

META ANALYSIS AND SYSTEMATIC REVIEW

The prevalence of burnout, risk factors, and job-related stressors in gastroenterologists: A systematic review

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Key words

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Abstract

Background and Aims: Burnout is an important occupational hazard, and the scale of the problem within gastroenterology remains poorly understood. The primary objective of this study was to understand the prevalence of burnout in gastroenterology and ascertain if there was a common prevalence within the field. The secondary objective was to identify factors and job-related stressors that commonly contribute to burnout in gastroenterologists.

Methods: Systematic searches were conducted in PubMed, Scopus, Cochrane, and PsycINFO by two reviewers independently for articles published to 1 September 2020. The primary outcome measure was the reported prevalence of burnout in gastroenterologists. The secondary outcome measures were (i) the prevalence of non-somatic burnout symptoms (emotional exhaustion, depersonalization, and low personal accomplishment) and (ii) the frequency of risk factors and stressors reported in studies. Data were presented, and limited meta-analyses discussed.

Results: Data were extracted from 11 studies. 54.5% (6/11) of these studies reported the prevalence of burnout in gastroenterologists; this ranged from 18.3% to 64.4%. Similar to burnout prevalence, burnout symptoms showed geographical variation and were common in gastroenterologists (up to 63.9%). Factors associated with work volume, age, and female gender were the three most frequently reported risk factors for increased levels of stress and burnout in 72.7% (8/11), 54.5% (6/11), and 45.5% (5/11) of studies, respectively. Significant methodological and clinical heterogeneity was observed.

Conclusions: Burnout and its non-somatic symptoms are common in gastroenterologists, but the syndrome is understudied within the field. Further research and good quality data are needed to help address the problem.

Introduction

In 2019, the World Health Organization (WHO) recognized burnout as an “occupational phenomenon” in the 11th revision of the International Classification of Disease (ICD).¹ The syndrome is characterized by abnormal feelings of emotional exhaustion (EE), depersonalization (DP), and a sense of reduced personal accomplishment (PA). The latter two dimensions are also known as “cynicism” and “professional efficacy,” respectively.² Symptoms exist on a scale of varying severity, and affected individuals can go unrecognized due to the lack of awareness.³ Importance is given to the early detection and management of burnout because troubling associations have been demonstrated between physician burnout, suboptimal patient care, and physician ill health.^{4–6} As such, it is an occupational hazard that requires well-placed support mechanisms to intervene, alleviate, or reverse burnout, ensuring the sustainability of the current workforce and the quality of care it delivers.^{7,8}

In essence, burnout is precipitated by chronic and excessive stress at work. To that end, gastroenterology often involves long working hours, heavy workloads, large volumes of patients, invasive procedures, and high amounts of stress. Furthermore, the current coronavirus disease 2019 (COVID-19) pandemic may have also compounded this risk, with early reports from severely affected countries suggesting that gastroenterologists have been placed under significantly higher amounts of stress due to the outbreak.^{9–11} Therefore, the scale of this problem must first be understood within gastroenterology in order to compel institutional improvements.¹²

It is currently unknown if the prevalence of burnout is similar among gastroenterologists globally; in addition, previous systematic reviews in the specialty are lacking. Therefore, to address these issues, we conducted a PROSPERO registered systematic review of observational studies and randomized controlled trials on burnout. The primary objective of the systematic review was to understand the prevalence rates of burnout within gastroenterology

and ascertain if a common prevalence rate exists. The secondary objectives were to understand: (i) the prevalence rates of burnout-related psychological symptoms (EE, DP and PA) and (ii) the risk factors and stressors that are commonly reported in gastroenterologists.

Methods

The methodology herein has been reported according to the PRISMA recommendations.¹³ The protocol for this systematic review has been registered with PROSPERO, University of York (<https://www.crd.york.ac.uk/prospero/>), identification number CRD42020192707.

Search strategy. Two authors, JO and CS, conducted systematic searches independently in PubMed, Scopus, PsycINFO, and Cochrane databases from inception to 1 September 2020.

Briefly, over 120 searches were conducted using search terms related, but not limited to, burnout, stress, gastroenterology, hepatology, and endoscopy. Manual searches of retrieved references were also performed. The detailed search strategy is attached as Appendix 1 (Supplementary information). All articles were screened by title and abstract. Observational studies and randomized controlled trials that reported the (i) prevalence of burnout, (ii) prevalence of related psychological symptoms (EE, DP and PA), and (iii) stressors or risk factors associated with burnout were included for further eligibility screening. Our exclusion criteria were (i) articles that did not report detailed quantitative data such as burnout prevalence rates and dimensional scores; (ii) non-research articles, for example, commentaries, editorials, and correspondences; (iii) articles that did not report burnout data that are specific to gastroenterologists; (iv) low-quality observational studies defined by a modified Quality Assessment Tool for Systematic reviews of Observational studies (modified QATSO) score $\leq 33\%$ ¹⁴ (see Appendix 2, Supplementary information); (v)

Systematic review flow diagram

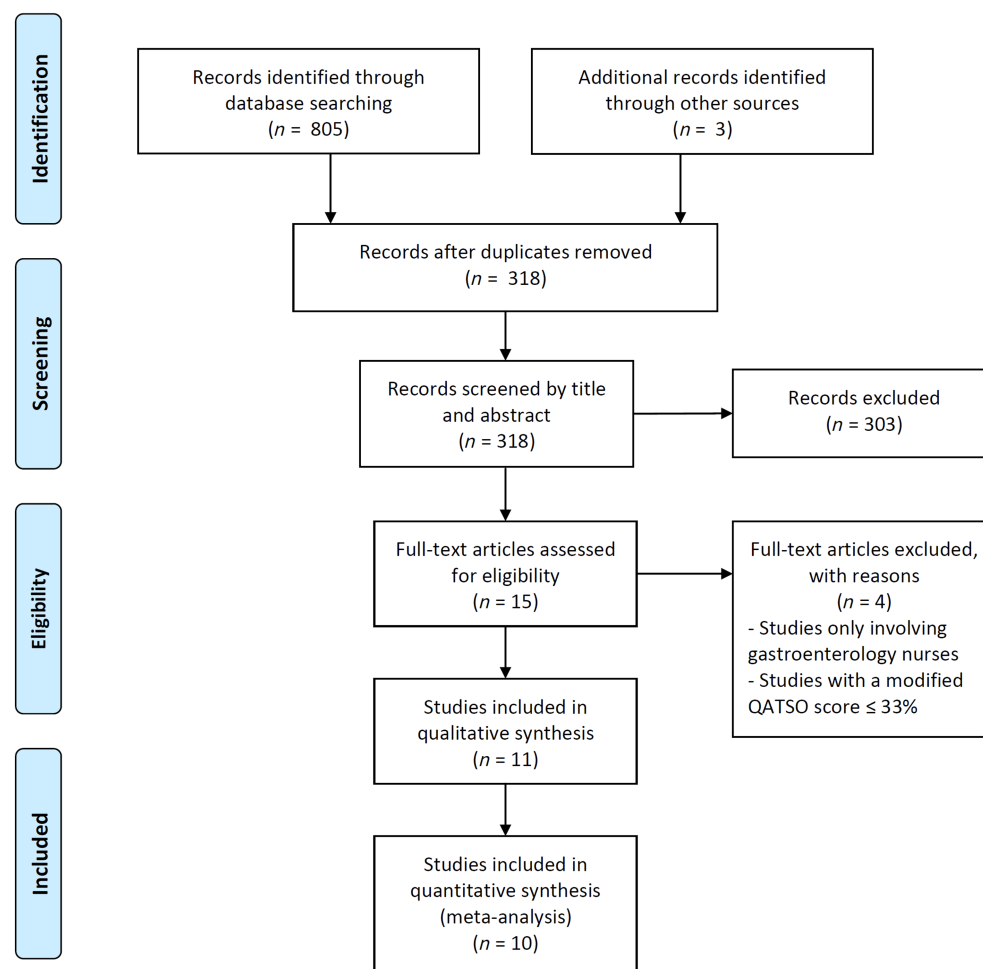


Figure 1 A systematic review flow diagram illustrating the number of articles that were identified, excluded, screened, and included in the qualitative and quantitative synthesis.

articles that were not available through the UK Access Management Federation; and (vi) articles with irrelevant content. Any disagreements between JO and CS were resolved by consensus with WL and SO; only two of 15 short-listed articles needed discussion with WL and SO.

Data extraction. All data were extracted onto predesigned forms in Microsoft Excel 2007 (Microsoft Corporation, Washington, USA). Forms contained columns tabulating the country of origin of selected studies, first author including the year of publication, study population, sample size, response rates, reported prevalence rates of burnout, criteria for burnout, prevalence rates of EE, criteria for abnormal EE, prevalence rates of DP, criteria for abnormal DP, prevalence rates of PA, criteria for abnormal PA, stressors reported, and any risk factors associated with burnout. Risk factors and stressors were grouped under themes agreed upon after a focus group discussion between JO, CS, WL, and SO. Collated data were then summarized and presented as tables illustrated below.

Statistical analyses. MedCalc 19.1.5 (MedCalc Software bv, www.medcalc.org) was utilized to perform the statistical analyses. Summary measures were the prevalence rates of burnout, the

prevalence rates of EE, the prevalence rates of DP, and the prevalence rates of PA. Where applicable, meta-analyses were performed to obtain funnel plots and forest plots using reported prevalence rates (positive cases and sample sizes). I^2 and Cochrane Q were used to test for heterogeneity between studies. Conventional classifications of the I^2 statistic were used to describe heterogeneity; low, medium, and high corresponded to I^2 statistics of 25%, 50%, and 75%, respectively.¹⁵ Random effect models were used to generate forest plots because medium to high heterogeneity was observed between studies. Egger's test and Begg's test were used to detect publication bias. Despite high heterogeneity between studies, meta-regression was not performed because the number of studies reporting burnout prevalence and related symptoms was less than 10 in both groups.¹⁶ Data were therefore collated and presented in tables for better accuracy instead of pooled results.

Results

Study selection and characteristics. A total of 808 articles were identified in the systematic search (Fig. 1). After removing 490 duplicate search results, 318 articles were screened by title and abstracts. Of these, 237 articles had irrelevant content, 27 articles studied burnout in non-gastroenterology populations,

Table 1 Reported prevalence of burnout and its symptoms in gastroenterologists

Country	Authors	Sample Size	Study population	Adjusted Response Rate [†]	Burnout Detection Tool	Criteria for burnout	Burnout Prevalence
Mexico	Aguilar-Nájera <i>et al.</i> ^{21 †}	317	Gastroenterologists, gastroenterology residents, endoscopists, endoscopy residents, gastroenterology fellows	17.7% (317/1792)	22-item MBI	EE > 27 OR DP > 10 OR PA < 33	27.8% (88/317)
Mexico	Aguilar-Nájera <i>et al.</i> ^{21 †}	301	Gastroenterologists, gastroenterology residents, endoscopists, endoscopy residents, gastroenterology fellows	22.0% (301/1792)	SIBOQ	Options 3–5	33.9% (102/301)
International	Pawlak <i>et al.</i> ^{22 †}	666	Gastroenterology Trainees	NR	SIBOQ	Options 3–5	18.3% (122/666)
South Korea	Jang <i>et al.</i> ²³	222	Gastroenterologists	NR	22-item MBI	EE ≥ 27 OR DP ≥ 10	64.4% (143/222)
United Kingdom	Ong <i>et al.</i> ²⁴	40	Gastroenterology Trainees	37.3% (34/91)	22-item MBI	EE ≥ 27 + DP ≥ 13 OR EE ≥ 27 AND PA ≤ 31	35.3% (12/34)
United States and Canada	DeCross ^{25 †}	639	Gastroenterologists	11.7% (639/5440)	22-item MBI AND single-item measure [§]	EE > 27 + DP > 10 + PA < 33 AND "Agreed"/ "Strongly agreed"	54.3% (347/639)
United States	Burke ²⁶	749	Gastroenterologists	6.8% (749/11080)	22-item MBI	EE ≥ 27 OR DP ≥ 13	49.0% (367/749)

[†]Adjusted response rate = percentage of gastroenterologists who had completed the burnout detection tool fully in relation to the total target population.

[‡]Additional data and clarification provided by authors through personal correspondence.

[§]Single-item measure developed during the same study.

22-item MBI, Maslach Burnout Inventory Human Services Survey³²; NR, not reported by the study; SIBOQ, single-item burnout question.³³

and 39 articles were editorials, commentaries, letters, or reviews. These were removed, leaving 15 articles in the field of gastroenterology that were fully assessed for eligibility.^{17–31} Subsequently, four articles were excluded from further analyses: one article had data that lacked sufficient quality¹⁷ (modified QATSO score $\leq 33\%$), and three articles reported data on gastroenterology nurses only.^{18–20} Overall, 11 studies were included in the qualitative synthesis.^{21–31}

Prevalence of burnout in gastroenterologists. 54.5% (6/11) of studies reported a burnout prevalence in gastroenterologists. The median prevalence was 35.3%; however, the reported prevalence ranged broadly from 18.3% to 64.4%^{21–26} (see Table 1). Significant (“high”) heterogeneity was detected between the studies: $I^2 = 98.0\%$ (95% CI: 97.2%–98.6%) (Fig. 2). No evidence of publication bias was detected (Egger’s test:

P -value = 0.88). Subgroup analysis determined that methodological and clinical heterogeneity was present (Table 1). Respectively, in the six studies, there were three different burnout tools used to detect burnout in gastroenterologists, and several different criteria were used to define burnout even when the same burnout detection tool was used. This, along with differences in study subpopulations, contributed to a large degree of the heterogeneity observed in reported results.

Psychological symptoms of burnout in gastroenterologists. 54.5% (6/11) of studies reported data on the dimensions of burnout in gastroenterologists.^{21,23,24,27–29} Abnormal symptoms of EE, DP, or PA in gastroenterologists were reported in all study populations to varying degrees. These varied geographically even though there was less heterogeneity in definitions of abnormal cutoffs for EE, DP, and PA values

Meta-analyses of burnout prevalence in gastroenterologists

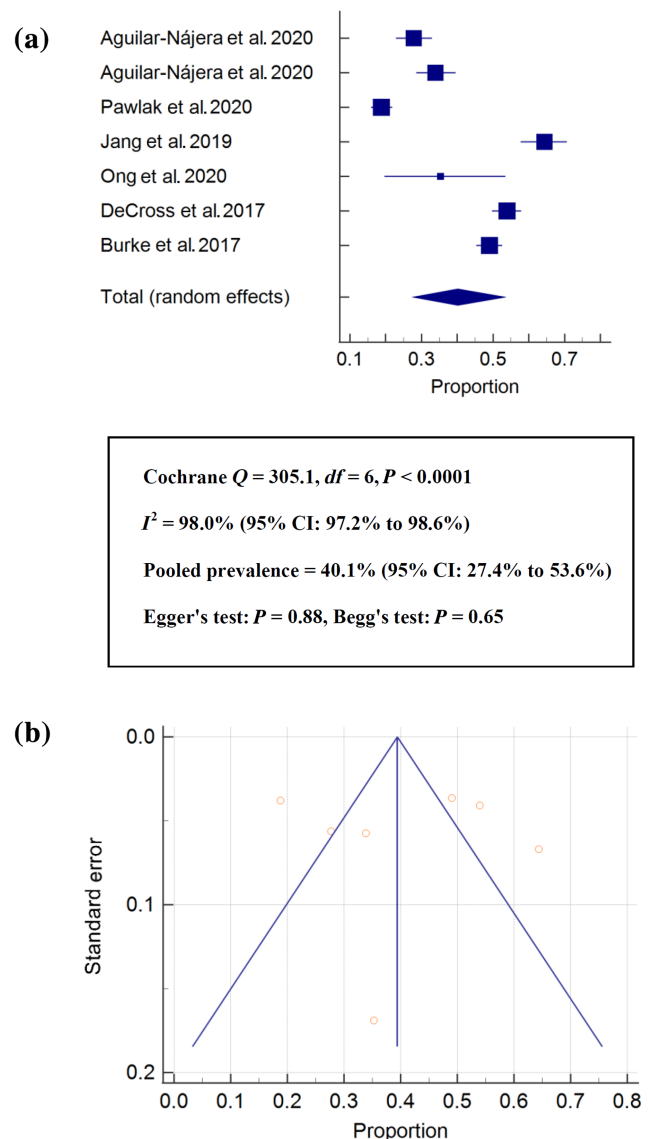
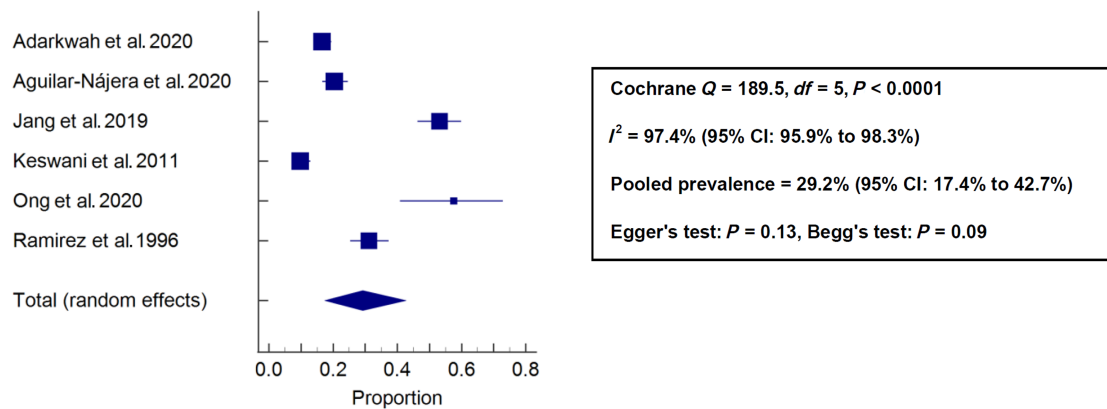


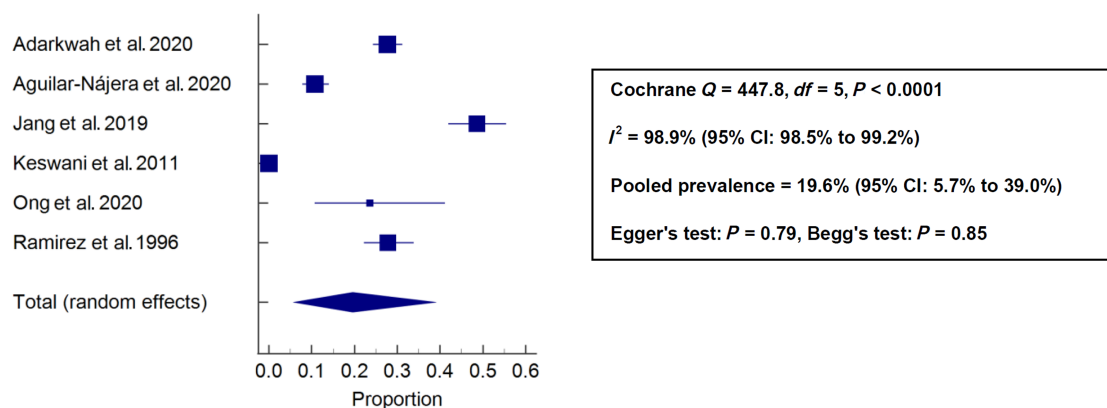
Figure 2 (a) Forest plot and (b) funnel plot of studies reporting burnout prevalence in gastroenterologists.

Meta-analyses of the prevalence of burnout symptoms in gastroenterologists

(a) Emotional exhaustion



(b) Depersonalization



(c) Low personal accomplishment

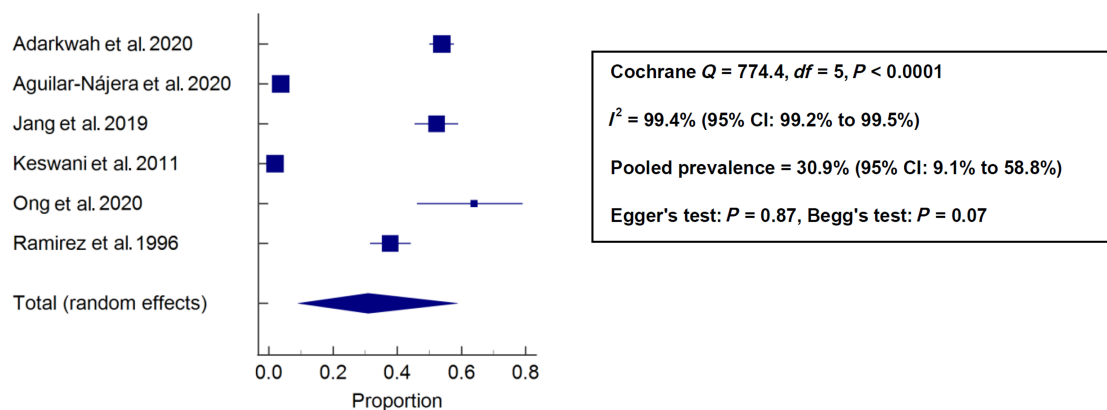


Figure 3 Forest plots and meta-analyses of studies reporting the prevalence of (a) emotional exhaustion, (b) depersonalization, and (c) low personal accomplishment in gastroenterologists. Funnel plots are provided in the supplementary data.

compared to the definitions used to identify burnout. EE was present in gastroenterologists across all studies ranging from 7.4% to 57.5%, showing less heterogeneity in funnel and forest

plots compared with DP and PA (Supplementary Fig. S1 and Fig. 3). DP varied from 0% to 48.7%, and PA varied from 1.5% to 63.9%. The median values for EE, DP, and PA are

Table 2 The frequency of burnout symptoms in gastroenterologists

Country	Author	Abnormal EE	Abnormal DP	Abnormal PA
Germany	Adarkwah <i>et al.</i> ²⁷	16.6% (113/683) Criterion: EE ≥ 27	27.7% (189/683) Criterion: DP ≥ 10	53.9% (368/683) Criterion: PA ≤ 33
Mexico	Aguilar-Nájera <i>et al.</i> ²¹	20.4% (84/411) Criterion: EE > 27	10.7% (44/411) Criterion: DP > 10	3.6% (15/411) Criterion: PA < 33
South Korea	Jang <i>et al.</i> ²³	53.2% (118/222) Criterion: EE ≥ 27	48.7% (108/222) Criterion: DP ≥ 10	52.3% (116/222) Criterion: PA ≤ 33
United States	Keswani <i>et al.</i> ²⁸	7.4%–11.1% Criterion: NR	0% Criterion: NR	1.5%–3.7% Criterion: NR
United Kingdom	Ong <i>et al.</i> ²⁴	57.5% (23/40) Criterion: EE > mean + 0.5 SD*	23.5% (8/34) Criterion: DP > mean + 1.25 SD*	63.9% (23/36) Criterion: PA < mean + 0.1 SD*
United Kingdom	Ramirez <i>et al.</i> ²⁹	31.0% (75/241) Criterion: EE ≥ 27	28.0% (67/241) Criterion: DP ≥ 10	38.0% (91/241) Criterion: PA ≤ 33

25.7%, 25.6%, and 45.1%, respectively. The results are summarized in Table 2.

Stressors and risk factors for burnout in gastroenterologists. Eleven studies^{21–31} reported stressors or risk factors for burnout in gastroenterologists. Factors related to high work volumes were the most reported risk factors associated with higher stress or more severe symptoms of burnout in 72.7% (8/11) of studies. Of the remaining three studies, two did not comment adequately on factors related to work volume,^{22,27} and one reported no relationship between workload and burnout.³¹ Age was the second most reported risk factor: 54.5% (6/11) of studies. The reported ages for at-risk groups were heterogeneous: 40–49 years,³⁰ age under 48 years,²⁷ age 50.4 ± 9.2 years,²⁶ and age ≤ 55 years.²⁹ Two studies defined age as “younger” without specifying numerical values.^{28,31} Of the remaining five studies, three did not report any age-related comparisons,^{21,22,25} and two found no significant associations.^{23,24}

The third most reported risk factor was female gender. 45.5% (5/11) of studies reported that female gastroenterologists experienced more anxiety, stress, or burnout than male gastroenterologists. In the remaining six studies, two studies reported no difference in burnout prevalence rates between genders,^{21,24} three studies reported lower PA scores in females^{27,28,31} but did not report gender-specific burnout rates, and one study did not report any data on gender comparisons.²⁹ Regardless of burnout tools or criteria of burnout, a meta-analysis of 2694 gastroenterologists across all six studies that reported burnout prevalence suggested that female gastroenterologists may be at higher risk of burnout compared with their male counterparts: OR = 1.5 (95% CI: 1.1–2.1), $P < 0.01$ (Fig. 4). Individually, lack of support from colleagues and performing endoscopic procedures were other important stressors reported in 27.3% (3/11) of studies. Table 3 provides a summary of the risk factors and job-related stressors in gastroenterologists.

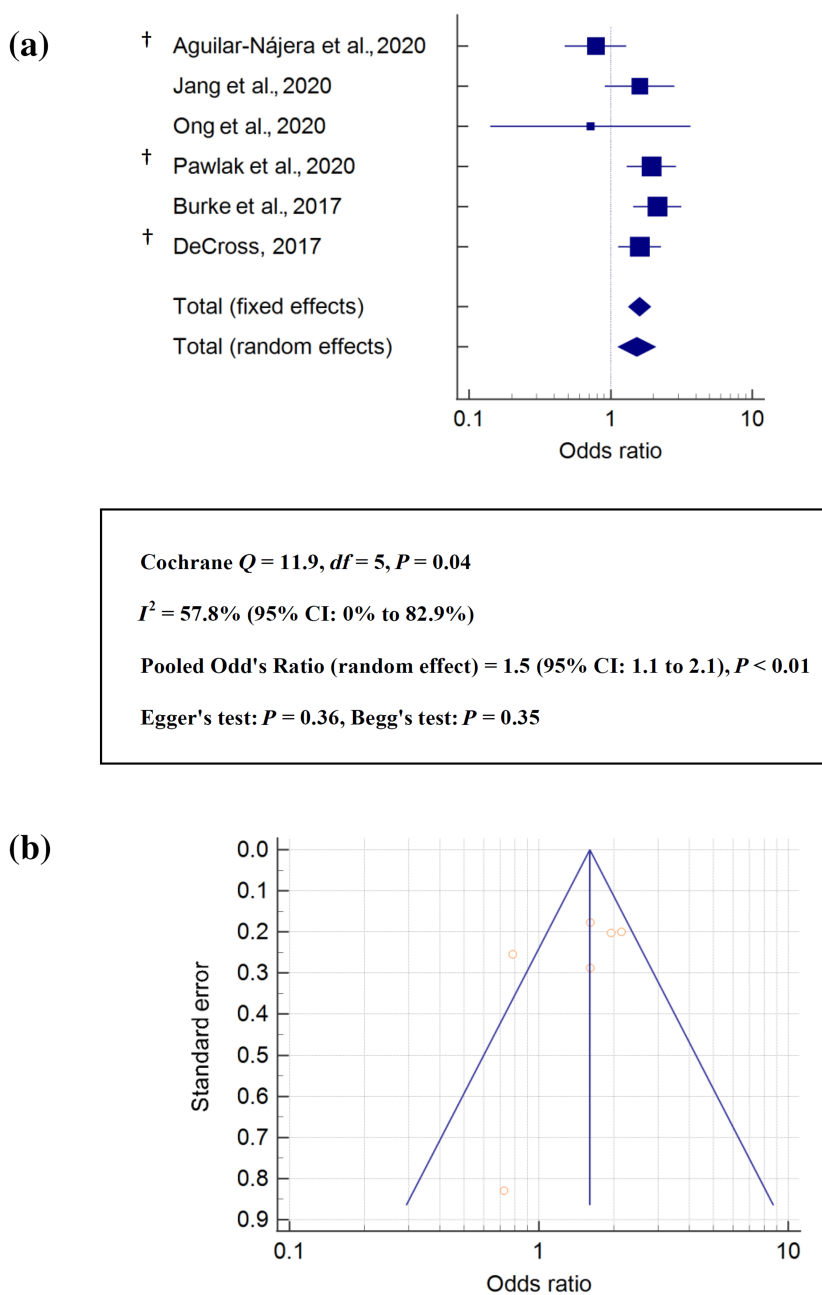
Discussion

Occupational burnout was first described in the 1970s,^{34,35} and research in the area remains popular in the field of medicine. Despite this and nearly 50 years on, our study has demonstrated

that this phenomenon remains poorly studied within gastroenterology. To date, we have identified only seven studies that reported the prevalence of burnout within the speciality: six in gastroenterologists^{21–26} and one in gastroenterology nurses.²⁰ Furthermore, frequent commentaries of burnout in gastroenterology often cite data from the limited number of US studies, regarding these reported prevalence rates as norms in the field. Herein, we have demonstrated that a common prevalence rate for burnout or its symptoms does not exist in gastroenterology. On the contrary, regional differences are evident and different from results reported in US gastroenterologists. For example, significantly different prevalence rates of burnout symptoms were observed between gastroenterologists in Germany, South Korea, and the United Kingdom (Table 2), notably when the criteria for abnormality were identical. Reasons for this are likely multifactorial and complex, involving differences in healthcare systems, working environment, organizational culture, societal culture and expectations, etc., the effects of which are not easily quantifiable. Therefore, we have reported the median prevalence rates of burnout and its symptoms instead of emphasizing pooled prevalence results. Any inferences made from a pooled prevalence in the figures provided herein or in the current literature should be done so with caution. We also advise that when trying to determine the scale of the problem locally, population sampling should be performed for better accuracy instead of extrapolating estimates from studies of different populations.

Besides true differences that exist between various geographic populations, significant methodological and clinical heterogeneity between studies also contributed to the differences in results. This limited direct comparisons and in-depth meta-analyses. Similar to systematic reviews of burnout in other specialities,^{36,37} methodological heterogeneity among the studies that we reviewed stemmed mainly from differences in burnout tools and criteria to identify burnout (Table 1). Although the 22-item MBI is the most commonly used and extensively validated tool to detect burnout in clinicians,^{36,38} limitations such as cost to administer and survey length may have encouraged researchers to use different tools to study burnout; only 66.7% (4/6) of the studies that reported burnout prevalence in gastroenterologists used the 22-item MBI. In the remaining two studies, a less reliable single-item measure of burnout was used. Although shorter surveys may improve response rates and be cost-free, it has been shown that abbreviated versions

Meta-analyses of the prevalence of burnout in female gastroenterologists (Odds Ratio)



Cochrane $Q = 11.9, df = 5, P = 0.04$
 $I^2 = 57.8\%$ (95% CI: 0% to 82.9%)
Pooled Odds Ratio (random effect) = 1.5 (95% CI: 1.1 to 2.1), $P < 0.01$
Egger's test: $P = 0.36$, Begg's test: $P = 0.35$

Figure 4 (a) Forest plot and (b) funnel plot showing odds ratio of studies reporting gender-specific burnout rates in female gastroenterologists. †Additional data provided by authors through personal correspondence.

of the 22-item MBI and single-item measures of burnout can be inaccurate.^{39,40} As such, some researchers including ourselves advise against the use of such alternatives because readouts may be unreliable.^{12,39,41}

Apart from different subgroups (e.g., trainees vs. consultants or endoscopists vs. non-endoscopists), clinical heterogeneity mainly arose from non-identical 22-item MBI criteria used to define burnout. In the earlier editions of the MBI, abnormal scores in all three

burnout components were needed to identify burnout (high EE AND high DP AND low PA scores). However, some researchers have adapted the criteria in various ways to improve burnout detection. Nonetheless, the only criteria of burnout that were validated clinically against symptoms in the WHO ICD are “a high EE score AND a high DP score” or “a high EE score AND a low PA score.” This has been supported by Maslach and corroborated by other researchers.^{40,42,43} Only one study that was identified used

Table 3 Stressors and risk factors for burnout in gastroenterologists

Themes	Stressors and risk factors associated with stress and burnout
Individual factors	Female gender ^{22,23,25,26,30} Age ^{26–31} Lack of confidence ³⁰
Factors related to work volume	Medical knowledge required for normal practice ²⁵ High workload ^{24,29,30} Longer working hours ²⁸ Work–life imbalance ^{23,25,26}
Factors related to professional risk or responsibility	Non-medical duties during work ²¹ Endoscopic procedures ^{21,25,28} Clinical errors ³⁰
Factors related to resources at work	Managerial responsibilities ²⁹ Inadequate staffing levels ²⁴ Non-user-friendly IT systems ²⁶ Poor management of resources ²⁹ Lack of resources ²⁹ Lack of personal protective equipment during COVID-19 ²²
Factors related to training	Working conditions beyond control ³⁰ Length of training ^{22,24} Postgraduate exams ²⁴ Lack of training in communication and management skills ²⁹ Lack of endoscopic training during COVID-19 ²² Curriculum requirements ²⁴
Factors related to relationships with colleagues	Lack of support from colleagues ^{21,24,30} Conflict/violence at work ^{21,30} The expectation of seniors ²⁴ Reprimands by seniors ²¹
Factors related to the location of work	Accusations of inappropriate behavior ³⁰ A long commute to work ²⁴ Living in a big city ²¹
Factors related to patient relationships	Conflict/violence at work ^{21,30} Dealing with patient suffering ²⁹ Difficult patients and managing patient expectations ²⁴ Accusations of inappropriate behavior ³⁰
Others	Lack of awareness or provision for mental health services ^{22,24} The increasing imposition of external regulatory burdens ²⁵ Work unrelated to medicine ²¹

these criteria to define burnout. If the above criteria were used in the above-mentioned studies, then up to 16%–20% of gastroenterologists in Mexico and Germany, 30%–40% in the United Kingdom, and 50%–55% in South Korea, Canada, and the United States approximately would either have burnout or be at high risk of developing burnout. Abnormal scores in one dimension alone should not be used to define the presence of burnout because it is conceptually inadequate and these can be present in individuals without burnout, that is, different personality or profile types.^{32,44,45} Unsurprisingly, single-dimension criteria and detection tools carry a significant risk of overestimating burnout prevalence.

Pooled prevalence by geographical region may be attempted in the future; however, more burnout studies are needed globally in the first instance. Reassuringly, native-language versions of the MBI-HSS have been previously validated in the countries within Table 1, and so, the MBI-HSS has the potential to accurately identify burnout in these populations in future studies, provided rigorous burnout criteria are used. It is also noteworthy that

previous scores on the MBI scale were derived arbitrarily,³² and therefore, delineations of “low”, “medium,” and “high” subscale scores carry limited clinical value. Therefore, Maslach³² has proposed the use of a different method to identify abnormal symptom scores. This is referred to as “Method 2 (AVE)” in the fourth edition of the MBI manual. Advantages are threefold: Firstly, the computed score remains valid even if not all questions are completed by respondents (as per product literature); secondly, a normal range based on over six thousand US healthcare workers has been established for comparison; and thirdly, normal ranges for different populations can be tailored if needed. Therefore, we recommend researchers to report results using both methods in future studies to allow comparison of results across different times and populations.

Lastly, to facilitate better comparability of burnout prevalence results when the 22-item MBI-HSS is used, we recommend the reporting of proportions using all the following definitions of burnout: (1) $EE \geq 27$ together with $DP \geq 13$, (2) $EE \geq 27$ together with $PA \leq 31$, and (3) $EE > 27$ together with $DP > 10$ and

PA < 33. Furthermore, to help researchers compare and understand the relationship between gastroenterology workload and burnout in different populations, documentation of demographic information should also be standardized, for example, weekly clinical working hours, weekly endoscopies performed, weekly patients seen in clinics, weekly ward patients cared for, and weekly out-of-hours time spent studying or in research. Unfortunately, this was lacking in current studies and limited meaningful insight and objectivity when we attempted to evaluate burnout precipitants across different populations.

In terms of stressors and risk factors for burnout (Table 3), it is unsurprising that factors related to high work volumes (high workload, longer working hours, work–life imbalance, and non-medical duties during work) were reported in the majority of studies because burnout is typically precipitated by work-related stress. It is noteworthy that these are perceptions of gastroenterologists and are therefore subjective. Insufficient data were reported for objective assessment, for example, actual working hours of those reporting longer working hours versus those that do not report longer working hours. When assessing individual risk factors associated with burnout, it is unusual that gastroenterologists aged approximately between their late 30s and early 50s were reported to be more prone to anxiety, stress, and burnout. Further research is needed to explore these observations. Interestingly, female gastroenterologists were reported to be at higher risk of suffering from anxiety, stress, and burnout. The association between female gender and anxiety may be consistent with population-based studies^{22,46} and having added domestic commitments may have contributed to stress in female gastroenterologists.²³ Nonetheless, having organization-led initiatives, such as mentoring schemes and easily accessible well-being support services, can help lower anxiety, stress, and burnout risk.^{17,22,47,48} Furthermore, regardless of age and gender, access to support services can also aid in the early detection and management of underlying mental health conditions, which can also be associated with burnout.⁴⁹

Surprisingly, factors associated with relationships with colleagues (lack of support, conflict or violence at work, high expectations, being reprimanded by seniors, and accusations of inappropriate behavior) were a frequently reported source of stress for gastroenterologists. These modifiable stressors could potentially be addressed through measures such as improving communication and mindfulness-based activities, both of which have been reported to have demonstrable effects in large meta-analyses.^{7,50} Interestingly, performing endoscopic procedures was reported to cause more stress in North America. The reasons for this are unclear but may be related to medicolegal issues in different regions. On the contrary, an international survey of gastroenterology trainees found that during the COVID-19 pandemic, the lack of endoscopy procedures or the lack of access to endoscopy was an important precipitant of stress and anxiety.²² Presumably, this was associated with trainee-related stressors such as the prolongation (length) of training and postgraduate exams (Table 3), both of which may also have been adversely affected by the pandemic. Indeed, the stressor–burnout relationship is complex, and stressors should always be considered with context.

This study had several limitations. Firstly, large-scale burnout studies are invariably survey based, and the response rates in the included studies were low. Therefore, survey bias such as

response, nonresponse, and sampling bias could not have been excluded. This could have affected the meta-analyses on burnout in female gastroenterologists although high heterogeneity and publication bias were not detected. Secondly, there were insufficient high-quality data for meta-analyses to determine the strengths of associations between stressors and other risk factors of burnout, for example, age. Thirdly, all but one study were conducted before the COVID-19 outbreak; therefore, previously reported burnout rates may not be reflective of burnout rates intra- or post-pandemic. Fourthly, some unpublished data were included in our analyses; we wrote to study authors to obtain raw data when certain fields of interests were omitted in their article. Fifthly, studies that involved gastroenterologists as a subgroup and not the main population of interest may have been missed in our search strategy (e.g., multi-speciality studies of burnout).

Conclusion

Burnout and its symptoms are common in gastroenterologists. Occupational factors related to high work volumes, younger age, female gender, endoscopic procedures, and the lack of support from colleagues are commonly reported stressors in gastroenterology. The syndrome continues to be understudied within the field, and further research is needed to help address the problem.

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Data availability statement. The data that supported the findings of this study were derived from references 17 to 31. These are accessible through resources available in the public domain: PubMed (www.pubmed.ncbi.nlm.nih.gov), PsycINFO (www.apa.org/pubs/databases/psycinfo), Scopus (www.scopus.com), and Cochrane (www.cochranelibrary.com).

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

Appendix S1 Systematic review search strategy.

Appendix S2 Modified QATSO Tool.

Figure S1 Funnel plots of the prevalence of burnout symptoms in gastroenterologists.