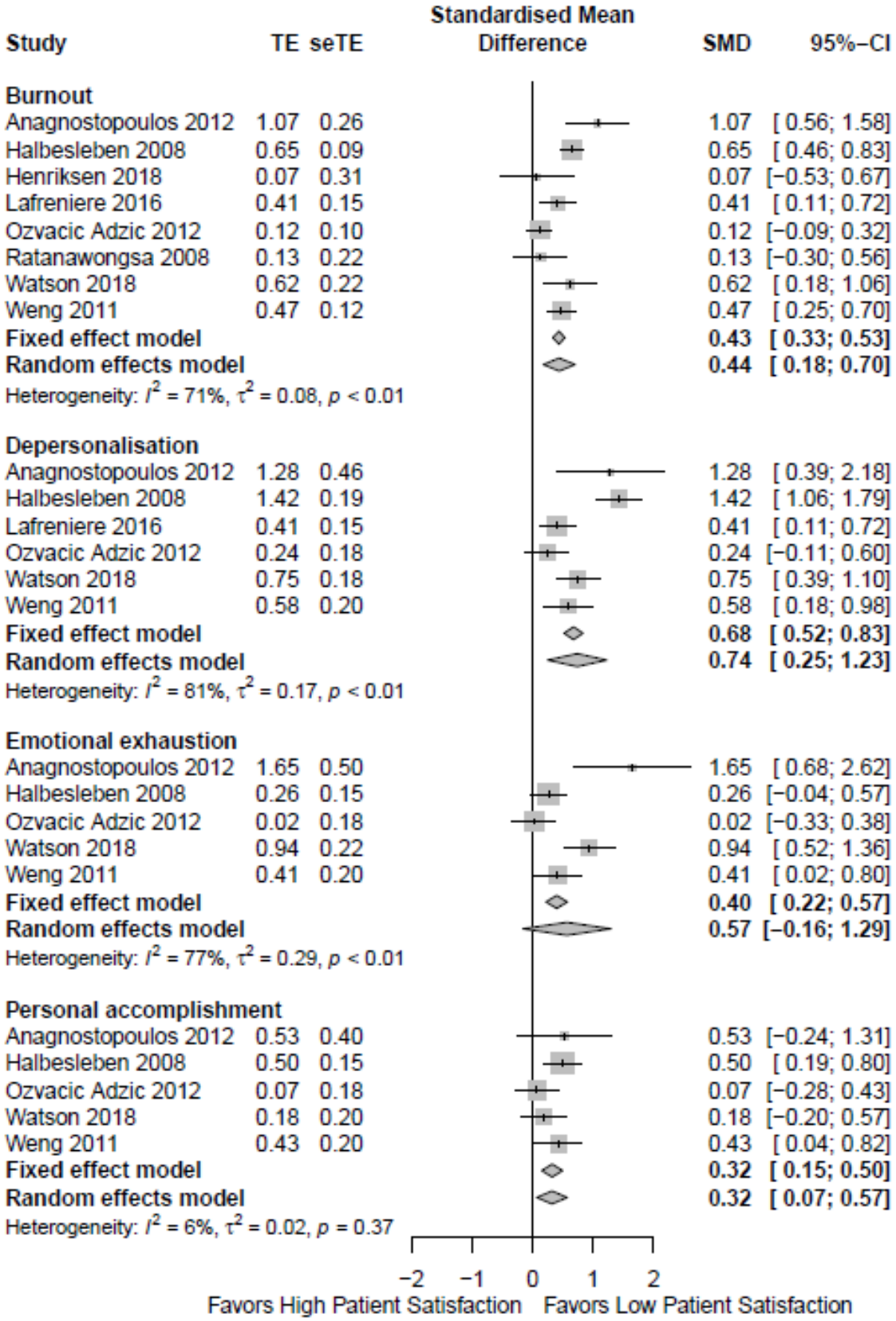
Job Satisfaction



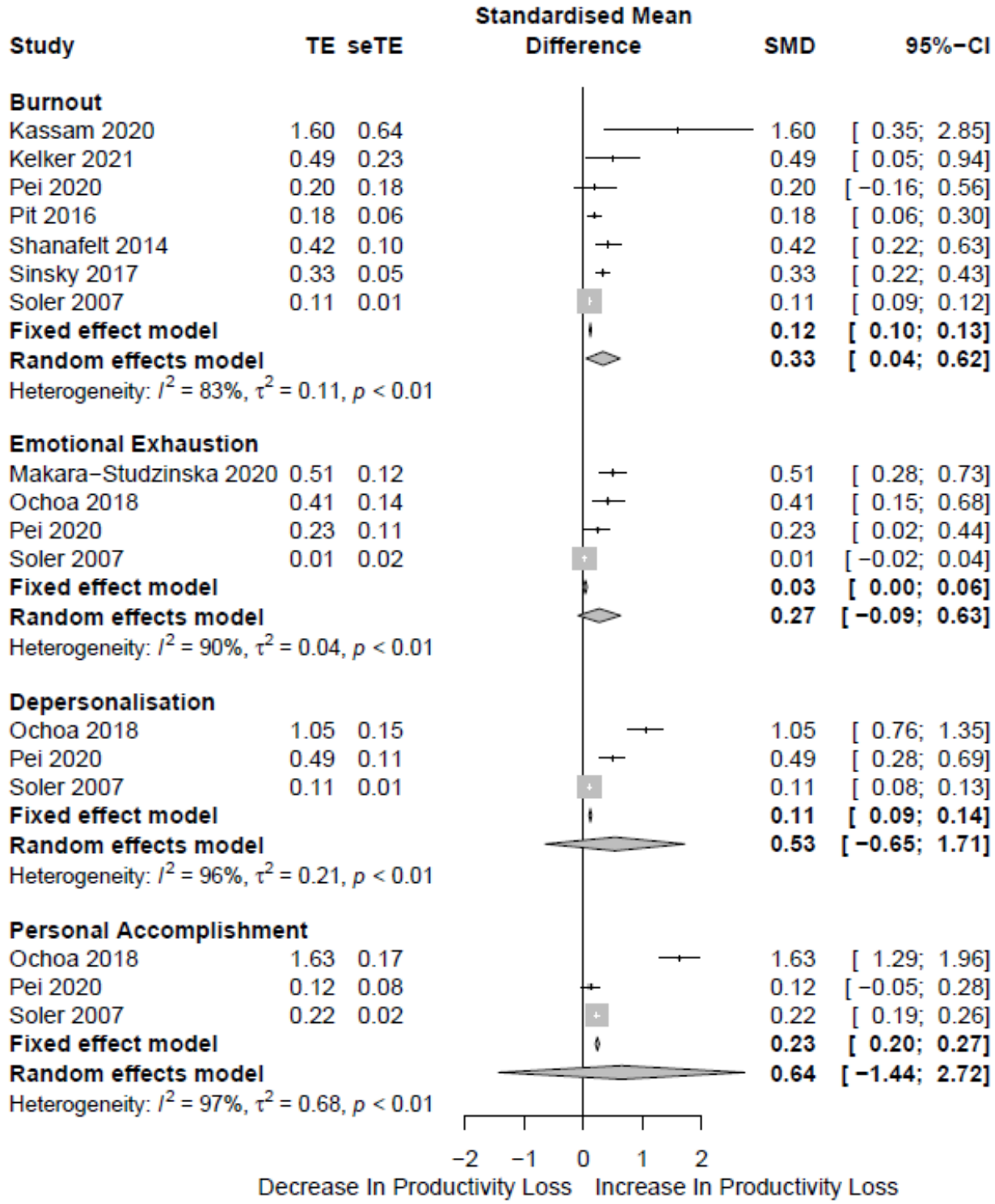
Patient safety incidents



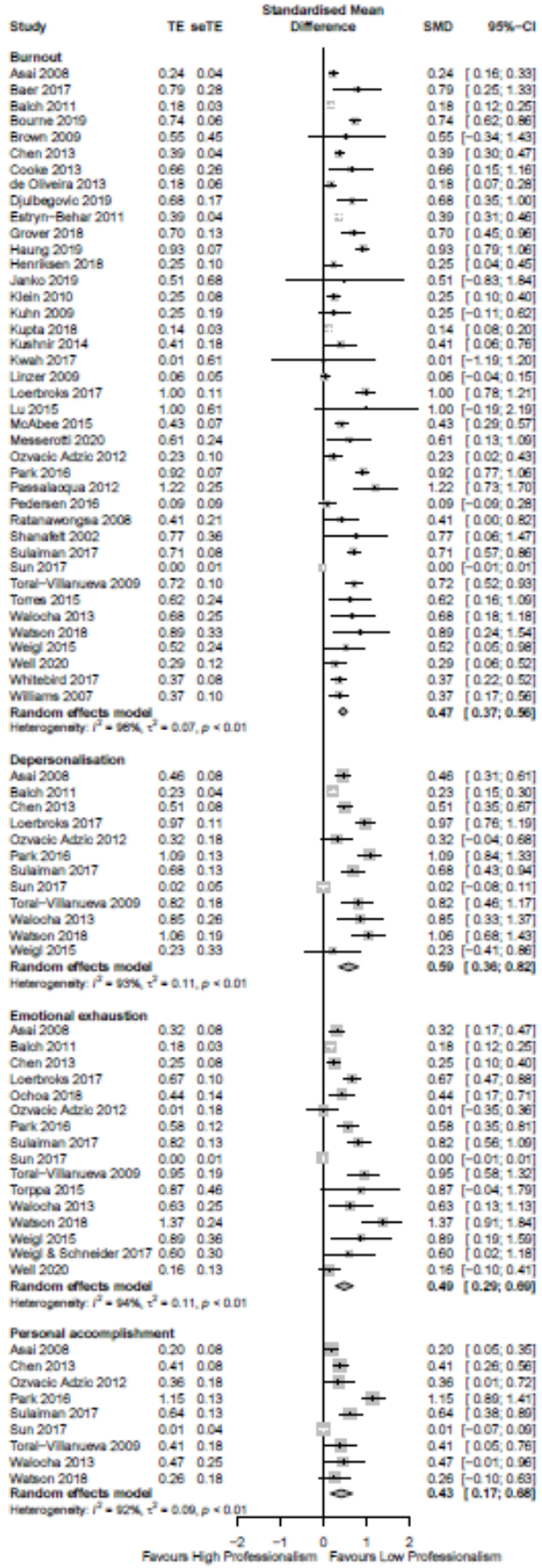
Patient satisfaction



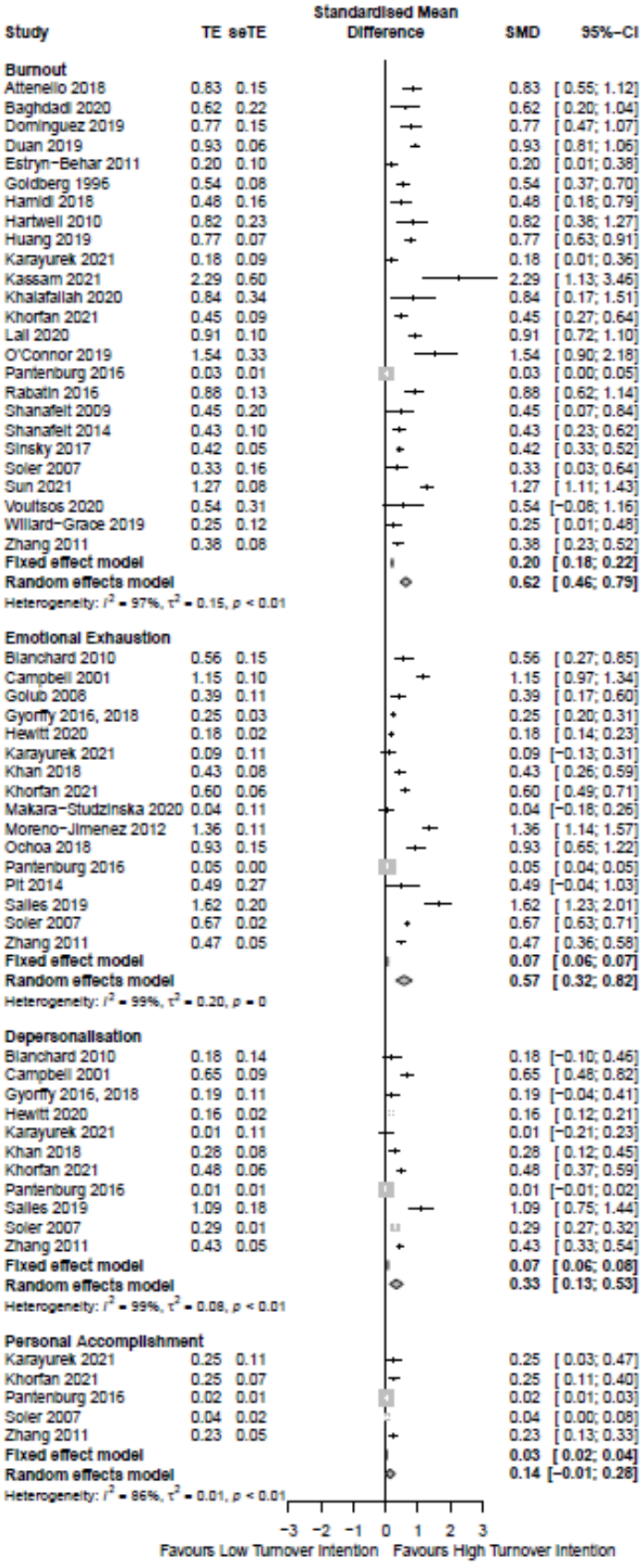
Productivity



Professionalism



Turnover Intention



Appendix 12: Meta-Regressions

Meta-regressions were only done for those involving 10 or more studies. Variables from univariable regressions were included in the multivariable regressions when p<0.10.

Career choice regret:

Univariable and multivariable meta-regression analysis for association of physician burnout and career choice regret

		Univariable			Multivariable[β]		
Variable	**No. of studies**	**OR**	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Burnout							
Region:							
- US	13	1	-	-	1	-	-
- UK/EU	0	NA	NA	**NA**	NA	NA	NA
- Commonwealth	1	0.93	0.16, 5.22	0.925	NA	NA	NA
- Southeast Asia/Other	2	0.73	0.25, 2.11	0.530	NA	NA	NA
Setting:							
- Primary Care	1	1	-	-	1	-	-
- Hospital	12	1.08	0.14, 8.70	0.934	NA	NA	NA
- Mixed	3	0.75	0.08, 6.68	0.780	NA	NA	NA
Design:							
- Cross-sectional	16	1	-	-	1	-	-
- Prospective cohort/Longitudinal	0	NA	NA	NA	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	6	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	2	0.87	0.75, 5.30	0.834	NA	NA	NA
- > 50 yrs.	3	0.81	0.21, 3.67	0.600	NA	NA	NA
Gender:							
- Females	4	1	-	-	1	-	-
- Males	12	1.56	0.67, 3.62	0.273	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	1	1	-	-	1	-	-
- GP	0	NA	NA	NA	NA	NA	NA
- Surgery/Neurosurgery	6	1.77	0.07, 11.47	0.560	NA	NA	NA

- Emergency medicine & ICU	1	2.89	0.97, 14.89	**0.098**	NA	NA	NA
- Cancer	1	0.98	0.06, 30.71	0.990	NA	NA	NA
- Interns/Residents	1	1.38	0.02, 5.69	0.813	NA	NA	NA
- Paediatrics	1	0.37	0.07, 6.97	0.418	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	2	0.68	0.08, 6.92	0.710	NA	NA	NA
- Neurology	2	2.52	0.82, 7.80	**0.095**	NA	NA	NA
- Other	1	0.48	0.04, 6.03	0.518	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	6	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	4	0.67	0.23, 1.91	0.419	NA	NA	NA
- Mixture	5	0.43	0.22, 1.09	0.173	NA	NA	NA
Burnout measure:							
- Burnout (MBI)	15	1	-	-	1	-	-
- Mixed/other	1	0.43	0.07, 2.58	0.328	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	8	1	-	-	1	-	-
- Medium	4	0.47	0.15, 3.71	0.331	NA	NA	NA
- High	4	0.87	0.32, 2.71	0.489	NA	NA	NA
Model fit indices					NA		

NA=not applicable; $^{\beta}$Only variables with a P ≤ 0.10 were add to the multivariable model.

Job Satisfaction:

Univariable and multivariable meta-regression analysis for association of physician burnout and Job Satisfaction

		Univariable			Multivariable		
Variable	**No.**	**OR**	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Burnout							
Region:							
- US	30	1	-	-	1	-	-
- UK/EU	18	0.82	0.44, 1.52	0.518	NA	NA	NA
- Commonwealth	7	1.34	0.56, 3.16	0.513	NA	NA	NA
- Southeast Asia/Other	18	0.62	0.34, 1.12	0.110	NA	NA	NA
Setting:							
- Primary Care	11	1	-	-	1	-	-
- Hospital	40	1.88	0.91, 3.86	**0.086**	1.11	0.43, 2.83	0.842
- Mixed	22	2.12	0.96, 4.62	**0.061**	1.54	0.54, 4.35	0.419
Design:							
- Cross-sectional	70	1	-	-	1	-	-
- Prospective cohort/Longitudinal	3	1.03	0.31, 3.46	0.955	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	11	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	43	1.03	0.50, 2.12	0.946	1.09	0.52, 2.29	0.809
- > 50 yrs.	7	2.41	1.02, 5.64	**0.044**	0.66	0.27, 1.63	0.371
Gender:							
- Females	16	1	-	-	1	-	-
- Males	56	0.67	0.38, 1.20	0.172	0.78	0.37, 1.63	0.513
- Mixed	1	0.02	0.01, 0.24	**0.003**	0.03	0.02, 0.38	**0.007**
Speciality of professional:							
- Internal medicine/Physician	15	1	-	-	1	-	-
- GP	2	0.16	0.03, 0.88	**0.036**	0.23	0.04, 1.26	0.107
- Surgery/Neurosurgery	11	0.77	0.34, 1.77	0.531	0.86	0.33, 2.25	0.754
- Emergency medicine & ICU	11	2.16	0.98, 4.76	**0.056**	1.95	0.80, 4.76	0.138
- Cancer	2	2.03	0.42, 9.68	0.372	2.14	0.44, 10.38	0.343
- Interns/Residents	2	1.21	0.24, 6.11	0.813	0.72	0.12, 4.14	0.711
- Paediatrics	3	1.80	0.52, 6.36	0.350	1.48	0.41, 5.37	0.548
- Psychiatry	3	2.18	0.64, 7.54	0.209	2.16	0.59, 7.77	0.244
- Mixed	15	1.07	0.54, 2.12	0.835	0.91	0.39, 2.14	0.837
- Neurology	5	2.20	0.81, 5.99	0.119	1.84	0.55, 6.11	0.317
- Other	4	1.97	0.64, 6.17	0.234	1.65	0.51, 5.31	0.402

Working Experience:							
- Experienced (> 6 yrs.)	25	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	13	1.08	0.50, 2.36	0.846	NA	NA	NA
- Mixture	26	1.04	0.57, 1.90	0.900	NA	NA	NA
Burnout measure:							
- Burnout (MBI)	55	1	-	-	1	-	-
- Mixed/other	18	0.69	0.39, 1.20	0.186	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	30	1	-	-	1	-	-
- Medium	18	0.73	0.39, 1.36	0.319	NA	NA	NA
- High	25	0.82	0.47, 1.43	0.407	NA	NA	NA
Model fit indices					$\chi2 = 147.95., P<0.0001$		
Emotional Exhaustion							
Region:							
- US	6	1	-	-	1	-	-
- UK/EU	13	0.38	0.08, 1.77	0.208	NA	NA	NA
- Commonwealth	5	0.42	0.06, 2.97	0.376	NA	NA	NA
- Southeast Asia/Other	9	0.43	0.08, 2.23	0.305	NA	NA	NA
Setting:							
- Primary Care	8	1	-	-	1	-	-
- Hospital	18	1.14	0.29, 4.44	0.852	NA	NA	NA
- Mixed	7	1.27	0.23, 6.89	0.780	NA	NA	NA
Design:							
- Cross-sectional	31	1	-	-	1	-	-
- Prospective cohort/Longitudinal	2	12.81	0.75, 122.73	0.972	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	21	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	7	0.99	0.25, 3.97	0.994	NA	NA	NA
- > 50 yrs.	4	0.31	0.06, 1.70	0.171	NA	NA	NA
Gender:							
- Females	7	1	-	-	1	-	-
- Males	26	0.84	0.22, 3.16	0.784	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	7	1	-	-	1	-	-
- GP	3	1.34	0.11, 16.28	0.812	NA	NA	NA
- Surgery/Neurosurgery	2	0.46	0.04, 4.90	0.505	NA	NA	NA
- Emergency medicine & ICU	3	1.45	0.17, 12.30	0.725	NA	NA	NA

- Cancer	1	5.47	0.14, 214.86	0.352	NA	NA	NA
- Interns/Residents	2	1.92	0.13, 29.08	0.626	NA	NA	NA
- Paediatrics	1	0.50	0.01, 20.70	0.704	NA	NA	NA
- Psychiatry	3	0.49	0.06, 4.26	0.503	NA	NA	NA
- Mixed	8	0.98	0.17, 5.70	0.978	NA	NA	NA
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	3	1.14	0.11, 11.82	0.910	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	13	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	4	1.46	0.21, 9.97	0.689	NA	NA	NA
- Mixture	13	1.86	0.52, 6.62	0.328	NA	NA	NA
Burnout measure:							
- MBI	32	1	-	-	1	-	-
- Mixed/other	1	0.38	0.02, 8.00	0.521	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	18	1	-	-	1	-	-
- Medium	5	1.55	0.32, 7.61	0.577	NA	NA	NA
- High	10	1.55	0.47, 5.05	0.460	NA	NA	NA
Model fit indices					$\chi2$ = NA , P=NA		
Depersonalization							
Region:							
- US	6	1	-	-	1	-	-
- UK/EU	11	0.65	0.28, 1.54	0.315	NA	NA	NA
- Commonwealth	4	0.88	0.27, 2.86	0.826	NA	NA	NA
- South East Asia/Other	9	0.76	0.31, 1.92	0.556	NA	NA	NA
Setting:							
- Primary Care	5	1	-	-	1	-	-
- Hospital	18	1.09	0.46, 2.59	0.834	NA	NA	NA
- Mixed	7	1.40	0.53, 3.74	0.486	NA	NA	NA
Design:							
- Cross-sectional	29	1	-	-	1	-	-
- Prospective cohort/Longitudinal	1	1.54	0.24, 10.07	0.640	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	6	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	19	1.04	0.51, 2.12	0.911	1.15	0.55, 2.39	0.717
- > 50 yrs.	3	4.81	1.97, 11.70	**0.001**	0.24	0.09, 0.61	**0.003**
Gender:							
- Females	6	1	-	-	1	-	-

- Males	24	0.79	0.38, 1.67	0.537	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	5	1	-	-	1	-	-
- GP	1	1.70	0.25, 11.36	0.571	NA	NA	NA
- Surgery/Neurosurgery	3	0.65	0.19, 2.27	0.484	NA	NA	NA
- Emergency medicine & ICU	4	1.21	0.34, 4.39	0.757	NA	NA	NA
- Cancer	2	1.35	0.24, 7.69	0.723	NA	NA	NA
- Interns/Residents	1	0.99	0.15, 6.75	0.992	NA	NA	NA
- Paediatrics	1	0.91	0.10, 8.00	0.936	NA	NA	NA
- Psychiatry	3	1.54	0.38, 6.17	0.529	NA	NA	NA
- Mixed	8	1.13	0.39, 3.22	0.820	NA	NA	NA
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	2	0.72	0.15, 3.39	0.661	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	11	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	3	1.68	0.54, 5.21	0.357	NA	NA	NA
- Mixture	12	1.46	0.73, 2.92	0.271	NA	NA	NA
Burnout measure:							
- MBI	29	1	-	-	1	-	-
- Mixed/other	1	0.61	0.13, 2.83	0.517	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	15	1	-	-	1	-	-
- Medium	5	1.21	0.52, 2.83	0.642	0.93	0.44, 1.97	0.852
- High	10	1.72	0.90, 3.25	**0.098**	1.36	0.75, 2.46	0.317
Model fit indices					$\chi2 = 63.93, P<0.0001$		
Personal Accomplishment							
Region:							
- US	7	1	-	-	1	-	-
- UK/EU	12	0.44	0.16, 1.25	0.117	0.40	0.20, 0.81	**0.011**
- Commonwealth	4	0.66	0.16, 2.80	0.564	0.33	0.12, 0.87	**0.024**
- Southeast Asia/Other	9	0.38	0.12, 1.17	**0.090**	0.23	0.10, 0.53	**0.0004**
Setting:							
- Primary Care	7	1	-	-	1	-	-
- Hospital	17	1.23	0.44, 3.46	0.672	NA	NA	NA
- Mixed	8	1.52	0.46, 5.00	0.480	NA	NA	NA
Design:							
- Cross-sectional	31	1	-	-	1	-	-

- Prospective cohort/Longitudinal	1	0.63	0.06, 7.03	0.699	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	20	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	6	0.69	0.29, 1.62	0.380	0.44	0.21, 0.95	**0.036**
- > 50 yrs.	3	8.41	2.80, 25.53	**0.0004**	0.07	0.03, 0.19	**<0.0001**
Gender:							
- Females	8	1	-	-	1	-	-
- Males	24	0.66	0.27, 1.63	0.361	NA	NA	NA
- Mixed	0	1.37	0.12, 15.96	0.795	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	7	1	-	-	1	-	-
- GP	2	1.08	0.13, 9.12	0.940	NA	NA	NA
- Surgery/Neurosurgery	3	1.21	0.19, 7.77	0.831	NA	NA	NA
- Emergency medicine & ICU	4	1.38	0.26, 7.39	0.701	NA	NA	NA
- Cancer	2	1.27	0.13, 12.06	0.830	NA	NA	NA
- Interns/Residents	1	1.21	0.08, 17.81	0.884	NA	NA	NA
- Paediatrics	1	0.92	0.05, 16.28	0.953	NA	NA	NA
- Psychiatry	3	1.79	0.28, 11.02	0.539	NA	NA	NA
- Mixed	5	0.98	0.24, 3.97	0.980	NA	NA	NA
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	4	1.07	0.20, 5.75	0.930	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	10	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	3	3.32	0.66, 16.78	0.142	NA	NA	NA
- Mixture	13	1.79	0.70, 4.53	0.215	NA	NA	NA
Burnout measure:							
- MBI	31	1	-	-	1	-	-
- Mixed/other	1	0.66	0.08, 5.53	0.690	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	15	1	-	-	1	-	-
- Medium	6	1.23	0.42, 3.60	0.692	NA	NA	NA
- High	11	1.62	0.67, 3.86	0.274	NA	NA	NA
Model fit indices					$\chi 2 = 65.42, P<0.0001$		

Patient Safety Incidents:

Univariable and multivariable meta-regression analysis for association of physician burnout and Patient Safety Incidents

		Univariable			Multivariable		
Variable	**No.**	**OR**	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Burnout							
Region:							
- US	18	1	-	-	1	-	-
- UK/EU	10	0.86	0.50, 1.46	0.567	0.73	0.45, 1.16	0.202
- Commonwealth	1	3.03	0.83, 11.25	**0.093**	1.86	0.65, 5.37	0.246
- Southeast Asia/Other	6	1.02	0.55, 1.86	0.960	0.85	0.50, 1.48	0.575
Setting:							
- Primary Care	4	1	-	-	1	-	-
- Hospital	26	1.70	0.81, 3.56	0.154	NA	NA	NA
- Mixed	5	1.28	0.50, 3.32	0.596	NA	NA	NA
Design:							
- Cross-sectional	26	1	-	-	1	-	-
- Prospective cohort/Longitudinal	9	1.00	0.57, 1.73	0.993	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	10	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	13	1.88	1.07, 3.29	**0.030**	1.55	0.94, 2.56	**0.083**
- > 50 yrs.	4	1.20	0.60, 2.41	0.599	1.11	0.59, 2.05	0.756
Gender:							
- Females	9	1	-	-	1	-	-
- Males	23	1.34	0.75, 2.36	0.315	NA	NA	NA
- Mixed	2	1.46	0.48, 4.48	0.490	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	5	1	-	-	1	-	-
- GP	1	0.96	0.22, 4.10	0.953	1.49	0.43, 5.21	0.534
- Surgery/Neurosurgery	6	1.60	0.74, 3.49	0.221	1.20	0.64, 2.25	0.573
- Emergency medicine & ICU	5	2.10	1.09, 3.56	**0.018**	1.30	0.61, 2.72	0.497
- Cancer	NA	NA	NA	NA	NA	NA	NA
- Interns/Residents	4	1.80	0.80, 4.06	0.145	1.67	0.86, 3.22	0.127
- Paediatrics	4	1.54	0.61, 3.90	0.350	0.95	0.43, 2.12	0.911
- Psychiatry	NA	NA	NA	NA	NA	NA	NA
- Mixed	8	2.20	1.11, 4.39	**0.027**	1.92	1.05, 3.53	**0.033**
- Neurology	NA	NA	NA	NA	NA	NA	NA
- Other	2	2.66	0.92, 7.69	**0.069**	1.95	0.80, 4.71	0.141

Working Experience:							
- Experienced (> 6 yrs.)	10	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	14	1.13	0.65, 1.95	0.658	NA	NA	NA
- Mixture	6	1.55	0.79, 3.06	0.198	NA	NA	NA
Burnout measure:							
- Burnout (MBI)	28	1	-	-	1	-	-
- Mixed/other	7	0.77	0.44, 1.35	0.353	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	9	1	-	-	1	-	-
- Medium	11	0.93	0.51, 0.68	0.823	NA	NA	NA
- High	15	0.68	0.38, 1.20	0.170	NA	NA	NA
Model fit indices					$\chi2 = 37.22$, **P=0.016**		
Emotional Exhaustion							
Region:							
- US	7	1	-	-	1	-	-
- UK/EU	7	1.36	0.84, 2.25	0.195	NA	NA	NA
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	3	1.43	0.76, 2.72	0.254	NA	NA	NA
Setting:							
- Primary Care	1	1	-	-	1	-	-
- Hospital	14	NA	NA	NA	NA	NA	NA
- Mixed	2	NA	NA	NA	NA	NA	NA
Design:							
- Cross-sectional	11	1	-	-	1	-	-
- Prospective cohort/Longitudinal	6	1.23	0.76, 2.01	0.373	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	6	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	6	1.12	0.77, 1.62	0.541	NA	NA	NA
- > 50 yrs.	2	1.30	0.86, 1.95	0.194	NA	NA	NA
Gender:							
- Females	6	1	-	-	1	-	-
- Males	9	0.83	0.53, 1.30	0.372	NA	NA	NA
- Mixed	2	1.38	0.64, 2.94	0.385	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	1	1	-	-	1	-	-
- GP	1	2.05	0.58, 7.24	0.231	2.05	0.58, 7.24	0.231
- Surgery/Neurosurgery	3	1.99	1.09, 3.60	**0.028**	1.99	1.09, 3.60	**0.028**
- Emergency medicine & ICU	2	3.39	1.54, 7.46	**0.006**	3.39	1.54, 7.46	**0.006**

- Cancer	NA	NA	NA	**NA**	NA	NA	**NA**
- Interns/Residents	4	2.25	1.43, 3.56	**0.003**	2.25	1.43, 3.56	**0.003**
- Paediatrics	1	1.28	0.50, 3.25	0.570	1.28	0.50, 3.25	0.570
- Psychiatry	1	1.19	0.34, 4.18	0.769	1.19	0.34, 4.18	0.769
- Mixed	4	1.05	0.81, 1.35	0.694	1.05	0.81, 1.35	0.694
- Neurology	NA	NA	NA	NA	NA	NA	NA
- Other	NA	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	3	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	7	0.71	0.35, 1.48	0.334	NA	NA	NA
- Mixture	5	0.67	0.31, 1.43	0.278	NA	NA	NA
Burnout measure:							
- MBI	17	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	3	1	-	-	1	-	-
- Medium	6	1.27	0.64, 2.51	0.476	NA	NA	NA
- High	8	0.76	0.40, 1.39	0.341	NA	NA	NA
Model fit indices					NA		
Depersonalization							
Region:							
- US	7	1	-	-	1	-	-
- UK/EU	4	1.57	0.71, 3.42	0.236	NA	NA	NA
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	3	1.04	0.41, 2.64	0.923	NA	NA	NA
Setting:							
- Hospital	12	1	-	-	1	-	-
- Primary care	0	NA	NA	NA	NA	NA	NA
- Mixed	2	0.90	0.38, 2.14	0.798	NA	NA	NA
Design:							
- Cross-sectional	9	1	-	-	1	-	-
- Prospective cohort/Longitudinal	5	2.39	1.32, 4.31	**0.008**	1.65	0.63, 4.35	0.306
Age:							
- 31 to ≤ 50 yrs.	4	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	5	1.17	0.57, 2.44	0.623	1.31	0.50, 3.46	0.558
- > 50 yrs.	2	0.45	0.27, 0.75	**0.006**	0.67	0.25, 1.79	0.422
Gender:							
- Females	2	1	-	-	1	-	-

- Males	9	0.35	0.16, 0.74	**0.011**	0.72	0.14, 3.67	0.695
- Mixed	2	0.93	0.27, 3.22	0.903	0.87	0.05, 16.12	0.926
Speciality of professional:							
- Internal medicine/Physician	1	1	-	-	1	-	-
- GP	0	NA	NA	NA	NA	NA	NA
- Surgery/Neurosurgery	3	1.45	0.54, 3.90	0.412	0.70	0.17, 2.92	0.621
- Emergency medicine & ICU	2	1.86	0.56, 6.17	0.271	0.53	0.04, 6.89	0.630
- Cancer	0	NA	NA	NA	NA	NA	NA
- Interns/Residents	4	2.61	1.28, 5.37	**0.014**	0.77	0.26, 2.34	0.648
- Paediatrics	0	NA	NA	NA	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	4	1.09	0.74, 1.60	0.622	0.99	0.78, 1.26	0.947
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	0	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	2	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	6	1.43	0.48, 4.26	0.478	NA	NA	NA
- Mixture	4	1.11	0.35, 3.53	0.853	NA	NA	NA
Burnout measure:							
- MBI	14	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	2	1	-	-	1	-	-
- Medium	5	2.18	0.87, 5.47	**0.088**	1.70	0.33, 8.76	0.533
- High	7	0.78	0.36, 1.70	0.498	NA	NA	NA
Model fit indices					$\chi2 = 39.53, P=0.7646$		
Personal Accomplishment							
Region:							
- US	7	1	-	-	1	-	-
- UK/EU	4	1.43	0.94, 2.18	**0.083**	1.07	0.39, 2.92	0.893
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	3	1.34	0.82, 2.18	0.225	1.07	0.44, 2.59	0.877
Setting:							
- Primary Care	0	1	-	-	1	-	-
- Hospital	12	NA	NA	NA	NA	NA	NA
- Mixed	2	0.86	0.70, 1.04	0.113	NA	NA	NA
Design:							
- Cross-sectional	9	1	-	-	1	-	-

- Prospective cohort/Longitudinal	5	1.75	1.23, 2.48	**0.004**	1.39	0.61, 3.22	0.434
Age:							
- 31 to ≤ 50 yrs.	4	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	5	1.36	0.93, 1.97	**0.097**	1.27	0.64, 2.53	0.492
- > 50 yrs.	2	0.70	0.55, 0.90	**0.009**	0.81	0.20, 3.25	0.771
Gender:							
- Females	2	1	-	-	1	-	-
- Males	9	0.79	0.44, 1.43	0.407	NA	NA	NA
- Mixed	2	1.19	0.46, 3.03	0.699	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	1	1	-	-	1	-	-
- GP	0	NA	NA	NA	NA	NA	NA
- Surgery/Neurosurgery	3	1.22	0.64, 2.36	0.498	1.08	0.44, 2.66	0.859
- Emergency medicine & ICU	2	1.19	0.52, 2.72	0.648	1.09	0.36, 3.32	0.873
- Cancer	0	NA	NA	NA	NA	NA	NA
- Interns/Residents	4	1.49	0.93, 2.39	**0.090**	0.92	0.41, 2.08	0.839
- Paediatrics	0	NA	NA	NA	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	4	0.95	0.76, 1.19	0.605	0.91	0.75, 1.13	0.400
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	0	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	2	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	6	1.42	0.73, 2.77	0.263	NA	NA	NA
- Mixture	4	1.20	0.60, 2.39	0.570	NA	NA	NA
Burnout measure:							
- MBI	14	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	2	1	-	-	1	-	-
- Medium	5	1.14	0.54, 2.39	0.700	NA	NA	NA
- High	7	0.82	0.44, 1.54	0.505	NA	NA	NA
Model fit indices					$\chi2$ = 11.87, P=0.294		

Professionalism:

Univariable and multivariable meta-regression analysis for association of physician burnout and Professionalism

		Univariable			Multivariable		
Variable	**No. of studies**	**OR**	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Burnout							
Region:							
- US	20	1	-	-	1	-	-
- UK/EU	13	1.36	0.87, 2.16	0.171	1.26	0.76, 2.05	0.372
- Commonwealth	1	1.90	0.35, 10.28	0.453	1.42	0.29, 6.96	0.660
- Southeast Asia/Other	6	1.68	0.94, 2.97	**0.076**	1.04	0.63, 1.75	0.864
Setting:							
- Primary Care	12	1	-	-	1	-	-
- Hospital	23	2.16	1.46, 3.19	**0.0002**	3.82	1.84, 8.00	**0.0003**
- Mixed	5	1.42	0.83, 2.44	0.195	1.58	0.90, 2.80	0.112
Design:							
- Cross-sectional	35	1	-	-	1	-	-
- Prospective cohort/Longitudinal	5	0.57	0.30, 1.07	0.082	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	18	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	9	1.09	0.67, 1.79	0.708	0.70	0.41, 1.21	0.201
- > 50 yrs.	4	0.36	0.19, 0.69	**0.003**	0.45	0.26, 0.76	**0.003**
Gender:							
- Females	14	1	-	-	1	-	-
- Males	26	1.35	0.87, 2.12	0.174	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	12	1	-	-	1	-	-
- GP	4	1.20	0.51, 2.80	0.671	1.40	0.67, 2.94	0.370
- Surgery/Neurosurgery	3	0.94	0.39, 2.25	0.885	0.47	0.17, 1.27	0.139
- Emergency medicine & ICU	4	1.48	1.01, 2.34	**0.042**	0.65	0.30, 1.39	0.265
- Cancer	1	0.88	0.26, 2.89	0.825	0.25	0.09, 0.74	**0.012**
- Interns/Residents	3	2.16	0.78, 6.05	0.135	0.75	0.30, 1.82	0.520
- Paediatrics	2	2.05	0.55, 7.54	0.274	0.57	0.18, 1.80	0.339
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	7	1.72	0.98, 2.97	**0.058**	0.78	0.47, 1.30	0.339
- Neurology	1	0.98	0.24, 3.94	0.977	0.22	0.07, 0.73	**0.014**

- Other	3	1.28	0.58, 2.83	0.535	0.38	0.18, 0.78	**0.009**
Working Experience:							
- Experienced (> 6 yrs.)	15	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	12	2.27	1.45, 3.60	**0.0006**	1.16	0.58, 2.32	0.678
- Mixture	9	1.12	0.68, 1.82	0.646	1.01	0.64, 1.62	0.952
Burnout measure:							
- Burnout (MBI)	9	1	-	-	1	-	-
- Mixed/other	31	1.38	0.84, 2.23	0.195	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	14	1	-	-	1	-	-
- Medium	11	0.76	0.45, 1.28	0.304	NA	NA	NA
- High	15	1.27	0.44, 1.14	0.149	NA	NA	NA
Model fit indices					$\chi2$ = 24.33, P=0.386		
Emotional Exhaustion							
Region:							
- US	6	1	-	-	1	-	-
- UK/EU	6	1.13	0.36, 3.46	0.826	NA	NA	NA
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	4	0.86	0.25, 3.03	0.807	NA	NA	NA
Setting:							
- Primary Care	4	1	-	-	1	-	-
- Hospital	9	2.56	0.94, 6.96	**0.064**	2.44	0.57, 10.38	0.228
- Mixed	3	1.63	0.44, 5.99	0.438	NA	NA	NA
Design:							
- Cross-sectional	15	1	-	-	1	-	-
- Prospective cohort/Longitudinal	1	0.60	0.09, 4.18	0.585	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	2	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	7	2.72	0.57, 12.94	0.189	NA	NA	NA
- > 50 yrs.	1	0.76	0.12, 4.71	0.754	NA	NA	NA
Gender:							
- Females	5	1	-	-	1	-	-
- Males	9	0.99	0.33, 2.94	0.980	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	3	1	-	-	1	-	-
- GP	2	1.00	0.26, 3.82	0.998	0.67	0.21, 2.16	0.502
- Surgery/Neurosurgery	1	1.34	0.61, 2.94	0.417	0.57	0.12, 2.59	0.466

- Emergency medicine & ICU	1	11.59	1.65, 81.45	**0.020**	4.95	0.72, 33.78	0.105
- Cancer	1	1.38	0.44, 4.26	0.533	0.58	0.12, 2.92	0.514
- Interns/Residents	1	5.37	0.96, 30.27	**0.055**	1.82	0.33, 10.18	0.494
- Paediatrics	1	4.85	0.44, 52.46	0.167	0.49	0.04, 6.11	0.577
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	5	2.89	1.48, 5.64	**0.006**	1.38	0.44, 4.39	0.581
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	1	0.51	0.12, 2.25	0.323	0.19	0.02, 1.92	0.160
Working Experience:							
- Experienced (> 6 yrs.)	5	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	4	2.75	1.11, 6.89	**0.032**	1.26	0.45, 3.53	0.665
- Mixture	3	2.41	0.69, 8.33	0.152	4.22	1.31, 13.46	**0.016**
Burnout measure:							
- MBI	16	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	6	1	-	-	1	-	-
- Medium	4	1.30	0.36, 4.76	0.669	NA	NA	NA
- High	6	1.35	0.44, 4.10	0.575	NA	NA	NA
Model fit indices					$\chi2 = 2.744, P=0.602$		
Depersonalization							
Region:							
- US	5	1	-	-	1	-	-
- UK/EU	4	1.92	0.62, 5.93	0.230	NA	NA	NA
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	3	2.48	0.70, 8.76	0.139	NA	NA	NA
Setting:							
- Primary Care	2	1	-	-	1	-	-
- Hospital	7	2.66	0.71, 9.87	0.131	NA	NA	NA
- Mixed	3	1.27	0.26, 6.23	0.744	NA	NA	NA
Design:							
- Cross-sectional	12	1	-	-	1	-	-
- Prospective cohort/Longitudinal	0	NA	NA	NA	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	6	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	2	1.31	0.30, 5.64	0.694	NA	NA	NA
- > 50 yrs.	2	1.01	0.29, 3.53	0.982	NA	NA	NA
Gender:							

- Females	4	1	-	-	1	-	-
- Males	7	1.58	0.48, 5.26	0.419	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	2	1	-	-	1	-	-
- GP	0	NA	NA	NA	NA	NA	NA
- Surgery/Neurosurgery	1	0.85	0.27, 2.66	0.746	0.74	0.23, 2.44	0.622
- Emergency medicine & ICU	1	4.95	0.60, 40.85	0.117	5.42	1.02, 29.08	**0.047**
- Cancer	1	1.04	0.24, 4.53	0.956	1.14	0.28, 4.71	0.853
- Interns/Residents	1	3.19	0.40, 25.28	0.228	3.78	0.41, 34.47	0.237
- Paediatrics	1	1.08	0.08. 15.49	0.942	0.32	0.03, 3.46	0.349
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	1	3.16	1.08, 9.21	**0.038**	4.66	1.05, 20.91	**0.043**
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	0	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	6	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	4	2.97	0.94, 9.49	**0.061**	0.92	0.21, 3.97	0.919
- Mixture	2	1.57	0.29, 8.41	0.564	3.71	0.61, 22.87	0.157
Burnout measure:							
- MBI	12	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	4	1	-	-	1	-	-
- Medium	3	0.83	0.19, 3.56	0.776	NA	NA	NA
- High	5	1.27	0.36, 4.48	0.682	NA	NA	NA
Model fit indices					$\chi2$ = 7.138, P=0.129		

Turnover intention:

Univariable and multivariable meta-regression analysis for association of physician burnout and Turnover intention

		Univariable			Multivariable		
Variable	**No. of studies**	**OR**	**95% CI**	**P-value**	**OR**	**95% CI**	**P-value**
Burnout							
Region:							
- US	13	1	-	-	1	-	-
- UK/EU	5	0.66	0.14, 3.10	0.588	NA	NA	NA
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	7	0.96	0.25, 3.67	0.948	NA	NA	NA
Setting:							
- Primary Care	4	1	-	-	1	-	-
- Hospital	14	0.98	0.20, 4.76	0.983	NA	NA	NA
- Mixed	7	1.97	0.34, 11.36	0.429	NA	NA	NA
Design:							
- Cross-sectional	21	1	-	-	1	-	-
- Prospective cohort/Longitudinal	4	0.98	0.21, 4.57	0.979	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	11	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	3	1.09	0.18, 6.75	0.924	NA	NA	NA
- > 50 yrs.	6	0.43	0.10, 1.86	0.246	NA	NA	NA
Gender:							
- Females	4	1	-	-	1	-	-
- Males	19	0.46	0.09, 2.34	0.333	NA	NA	NA
- Mixed	1	0.44	0.02, 11.25	0.607	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	6	1	-	-	1	-	-
- GP	2	0.68	0.07, 6.96	0.730	NA	NA	NA
- Surgery/Neurosurgery	6	0.34	0.06, 1.93	0.209	NA	NA	NA
- Emergency medicine & ICU	4	1.39	0.22, 8.94	0.713	NA	NA	NA
- Cancer	1	0.57	0.03, 11.94	0.704	NA	NA	NA
- Interns/Residents	0	NA	NA	NA	NA	NA	NA
- Paediatrics	0	NA	NA	NA	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	6	0.51	0.10, 2.53	0.393	NA	NA	NA
- Neurology	0	NA	NA	NA	NA	NA	NA

- Other	0	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	7	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	5	1.58	0.29, 8.67	0.584	NA	NA	NA
- Mixture	7	1.04	0.23, 4.76	0.959	NA	NA	NA
Burnout measure:							
- Burnout (MBI)	3	1	-	-	1	-	-
- Mixed/other	22	0.39	0.08, 1.93	0.235	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	8	1	-	-	1	-	-
- Medium	7	1.52	0.35, 6.55	0.554	NA	NA	NA
- High	10	2.48	0.67, 9.21	0.164	NA	NA	NA
Model fit indices					NA		
Emotional Exhaustion							
Region:							
- US	5	1	-	-	1	-	-
- UK/EU	6	0.65	0.17, 2.53	0.511	NA	NA	NA
- Commonwealth	2	2.36	0.23, 24.29	0.440	NA	NA	NA
- Southeast Asia/Other	3	0.58	0.10, 3.39	0.520	NA	NA	NA
Setting:							
- Primary Care	4	1	-	-	1	-	-
- Hospital	8	1.95	0.51, 7.46	0.301	NA	NA	NA
- Mixed	4	0.88	0.19, 4.18	0.863	NA	NA	NA
Design:							
- Cross-sectional	16	1	-	-	1	-	-
- Prospective cohort/Longitudinal	0	NA	NA	NA	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	9	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	3	0.50	0.11, 2.27	0.340	NA	NA	NA
- > 50 yrs.	3	2.36	0.50, 11.13	0.259	NA	NA	NA
Gender:							
- Females	5	1	-	-	1	-	-
- Males	11	2.03	0.62, 6.69	0.225	NA	NA	NA
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	3	1	-	-	1	-	-
- GP	2	0.55	0.06, 5.05	0.567	NA	NA	NA
- Surgery/Neurosurgery	4	2.05	0.41, 10.28	0.345	NA	NA	NA

- Emergency medicine & ICU	0	NA	NA	NA	NA	NA	NA
- Cancer	1	0.65	0.04, 10.59	0.743	NA	NA	NA
- Interns/Residents	0	NA	NA	NA	NA	NA	NA
- Paediatrics	0	NA	NA	NA	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	4	0.60	0.12, 3.06	0.511	NA	NA	NA
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	2	0.90	0.11, 7.54	0.912	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	7	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	5	1.88	0.45, 7.85	0.357	NA	NA	NA
- Mixture	2	0.48	0.08, 2.92	0.395	NA	NA	NA
Burnout measure:							
- MBI	14	1	-	-	1	-	-
- Mixed/other	2	0.74	0.12, 4.39	0.725	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	6	1	-	-	1	-	-
- Medium	4	0.38	0.10, 1.48	0.149	NA	NA	NA
- High	6	0.43	0.13, 1.42	0.152	NA	NA	NA
Model fit indices					NA		
Depersonalization							
Region:							
- US	4	1	-	-	1	-	-
- UK/EU	5	0.42	0.26, 0.70	**0.004**	0.59	0.37, 0.95	**0.030**
- Commonwealth	0	NA	NA	NA	NA	NA	NA
- Southeast Asia/Other	2	0.53	0.25, 1.11	**0.082**	0.84	0.34, 2.10	0.708
Setting:							
- Primary Care	3	1	-	-	1	-	-
- Hospital	6	1.27	0.70, 2.29	0.376	1.13	0.67, 1.90	0.654
- Mixed	2	0.53	0.33, 0.85	**0.015**	1.09	0.27, 4.53	0.900
Design:							
- Cross-sectional	11	1	-	-	1	-	-
- Prospective cohort/Longitudinal	0	NA	NA	NA	NA	NA	NA
Age:							
- 31 to ≤ 50 yrs.	5	1	-	-	1	-	-
- 20 to ≤ 30 yrs.	2	0.90	0.28, 2.89	0.840	NA	NA	NA
- > 50 yrs.	1	2.17	0.64, 7.39	0.177	NA	NA	NA
Gender:							

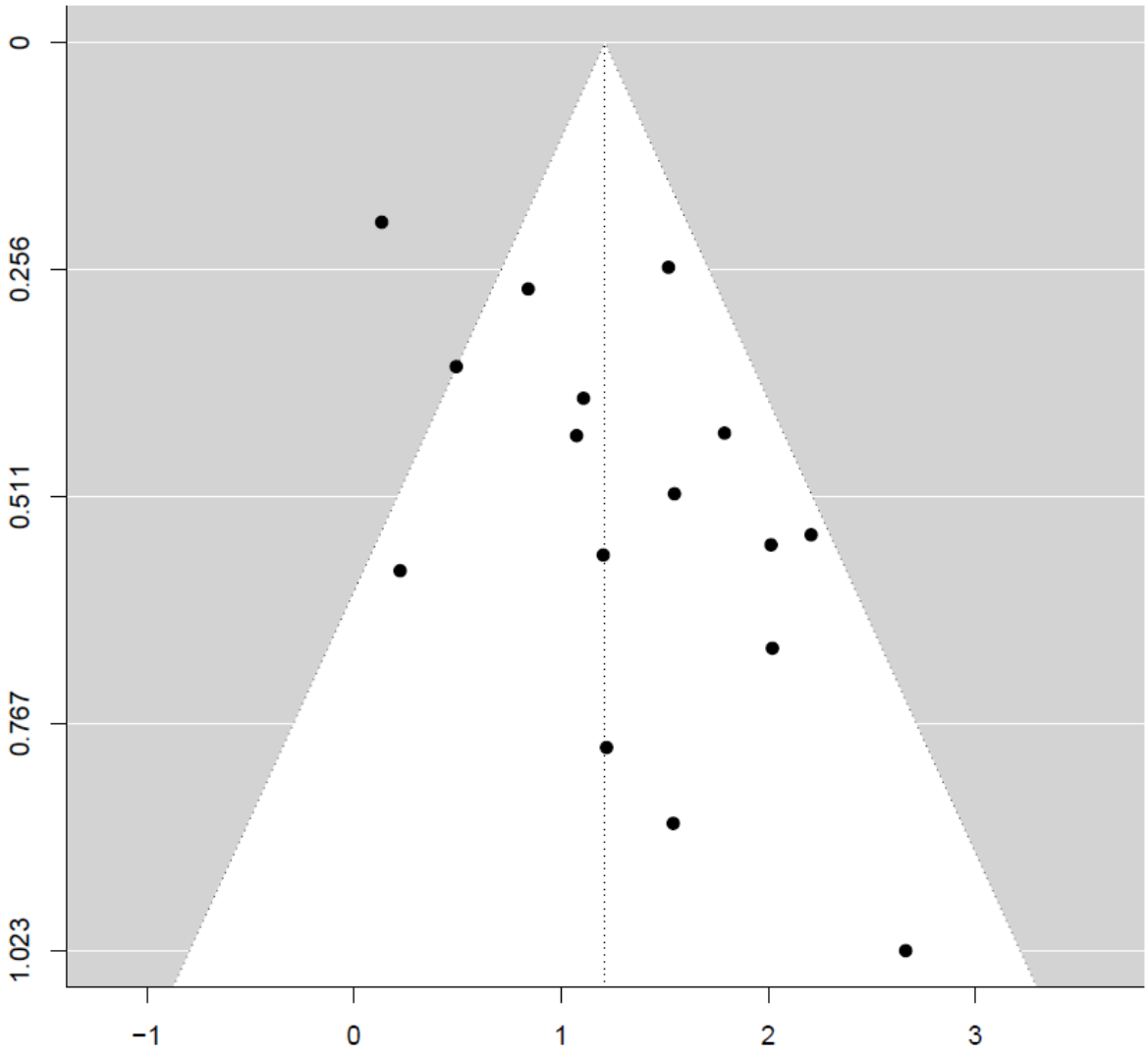
- Females	3	1	-	-	1	-	-
- Males	8	2.05	1.16, 3.63	**0.019**	1.49	0.47, 4.66	0.498
- Mixed	0	NA	NA	NA	NA	NA	NA
Speciality of professional:							
- Internal medicine/Physician	2	1	-	-	1	-	-
- GP	1	0.61	0.14, 2.66	0.442	0.42	0.12, 1.48	0.174
- Surgery/Neurosurgery	4	1.84	0.97, 3.46	**0.058**	NA	NA	NA
- Emergency medicine & ICU	0	NA	NA	NA	NA	NA	NA
- Cancer	1	0.78	0.15, 4.06	0.726	NA	NA	NA
- Interns/Residents	0	NA	NA	NA	NA	NA	NA
- Paediatrics	0	NA	NA	NA	NA	NA	NA
- Psychiatry	0	NA	NA	NA	NA	NA	NA
- Mixed	3	0.66	0.39, 1.13	0.726	0.80	0.41, 1.57	0.520
- Neurology	0	NA	NA	NA	NA	NA	NA
- Other	0	NA	NA	NA	NA	NA	NA
Working Experience:							
- Experienced (> 6 yrs.)	3	1	-	-	1	-	-
- Resident (≤ 6 yrs.)	4	1.34	1.79, 22.20	0.440	NA	NA	NA
- Mixture	2	0.64	0.27, 1.57	0.281	NA	NA	NA
Burnout measure:							
- MBI	11	1	-	-	1	-	-
- Mixed/other	0	NA	NA	NA	NA	NA	NA
NOS Quality assessment							
Risk of Bias:							
- Low	5	1	-	-	1	-	-
- Medium	2	0.93	0.37, 2.34	0.867	NA	NA	NA
- High	4	0.61	0.26, 1.39	0.202	NA	NA	NA
Model fit indices					$\chi 2 = 42.22$, $P<0.0001$		

Appendix 13: Publication Bias and Funnel Plots

Publication bias was only assessed in meta-analysis involving 10 or more studies.

Funnel plot asymmetry was firstly done visually by inspecting the standard error (recommended by Sterne and Egger (2001)) for overall burnout measure only. Then, statistical tests for testing funnel plot asymmetry we done using the classical egger's and the random/mixed effects version of eggers and trim-and-fill method were used as a sensitivity analysis across all subscales (Burnout, EE, DP and PA).

Career Choice Regret – Overall Burnout:



Classical Egger test

Regression Test for Funnel Plot Asymmetry
Model: weighted regression with multiplicative dispersion
Predictor: standard error
Test for funnel plot asymmetry: t = -3.4536, df = 14, **p = 0.0035**

Random/mixed-effects version of the Egger test

Regression Test for Funnel Plot Asymmetry
Model: mixed-effects meta-regression model
Predictor: standard error
Test for funnel plot asymmetry: z = -3.3459, **p = 0.0008**

Trim-and-fill analysis

Estimated number of missing studies on the right side: 0 (SE = 2.2305)
Random-Effects Model (k = 16; tau^2 estimator: REML)
Tau^2 (estimated amount of total heterogeneity): 1.8434 (SE = 0.7460)
Tau (square root of estimated tau^2 value): 1.3577
I^2 (total heterogeneity / total variability): 92.01%
H^2 (total variability / sampling variability): 12.52

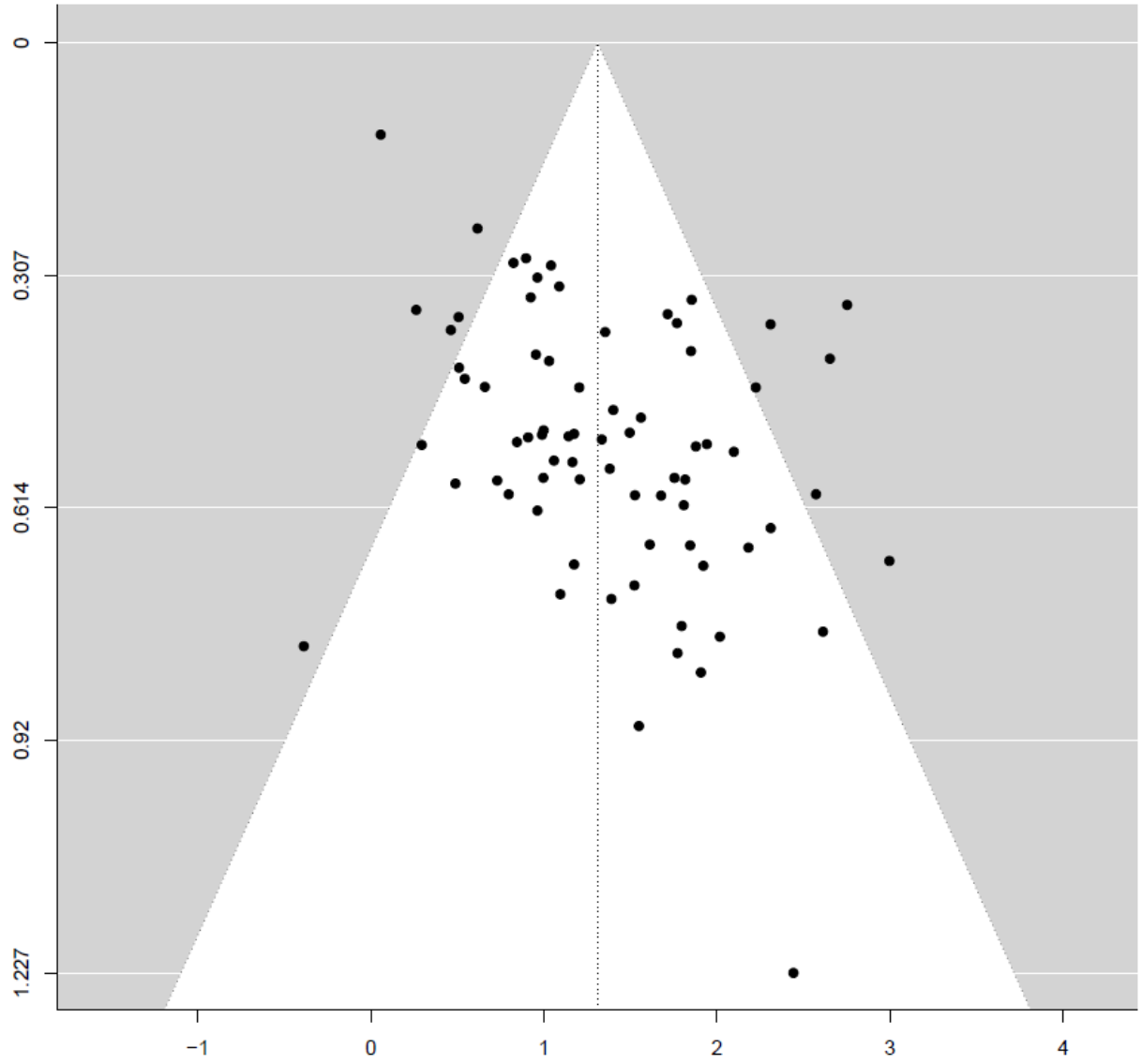
Test for Heterogeneity:
Q (df = 14) = 127.4147, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
-1.6559	0.3529	-4.6923	**<.0001**	-2.3475	-0.9642	***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Job Satisfaction – Overall Burnout:



Classical Egger test

Regression Test for Funnel Plot Asymmetry

Model: weighted regression with multiplicative dispersion
Predictor: standard error
Test for funnel plot asymmetry: t = -3.2834, df = 71, **p = 0.0015**

Random/mixed-effects version of the Egger test

Regression Test for Funnel Plot Asymmetry

Model: mixed-effects meta-regression model
Predictor: standard error
Test for funnel plot asymmetry: z = -7.0221, **p < .0001**

Trim-and-fill analysis

Estimated number of missing studies on the right side: 0 (SE = NA)

Random-Effects Model (k = 73; tau^2 estimator: REML)
Tau^2 (estimated amount of total heterogeneity): 18.1305 (SE = 2.9610)
Tau (square root of estimated tau^2 value): 4.2580
I^2 (total heterogeneity / total variability): 98.95%
H^2 (total variability / sampling variability): 95.38

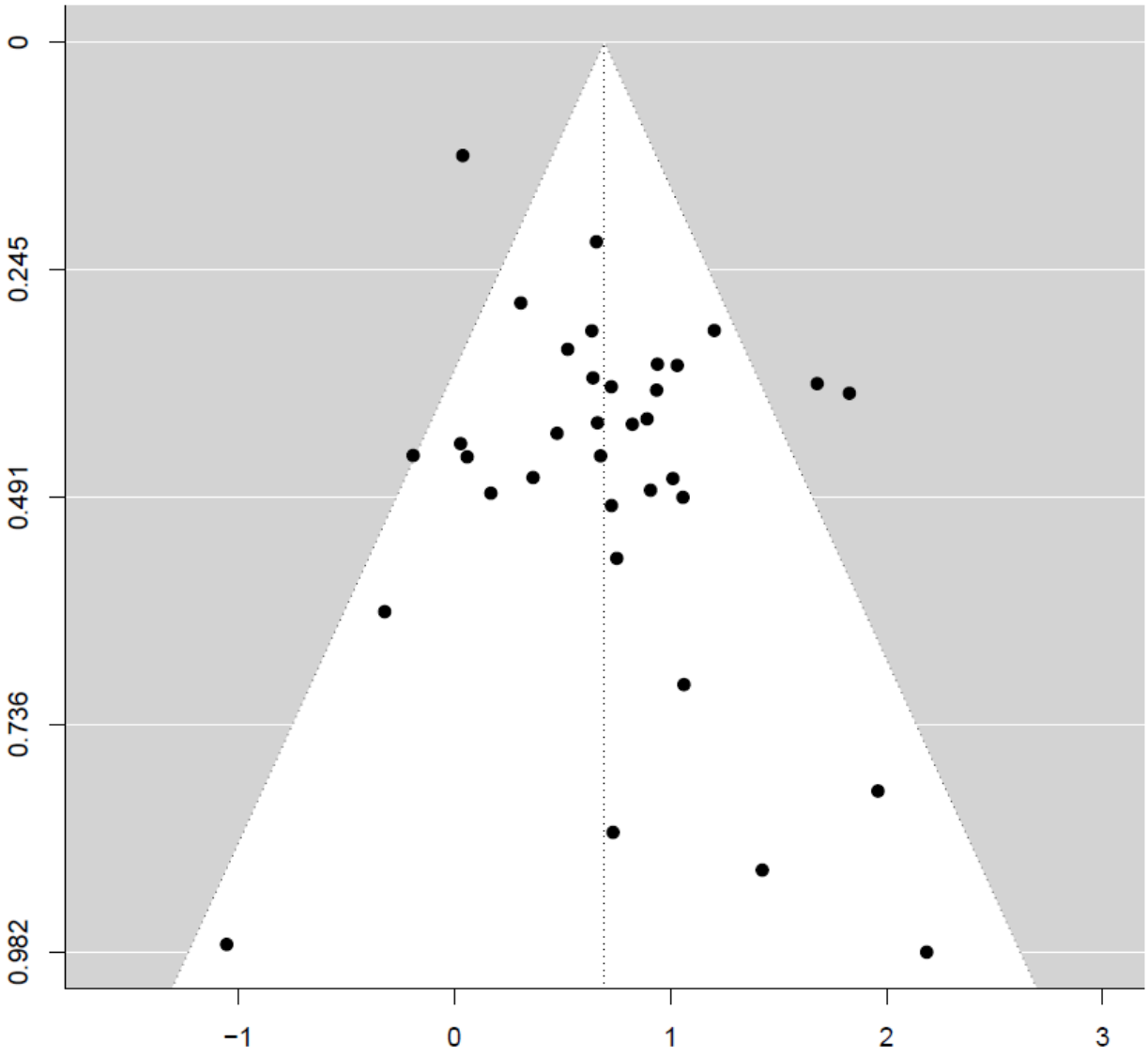
Test for Heterogeneity:
Q (df = 71) = 891.0371, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
-2.1250	0.4839	-4.3917	**<.0001**	-3.0734	-1.1766	***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Patient Safety Incidents – Overall Burnout:



Classical Egger test

Regression Test for Funnel Plot Asymmetry

Model: weighted regression with multiplicative dispersion
Predictor: standard error
Test for funnel plot asymmetry: t = 2.1527, df = 33, **p = 0.0383**

Random/mixed-effects version of the Egger test

Regression Test for Funnel Plot Asymmetry

Model: mixed-effects meta-regression model
Predictor: standard error
Test for funnel plot asymmetry: z = 0.1661, p = 0.8680

Trim-and-fill analysis

Estimated number of missing studies on the left side: 11 (SE = 3.9342)

Random-Effects Model (k = 35; tau^2 estimator: REML)
Tau^2 (estimated amount of total heterogeneity): 0.3773 (SE = 0.1203)
Tau (square root of estimated tau^2 value): 0.6143
I^2 (total heterogeneity / total variability): 71.44%
H^2 (total variability / sampling variability): 3.50

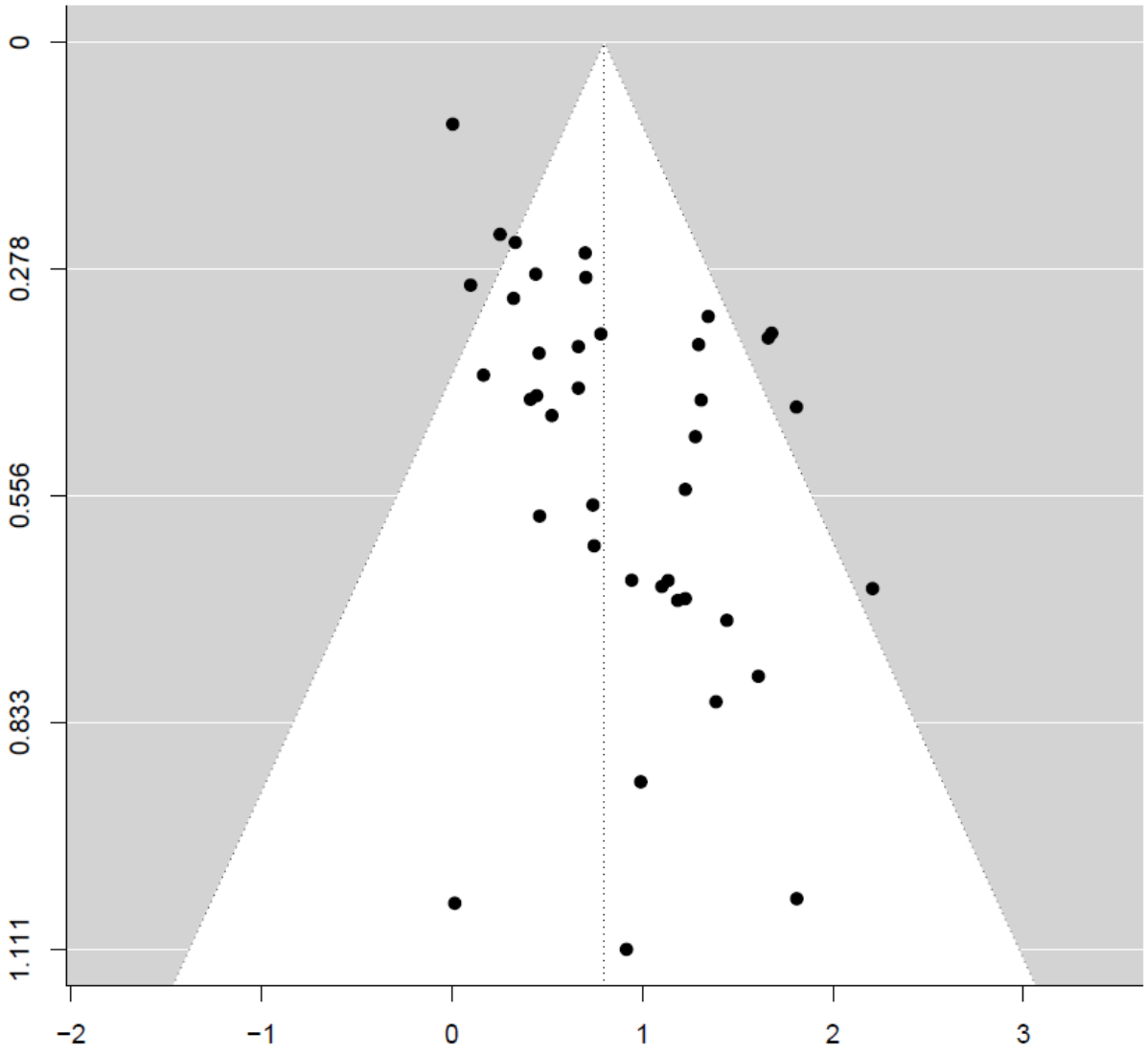
Test for Heterogeneity:
Q (df = 33) = 151.2212, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
0.4664	0.1120	4.1639	**<.0001**	0.2468	0.6859	***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Professionalism – Overall Burnout:



Classical Egger test

Regression Test for Funnel Plot Asymmetry

Model: weighted regression with multiplicative dispersion
Predictor: standard error
Test for funnel plot asymmetry: t = 4.3932, df = 38, **p < .0001**

Random/mixed-effects version of the Egger test

Regression Test for Funnel Plot Asymmetry

Model: mixed-effects meta-regression model
Predictor: standard error
Test for funnel plot asymmetry: z = 2.0250, **p = 0.0429**

Trim-and-fill analysis

Estimated number of missing studies on the left side: 10 (SE = 4.3759)

Random-Effects Model (k = 40; tau^2 estimator: REML)
Tau^2 (estimated amount of total heterogeneity): 0.4182 (SE = 0.1238)
Tau (square root of estimated tau^2 value): 0.6467
I^2 (total heterogeneity / total variability): 74.69%
H^2 (total variability / sampling variability): 3.95

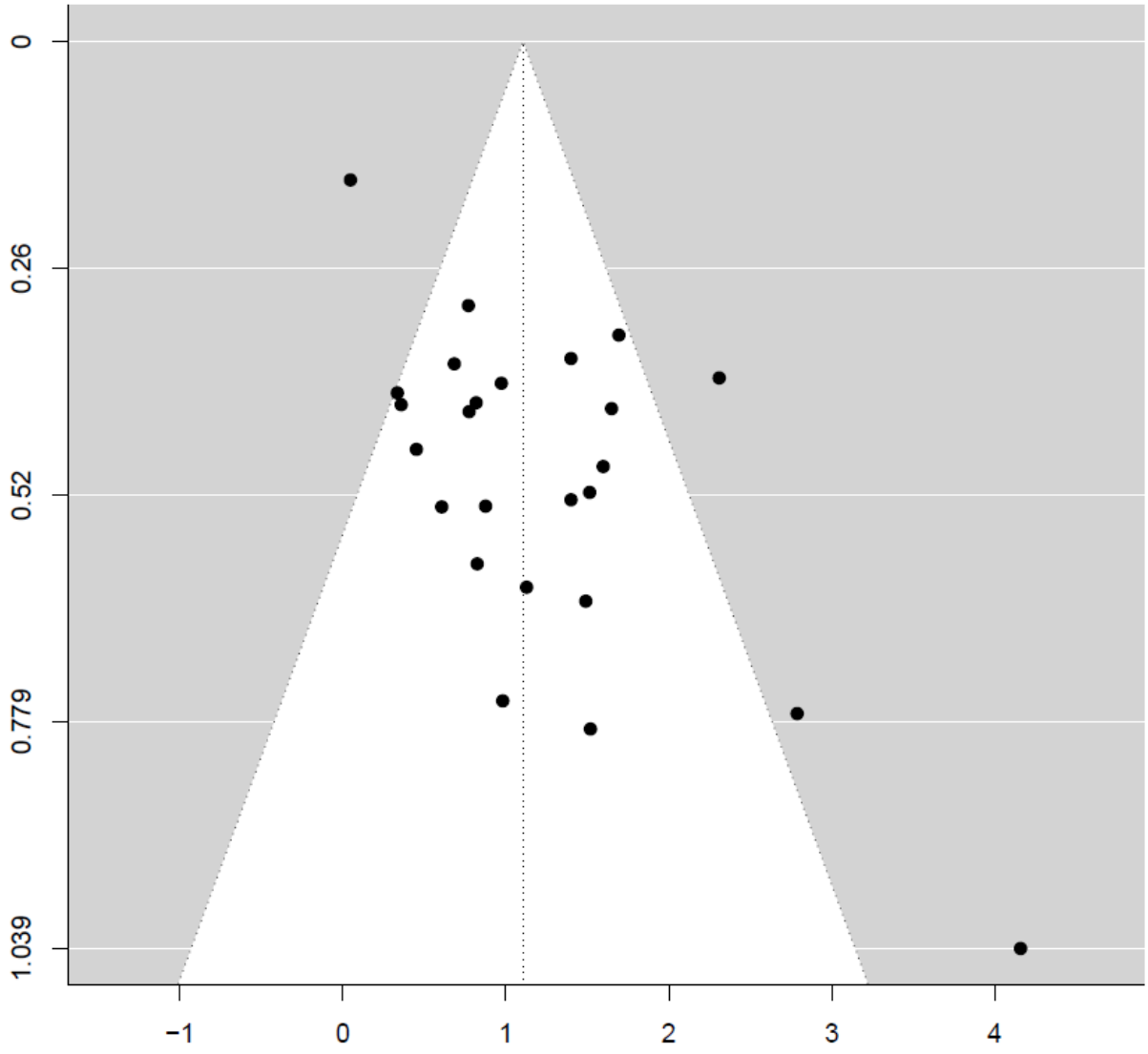
Test for Heterogeneity:
Q (df = 38) = 184.1634, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
0.5131	0.1105	4.6437	**<.0001**	0.2966	0.7297	***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Turnover Intention – Overall Burnout:



Classical Egger test

Regression Test for Funnel Plot Asymmetry

Model: weighted regression with multiplicative dispersion
Predictor: standard error
Test for funnel plot asymmetry: t = 0.1899, df = 23, p = 0.4538

Random/mixed-effects version of the Egger test

Regression Test for Funnel Plot Asymmetry

Model: mixed-effects meta-regression model
Predictor: standard error
Test for funnel plot asymmetry: z = -0.7490, p = 0.8417

Trim-and-fill analysis

Estimated number of missing studies on the right side: 0 (SE = 2.9031)

Random-Effects Model (k = 25; tau^2 estimator: REML)
Tau^2 (estimated amount of total heterogeneity): 1.3563 (SE = 0.4585)
Tau (square root of estimated tau^2 value): 1.1646
I^2 (total heterogeneity / total variability): 88.23%
H^2 (total variability / sampling variability): 8.49

Test for Heterogeneity:
Q (df = 23) = 184.9612, p-val < .0001

Model Results:

estimate	se	zval	pval	ci.lb	ci.ub	
0.9176	0.2504	3.6651	**0.0002**	0.4269	1.4083	***

Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1