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Title: Burnout and Endoscopy-Specific Workload among Gastroenterologists and Gastroenterology Fellows in Turkey: A National Cross-Sectional Survey

Running title: Burnout and Endoscopy Workload

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Abstract

BACKGROUND

Gastroenterologists in high-volume, public sector-dominant healthcare systems face considerable occupational strain from endoscopic workloads, out-of-hours commitments, and administrative burdens. However, robust data linking validated burnout measures to endoscopy-specific workload indicators remain scarce.

AIM

To evaluate burnout among gastroenterologists and gastroenterology fellows in Turkey and to identify modifiable workload and organisational factors independently associated with clinically relevant personal burnout.

METHODS

A national cross-sectional online survey was conducted in May 2026, combining the Copenhagen Burnout Inventory (CBI) with a purpose-designed endoscopy workload module. Recruitment used professional networks and snowball sampling. Of 352 submitted records, 278 eligible physicians were included. CBI subscale scores were transformed to a 0–100 scale, with clinically relevant burnout defined as a score ≥50. Multivariable logistic regression and Spearman correlation analyses were performed.

RESULTS

Among respondents, the proportions meeting the threshold for clinically relevant burnout were 79.5% for personal, 78.1% for work-related, and 69.8% for patient-related burnout; median scores were 71, 70, and 64, respectively. Because of the self-selected nature of the sample, these figures should be interpreted as descriptive rather than as unbiased population prevalence estimates. Monthly on-call frequency showed a graded association with personal burnout (p for trend < 0.001). In multivariable analysis, factors independently associated with clinically relevant personal burnout included ≥6 monthly on-call shifts (adjusted OR 4.82, 95% CI 2.91–7.98), out-of-hours endoscopy duty (adjusted OR 3.45, 95% CI 2.10–5.67), >60 endoscopic procedures per week (adjusted OR 2.91, 95% CI 1.82–4.66), inadequate endoscopy unit staff support (adjusted OR 2.68, 95% CI 1.65–4.35), and ≥6 outpatient sessions per week (adjusted OR 2.40, 95% CI 1.48–3.90). Only six respondents (2.2%) reported access to institutional psychological support.

CONCLUSION

In this national survey, responding gastroenterologists and fellows reported high burnout scores across all CBI domains. The near absence of institutional psychological support and the strong associations between burnout and modifiable workload factors highlight the urgent need for system-level interventions to protect physician well-being and sustain the gastroenterology workforce.

Keywords: Burnout; Copenhagen Burnout Inventory; Endoscopy workload; Gastroenterology; Occupational stress; Turkey

Core Tip

This national cross-sectional survey of 278 gastroenterologists and gastroenterology fellows in Turkey found that responding physicians reported high burnout scores across all Copenhagen Burnout Inventory domains. Clinically relevant personal burnout was independently associated with ≥6 monthly on-call shifts (adjusted OR 4.82), out-of-hours endoscopy duty (adjusted OR 3.45), >60 endoscopic procedures per week (adjusted OR 2.91), inadequate endoscopy unit staff support (adjusted OR 2.68), and ≥6 outpatient sessions per week (adjusted OR 2.40). Institutional psychological support was available to only 2.2% of respondents. These findings identify modifiable workload factors, rather than individual resilience alone, as major correlates of burnout and underscore the need for system-level interventions.

1. Introduction

Physician burnout is a well-documented occupational health problem that compromises job satisfaction, patient safety, quality of care, and retention in clinical practice [1,2]. Although long working hours are a recognised contributor, burnout arises from the cumulative interplay of workload intensity, time pressure, administrative demands, emotional strain, insufficient recovery, and limited organisational support [3,4]. These conditions are especially pronounced in procedural specialties, where complex clinical decision-making coincides with high patient throughput, sustained technical demands, and unpredictable emergency responsibilities.

Gastroenterology possesses several features that heighten exposure to occupational strain. Endoscopic procedures require sustained concentration, physical effort, fine motor precision, and the immediate management of unexpected findings or procedure-related complications [5,6]. In high-volume units, endoscopy lists are frequently conducted under strict time constraints, with tightly packed schedules, minimal recovery intervals, and frequent list overruns that prolong the working day [7]. Out-of-hours emergency endoscopy for acute upper gastrointestinal bleeding,

ascending cholangitis, food bolus obstruction, or foreign body ingestion disrupts sleep, limits recovery, and encroaches on family life [8]. These demands are likely to influence burnout through mechanisms that are not fully captured by weekly working hours alone.

Despite these concerns, the contribution of endoscopy-specific workload factors to burnout among gastroenterologists remains inadequately characterised. Most previous studies have focused on generic occupational determinants, whereas fewer have examined procedural volume, emergency or unscheduled endoscopy, list overruns, after-hours communication, documentation burden, and the adequacy of endoscopy unit support as distinct contributors [9–11]. Moreover, the available evidence is drawn predominantly from North America and Western Europe, which limits its applicability to healthcare systems with different workforce structures, public sector responsibilities, service pressures, and institutional support mechanisms [12,13].

Turkey provides a relevant and understudied context in which to examine these questions. Gastroenterology services are delivered largely within a public hospital framework, where specialists and fellows routinely manage high outpatient volumes, substantial endoscopic workloads, and emergency procedural responsibilities, often with variable personnel and administrative support. National data on burnout among gastroenterologists and gastroenterology fellows in Turkey remain scarce, and the associations between validated burnout domains and endoscopy-specific workload have not been systematically evaluated.

In this national cross-sectional survey, we combined the Copenhagen Burnout Inventory (CBI) with a purpose-designed endoscopy workload module. The CBI captured personal, work-related, and patient-related burnout, while the module assessed procedural volume, emergency and unscheduled endoscopy, out-of-hours duties, list overruns, after-hours communication, documentation burden, staff support, institutional psychological support, and career-related consequences. By linking a validated multidimensional burnout instrument with specialty-specific

workload indicators, the study aimed to examine the associations between modifiable organisational and procedural factors and burnout among gastroenterologists and fellows in Turkey. Identifying such factors is an essential step toward designing system-level interventions that protect physician well-being and sustain endoscopic service delivery.

2. Materials and Methods

2.1. Study Design and Setting

This national, cross-sectional, anonymous online survey was conducted among gastroenterology specialists and fellows practising in Turkey between 1 and 31 May 2026. The study was designed to evaluate burnout and endoscopy-specific workload indicators in routine gastroenterology practice. The protocol received approval from the Kayseri City Hospital Non-Interventional Clinical Research Ethics Committee (approval No. 2026/900; approval date: 28 April 2026). Electronic informed consent was obtained from all participants before they could access the questionnaire. The study was carried out in accordance with the Declaration of Helsinki and is reported following the STROBE and CHERRIES recommendations [14,15].

2.2. Participants and Recruitment

Eligible participants were physicians actively practising gastroenterology in Turkey, encompassing both gastroenterology specialists and fellows. Specialists included academic faculty, those completing obligatory service (the mandatory public service required of medical specialists in Turkey), and those who had fulfilled this obligation. Physicians who did not consent, were retired, were clinically inactive, or had missing information on professional status were excluded.

Recruitment was conducted through professional mailing lists, institutional contacts, and national gastroenterology networks. The survey link could be forwarded to eligible colleagues, thereby allowing snowball sampling. The survey remained open

for four weeks, and a single reminder was circulated during this period. Although initial invitations were sent to 835 physicians, the exact size of the eligible denominator could not be determined because of link forwarding; consequently, a formal response rate could not be calculated. Of the 352 survey records submitted, 278 consenting, non-retired physicians who met all eligibility criteria were retained for the final analysis.

2.3. Survey Instrument

A 42-item questionnaire was constructed, covering demographic and professional characteristics, career-related outcomes, the Copenhagen Burnout Inventory (CBI), and an endoscopy workload module.

Copenhagen Burnout Inventory. Burnout was assessed using the CBI, a validated multidimensional instrument that measures personal, work-related, and patient-related burnout [16]. We employed a previously translated Turkish version of the CBI that had undergone psychometric evaluation [17]. The 19-item CBI yields three domain scores: personal burnout (general exhaustion), work-related burnout (exhaustion attributed to work), and patient-related burnout (exhaustion linked to patient care). Each item is rated on a five-point scale and scores are transformed to a 0-100 metric, with higher values denoting greater burnout. Domain scores were analysed both as continuous variables and as binary outcomes. Clinically relevant burnout was defined as a domain score of ≥50, in line with commonly applied CBI thresholds [18]; however, it should be noted that this cut-off has not been specifically validated among Turkish gastroenterologists. Cronbach's alpha was computed for each subscale to confirm internal consistency in the study sample.

Endoscopy Workload Module. To capture gastroenterology-specific workload exposures not covered by existing instruments, a 12-item Endoscopy Workload Module was developed for this study. Items were generated through a review of relevant literature and structured discussions among four gastroenterologists experienced in high-volume endoscopy practice. Content validity was further supported by independent review from three additional gastroenterologists who

assessed the relevance and coverage of the items. The module was pilot-tested with 10 gastroenterologists for clarity and face validity; minor wording refinements were made, and no items were added or removed. Pilot responses were excluded from the analytic dataset.

The module assessed weekly endoscopic procedure volume, number of half-day endoscopy sessions, frequency of list overruns, proportion of therapeutic or advanced procedures, proportion of emergency or unscheduled procedures, out-of-hours endoscopy duty, frequency of after-hours work-related communication, physical exhaustion after endoscopy days, perceived documentation burden, perceived adequacy of endoscopy unit staff support, perceived workload fairness, and access to institutional psychological support. Response formats included numeric entry, categorical choices, and five-point Likert-type scales. Because the module was designed to measure distinct workload exposures rather than a latent psychometric construct, no composite score was calculated; each item was analysed individually. The complete questionnaire took approximately 12 minutes to finish.

2.4. Outcomes

The primary outcomes were the continuous CBI personal, work-related, and patient-related burnout scores, along with the binary indicator of clinically relevant burnout (score ≥50) in each domain. For multivariable modelling, clinically relevant personal burnout was selected as the main binary outcome because it captures general exhaustion and was considered most directly aligned with the workload exposures under investigation. Secondary outcomes comprised intention to reduce clinical workload within the following 1-2 years and stress-related consideration of leaving the current hospital, the specialty of gastroenterology, the medical profession, or the country.

18 ### 2.5. Statistical Analysis

Categorical variables are summarised as frequencies and percentages. Continuous

6 variables, which deviated from normality according to the Shapiro-Wilk test, are

presented as medians and interquartile ranges (IQR). Group comparisons were performed using the Mann-Whitney U test or the Kruskal-Wallis test, as appropriate; significant Kruskal-Wallis tests were followed by Dunn's post-hoc pairwise comparisons. Trends across ordered categories of monthly on-call frequency were examined with the Jonckheere-Terpstra test.

Spearman rank correlation coefficients were calculated to explore associations between workload variables and CBI subscale scores. Multivariable logistic regression was employed to identify factors independently associated with clinically relevant personal burnout. Candidate predictors were selected on the basis of clinical relevance and univariable associations at $p < 0.10$. Collinearity among candidate variables was assessed before model entry, and the number of predictors was restricted to avoid overfitting. Adjusted odds ratios (ORs) with 95% confidence intervals (CIs) are presented. Interaction terms, including on-call burden × out-of-hours endoscopy duty, were explored where clinically plausible.

All tests were two-sided, and $p < 0.05$ was considered statistically significant. No imputation was performed for missing data; denominators are reported for each variable whenever item-level missingness occurred. Analyses were performed using SPSS version 26.0 (IBM Corp., Armonk, NY, United States) and R version 4.2.0 (R Foundation for Statistical Computing, Vienna, Austria).

2.6. Sample Size and Precision

No formal a priori sample size calculation was carried out, as this was an exploratory national survey aiming to describe burnout burden and workload-related factors among gastroenterology physicians. Given the recruitment strategy, which relied on professional networks and snowball sampling, the estimates obtained should be regarded as descriptive survey estimates rather than as probability-based population prevalence estimates. The event-per-variable ratio in the final multivariable model was greater than 10, indicating adequate stability for the reported associations.

3. Results

The final analytic sample comprised 278 consenting, non-retired gastroenterology physicians who fulfilled all eligibility criteria (Figure 1). Because item-level missingness varied across survey items, all percentages are reported using the available denominator for the respective variable.

3.1. Participant Characteristics

Table 1 presents the demographic and professional characteristics of the respondents. The majority were male (196/278, 70.5%), married (230/278, 82.7%), had at least one dependent requiring care (224/278, 80.6%), and were between 30 and 50 years of age (248/278, 89.2%). Gastroenterology fellows constituted 82/278 (29.5%) of the sample; 42/278 (15.1%) were specialists in the process of completing obligatory service, 92/278 (33.1%) were specialists who had already fulfilled this requirement, and 62/278 (22.3%) were academic faculty. Public sector employment was reported by 246/278 respondents (88.5%). General gastroenterology represented the primary clinical focus for 148/278 respondents (53.2%), followed by mixed practice (92/278, 33.1%) and other or subspecialty-focused practice (38/278, 13.7%).

3.2. Endoscopy Workload and Organisational Support

Table 2 summarises workload indicators and perceived organisational support. Weekly working hours exceeding 80 were reported by 64/276 respondents (23.2%), and 154/276 (55.8%) had six or more monthly on-call shifts. High endoscopy volume was common: 130/278 respondents (46.8%) performed more than 60 endoscopic procedures per week, and 168/278 (60.4%) conducted six or more half-day endoscopy sessions weekly. Endoscopy list overruns occurring at least once per week were reported by 150/274 respondents (54.7%), while 120/274 (43.8%) indicated that emergency or unscheduled procedures accounted for at least 10% of their total endoscopic workload. Out-of-hours endoscopy duty was reported by 70/276 respondents (25.4%).

Endoscopy-related physical and psychological strain was prevalent. Physical exhaustion following endoscopy days was reported by 194/272 respondents (71.3%). Frequent or very frequent after-hours work-related communication was reported by 200/278 (71.9%). Work–life conflict was acknowledged by 210/278 respondents (75.5%), and 220/278 (79.1%) indicated having insufficient energy after work for personal or family activities. Inadequate staffing support within the endoscopy unit was reported by 150/278 respondents (54.0%). Notably, only 6/278 respondents (2.2%) reported any access to institutional psychological support services.

3.3. Copenhagen Burnout Inventory Scores

CBI subscale scores are displayed in Table 3. Median scores were 71 (IQR 59–83) for personal burnout, 70 (IQR 57–82) for work-related burnout, and 64 (IQR 50–76) for patient-related burnout. Clinically relevant burnout, defined as a CBI subscale score of ≥50, was observed in 221/278 respondents (79.5%) for personal burnout, 217/278 (78.1%) for work-related burnout, and 194/278 (69.8%) for patient-related burnout. Academic faculty members exhibited significantly higher work-related burnout scores than fellows ($p = 0.04$). Respondents working in the public sector had higher scores across all three CBI domains compared with those in non-public practice (all $p < 0.001$). The internal consistency of the CBI in this sample was high, with Cronbach's alpha values of 0.89 for personal burnout, 0.87 for work-related burnout, and 0.84 for patient-related burnout.

3.4. On-Call Frequency and Personal Burnout

Personal burnout increased in a stepwise manner with rising monthly on-call frequency (Figure 2). Median personal burnout scores rose from 54 among respondents without on-call duties to 92 among those reporting 16 or more monthly on-call shifts. The proportion of respondents meeting the threshold for clinically relevant personal burnout climbed from 58.3% to 95.0% across these same categories. The Jonckheere-Terpstra test confirmed a statistically significant dose–response trend for both continuous scores and the binary burnout indicator (p for trend < 0.001 for each).

3.5. Factors Independently Associated with Clinically Relevant Personal Burnout

In the multivariable logistic regression model, which was adjusted for age, marital status, presence of dependents, and years of professional experience, five factors emerged as independently associated with clinically relevant personal burnout (Figure 3). These were: six or more monthly on-call shifts (adjusted OR 4.82, 95% CI 2.91–7.98), out-of-hours endoscopy duty (adjusted OR 3.45, 95% CI 2.10–5.67), weekly endoscopic volume exceeding 60 procedures (adjusted OR 2.91, 95% CI 1.82–4.66), perceived inadequate endoscopy unit staff support (adjusted OR 2.68, 95% CI 1.65–4.35), and six or more weekly outpatient clinic sessions (adjusted OR 2.40, 95% CI 1.48–3.90). Female sex showed a non-significant trend towards higher odds of clinically relevant personal burnout (adjusted OR 1.68, 95% CI 0.98–2.88; $p = 0.058$). Institutional psychological support could not be entered into the model because only six respondents reported its availability, precluding meaningful estimation.

3.6. Correlations and Exploratory Analyses

Spearman correlation analyses demonstrated consistent positive associations between workload variables and all three CBI subscale scores (Table 4). Monthly on-call frequency showed the strongest correlation with personal burnout (rho = 0.72), whereas endoscopy list overrun frequency was most strongly correlated with patient-related burnout (rho = 0.71). Work–life balance and perceived adequacy of staff support were inversely correlated with every burnout domain. All reported correlations were significant at $p < 0.001$.

In exploratory subgroup analyses, respondents who reported a very high on-call burden, defined as 11 or more shifts per month, together with out-of-hours endoscopy duty appeared to constitute a subgroup with particularly elevated personal burnout (median 90, IQR 82–96). However, given the cross-sectional design and the limited size of this subgroup, this observation should be regarded strictly as hypothesis-generating.

3.7. Career-Related Consequences

Career-related consequences were strikingly common among respondents. A total of 156/278 (56.1%) expressed an intention to reduce their clinical workload within the subsequent 1–2 years, and 144/278 (51.8%) reported having considered leaving their current hospital because of occupational stress. Stress-related consideration of leaving the country was reported by 132/278 (47.5%), while 118/278 (42.4%) had contemplated leaving the medical profession altogether. Furthermore, 72/278 (25.9%) had considered leaving the specialty of gastroenterology, and 54/278 (19.4%) stated that they would probably or definitely not choose gastroenterology again if given the opportunity to revisit their career decision.

4. Discussion

This national cross-sectional survey reveals a substantial burden of burnout among responding gastroenterology specialists and fellows in Turkey, with clinically relevant scores documented in the majority of participants across all three domains of the Copenhagen Burnout Inventory. More importantly, the study identifies a set of modifiable, endoscopy-specific workload factors that were independently associated with clinically relevant personal burnout. By combining a validated multidimensional burnout instrument with a purpose-designed workload module, these findings offer a granular view of how procedural demands and organisational conditions intersect in high-volume gastroenterology practice [16,17].

The proportion of respondents meeting the threshold for clinically relevant burnout was high. However, these percentages must be interpreted with considerable caution. The recruitment strategy—professional networks and snowball sampling—precluded calculation of a formal response rate and may have selectively attracted physicians who were experiencing greater occupational strain. Consequently, the figures reported here should be regarded as descriptive estimates derived from a self-selected sample rather than as unbiased national prevalence estimates. Direct comparison with the pooled burnout prevalence reported in a recent global meta-analysis of gastroenterology and endoscopy is therefore problematic, as estimates

vary according to the instrument, cut-off definition, sampling method, and healthcare system context [12]. The value of the present work lies less in the absolute prevalence and more in the pattern of associations between specific workload characteristics and burnout.

The strongest independent association was observed for monthly on-call frequency. A graded, stepwise increase in personal burnout was evident across ordered on-call categories, and having six or more monthly on-call shifts was associated with a nearly fivefold increase in the odds of clinically relevant personal burnout. Repeated on-call exposure may contribute to cumulative fatigue, disrupted sleep, and insufficient inter-shift recovery, all of which are core mechanisms within recovery-based models of occupational stress [19,20]. The exploratory observation that respondents with very high on-call burdens who also performed out-of-hours endoscopy constituted a subgroup with particularly elevated burnout scores is consistent with these models, although the cross-sectional design and small subgroup size limit any causal interpretation and this finding should be viewed as hypothesis-generating.

Beyond on-call burden, the endoscopy workload module provided specialty-specific insights that are not captured by total weekly working hours. High weekly endoscopic volume, list overruns, and out-of-hours endoscopy duty were each independently associated with burnout. These associations are clinically plausible. Endoscopy demands sustained concentration, fine motor precision, rapid decision-making, and continuous responsibility for patient safety; when performed under time pressure and without adequate recovery intervals, such demands may contribute to both psychological strain and potential threats to service quality [21]. List overrun frequency was also positively correlated with burnout scores, particularly patient-related burnout, suggesting that the spillover of scheduled work into intended recovery time warrants attention. Similarly, frequent after-hours work-related communication may blur the boundaries between professional and personal life, further limiting opportunities for psychological detachment. This interpretation is consistent with broader physician workforce

evidence showing that burnout is closely linked to reduced satisfaction with work–life integration [22].

The inverse associations observed between perceived staff support, work–life balance, and all three burnout domains reinforce the understanding that burnout is shaped substantially by organisational conditions. More than half of the respondents perceived endoscopy unit staffing as inadequate, and only 2.2% reported access to institutional psychological support. The near absence of such support is striking, particularly given the high frequency of career-related consequences: more than half of the participants intended to reduce their clinical workload within the next 1–2 years or had considered leaving their current hospital, and nearly half had considered leaving the country or the medical profession altogether. These figures point to a workforce sustainability challenge that extends beyond individual well-being. This interpretation is consistent with broader healthcare workforce evidence showing that work overload is associated with both burnout and intention to leave employment [23]. Public sector physicians, who constituted the large majority of the sample, reported significantly higher burnout scores than their non-public counterparts, possibly reflecting higher patient throughput, greater procedural volume, more frequent emergency duties, mandatory service obligations, and more limited administrative and personnel support.

Several practical implications emerge. Routine occupational health surveillance in gastroenterology should integrate validated burnout assessments with monitoring of endoscopy-specific workload indicators—on-call schedules, out-of-hours procedural duties, list overruns, after-hours communication, and perceived staffing adequacy. Capacity planning in endoscopy units needs to move beyond simple procedure counts to incorporate case complexity, recovery time, staffing levels, and the cumulative burden of unscheduled emergency work. Hospital-level measures such as protected breaks, streamlined documentation processes, equitable workload distribution, and confidential psychological support services are all actionable and have been identified as components of effective organisation-directed interventions in systematic reviews and recent gastroenterology-specific recommendations [24–26].

This study has several strengths. It is, to the best of our knowledge, the first national survey to examine burnout among gastroenterologists and gastroenterology fellows

in Turkey using the Copenhagen Burnout Inventory in conjunction with a dedicated endoscopy workload module. The sample spanned career stages and practice settings, and the survey captured not only generic work hours but also nuanced procedural and organisational exposures. This design enabled burnout to be examined as a marker of workload organisation and endoscopy service pressure rather than purely as an individual-level outcome.

Several limitations must be acknowledged. First, the cross-sectional design precludes causal inference; the reported associations indicate relationships, not causation. Second, self-reported data are susceptible to recall and social desirability biases, and the snowball recruitment strategy means that respondents may overrepresent physicians with higher burnout, limiting the generalisability of the observed prevalence. Third, the endoscopy workload module, although developed with expert input and pilot-tested for clarity and face validity, is not a formally validated psychometric scale; its items were therefore analysed individually. Fourth, objective indicators of endoscopy quality, staffing records, or administrative workload logs were not collected, so self-reported workload could not be corroborated. Finally, the CBI cut-off of ≥50, while widely used internationally, has not been specifically validated among Turkish gastroenterologists; however, the continuous score analyses and correlations showed consistent patterns, supporting the robustness of the associations irrespective of the chosen threshold.

Future longitudinal studies are needed to determine whether interventions that reduce excessive on-call frequency, restructure endoscopy scheduling to minimise list overruns, strengthen nursing and ancillary staffing, reduce documentation burden, and establish dedicated out-of-hours endoscopy pathways can lead to measurable improvements in burnout, workforce retention, and patient outcomes. Linking burnout measures with objective endoscopy quality indicators—such as adenoma detection rate, caecal intubation rate, and complication records—would further clarify the clinical implications.

5. Conclusion

Among responding gastroenterology specialists and fellows in Turkey, burnout scores were high and were independently associated with a distinct set of modifiable workload factors: frequent on-call duty, out-of-hours endoscopy, high weekly endoscopic volume, list overruns, after-hours communication, and perceived inadequate staff support. The near-universal absence of institutional psychological support and the high frequency of career-related consequences indicate that burnout in this population is not merely an individual concern but a system-level workforce and service-organisation issue. Targeted interventions addressing workload distribution, endoscopy unit staffing, emergency procedural pathways, scheduling practices, documentation burden, and access to psychological support are likely to be necessary to safeguard physician well-being and sustain the quality of endoscopic care.

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Author Contributions

Yavuz Özden contributed to conceptualization, study design, methodology, survey development, data curation, formal analysis, interpretation of data, manuscript drafting, and project administration.

Rasim Eren Cankurtaran contributed to methodology, survey development, data collection, data interpretation, and critical revision of the manuscript.

Çağlayan Keklikkıran contributed to data collection, literature review, data interpretation, and critical revision of the manuscript.

Çağdaş Erdoğan contributed to methodology, supervision, interpretation of data, and critical revision of the manuscript for important intellectual content.

All authors reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work.

Institutional Review Board Statement

The study protocol was approved by the Kayseri City Hospital Non-Interventional Clinical Research Ethics Committee (approval No. 2026/900; approval date: 28 April 2026).

Informed Consent Statement

All participants provided electronic informed consent before accessing the questionnaire.

Conflict-of-Interest Statement

The authors declare that they have no conflict of interest.

Funding Statement

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Data Sharing Statement

The anonymised dataset supporting the findings of this study is available from the corresponding author upon reasonable request and subject to institutional ethics committee approval. The dataset is not publicly available because the survey responses contain professional and organisational information that could potentially compromise participant anonymity.

Reporting Checklist Statement

15 The manuscript was prepared and reported according to the STROBE statement for observational studies and the CHERRIES checklist for internet-based surveys.

Artificial Intelligence-Assisted Technology Statement

1 During manuscript preparation, ChatGPT (OpenAI) was used only for English language editing and wording refinement. The tool was not used for data analysis, statistical interpretation, figure preparation, or generation of scientific conclusions. All authors reviewed and approved the final manuscript and take full responsibility for its content.

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Tables

Table 1. Demographic and professional characteristics of respondents.

Characteristic	n/N (%)
Age group	
<30 years	2/278 (0.7)
30–40 years	136/278 (48.9)
41–50 years	112/278 (40.3)
≥51 years	28/278 (10.1)
Sex	

Female	80/278 (28.8)
Male	196/278 (70.5)
Prefer not to say	2/278 (0.7)
Married	230/278 (82.7)
Dependents requiring care, ≥1	224/278 (80.6)
Professional status	
Gastroenterology fellows	82/278 (29.5)
Specialists completing obligatory service	42/278 (15.1)
Specialists who completed obligatory service	92/278 (33.1)
Academic faculty	62/278 (22.3)
Public sector practice	246/278 (88.5)
Clinical focus	
General gastroenterology	148/278 (53.2)
Mixed practice	92/278 (33.1)
Other or subspecialty-focused practice	38/278 (13.7)

Note. Values are presented as n/N (%). Percentages were calculated using the available denominator for each variable. For all variables shown in this table, the denominator was 278. “Dependents requiring care” indicates the presence of at least one dependent requiring care. Clinical focus categories are mutually exclusive. “Other or subspecialty-focused practice” includes advanced endoscopy, inflammatory bowel disease, hepatology, or other focused practice areas.

Table 2. Endoscopy workload and organisational support indicators.

Parameter	n/N (%)
Weekly working hours >80 h	64/276 (23.2)
Monthly on-call shifts ≥6	154/276 (55.8)
Weekly endoscopy volume >60 procedures/wk	130/278 (46.8)

Weekly endoscopy sessions ≥6 half-day units	168/278 (60.4)
Endoscopy list overruns ≥ once weekly	150/274 (54.7)
Emergency/unscheduled procedures ≥10% of endoscopy workload	120/274 (43.8)
Out-of-hours endoscopy duty	70/276 (25.4)
Endoscopy days physically exhausting	194/272 (71.3)
Frequent/very frequent after-hours work communication	200/278 (71.9)
Work–life conflict	210/278 (75.5)
Insufficient post-work energy for personal or family activities	220/278 (79.1)
Inadequate endoscopy unit staff support	150/278 (54.0)
Reported access to institutional psychological support	6/278 (2.2)

Note. Values are presented as n/N (%). Denominators vary because of item-level missingness. Endoscopy sessions refer to half-day endoscopy units. Endoscopy list overruns indicate lists exceeding scheduled time at least once weekly. Emergency or unscheduled procedures refer to respondents reporting that these procedures constituted at least 10% of their total endoscopy workload. Institutional psychological support refers to respondents' perceived access to psychological support through their institution.

Table 3. Copenhagen Burnout Inventory scores by professional status and practice setting.

Group	n	Personal burnout, median (IQR)	Work-related burnout, median (IQR)	Patient-related burnout, median (IQR)
All respondents	278	71 (59–83)	70 (57–82)	64 (50–76)

Gastroenterology fellows	82	72 (60–84)	68 (55–80)	65 (50–78)
Specialists completing obligatory service	42	68 (54–80)	68 (54–80)	60 (46–72)
Specialists who completed obligatory service	92	70 (58–82)	70 (56–82)	62 (48–74)
Academic faculty	62	74 (62–86)	74 (60–86)*	68 (52–80)
Public sector	246	74 (62–86)†	72 (58–84)†	66 (52–78)†
Non-public practice	32	58 (46–70)	60 (48–72)	52 (40–64)
Clinically relevant burnout, n/N (%)	—	221/278 (79.5)	217/278 (78.1)	194/278 (69.8)

Note. CBI subscale scores are presented as median (interquartile range) and were transformed to a 0–100 scale, with higher scores indicating greater burnout. Clinically relevant burnout was defined as a CBI subscale score of ≥50. Rows for professional status and practice setting represent separate stratifications. *p = 0.04 for the post-hoc comparison of work-related burnout between academic faculty and gastroenterology fellows. †p < 0.001 for public sector versus non-public practice for the corresponding CBI domain. The clinically relevant burnout row presents overall prevalence and was not included in the group comparisons shown in this table. CBI, Copenhagen Burnout Inventory; IQR, interquartile range.

Table 4. Spearman correlations between workload variables and CBI subscale scores.

Variable	Personal burnout	Work-related burnout	Patient-related burnout
Monthly on-call frequency	0.72	0.68	0.55
Weekly endoscopy volume	0.65	0.70	0.60

Endoscopy list overrun frequency	0.61	0.66	0.71
After-hours work communication frequency	0.59	0.64	0.52
Weekly working hours	0.58	0.62	0.48
Perceived staff support	−0.55	−0.60	−0.49
Work–life balance	−0.68	−0.74	−0.56

Note. Values represent Spearman's rank correlation coefficients (rho). Positive coefficients indicate higher burnout scores with increasing workload or burden. Negative coefficients for perceived staff support and work–life balance indicate lower burnout scores among respondents reporting more favourable organisational conditions. All correlations were statistically significant at $p < 0.001$. CBI, Copenhagen Burnout Inventory.

Figure Legends

Figure 1. Participant recruitment and analytic sample.

Flow diagram showing participant recruitment and inclusion in the final analytic sample. Initial invitations were sent to 835 gastroenterology physicians. Because

forwarding of the survey link was permitted, the exact eligible denominator could not be determined and a formal response rate could not be calculated. Of 352 submitted survey records, 278 consenting, non-retired physicians who were actively practising gastroenterology and met all eligibility criteria were included in the final analysis.

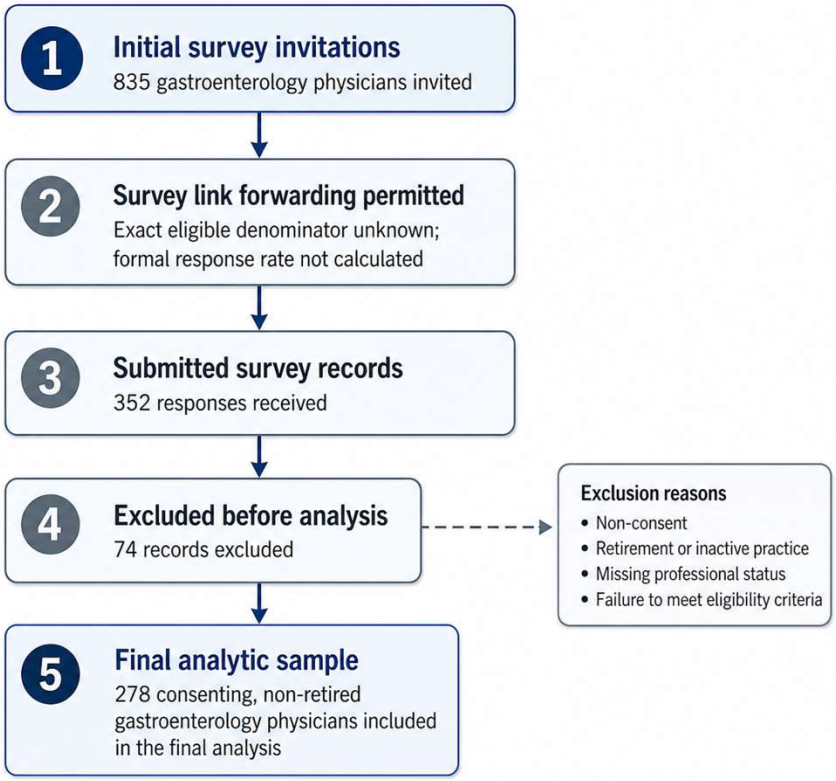


Figure 2. Personal burnout according to monthly on-call frequency.

Personal burnout increased progressively across categories of monthly on-call frequency. Panel A displays median personal burnout scores, and Panel B displays the proportion of respondents with clinically relevant personal burnout across

ordered on-call categories. Clinically relevant personal burnout was defined as a personal Copenhagen Burnout Inventory score of ≥50. Trends across monthly on-call categories were statistically significant for both personal burnout score and clinically relevant personal burnout prevalence (p for trend <0.001 for both). CBI, Copenhagen Burnout Inventory.

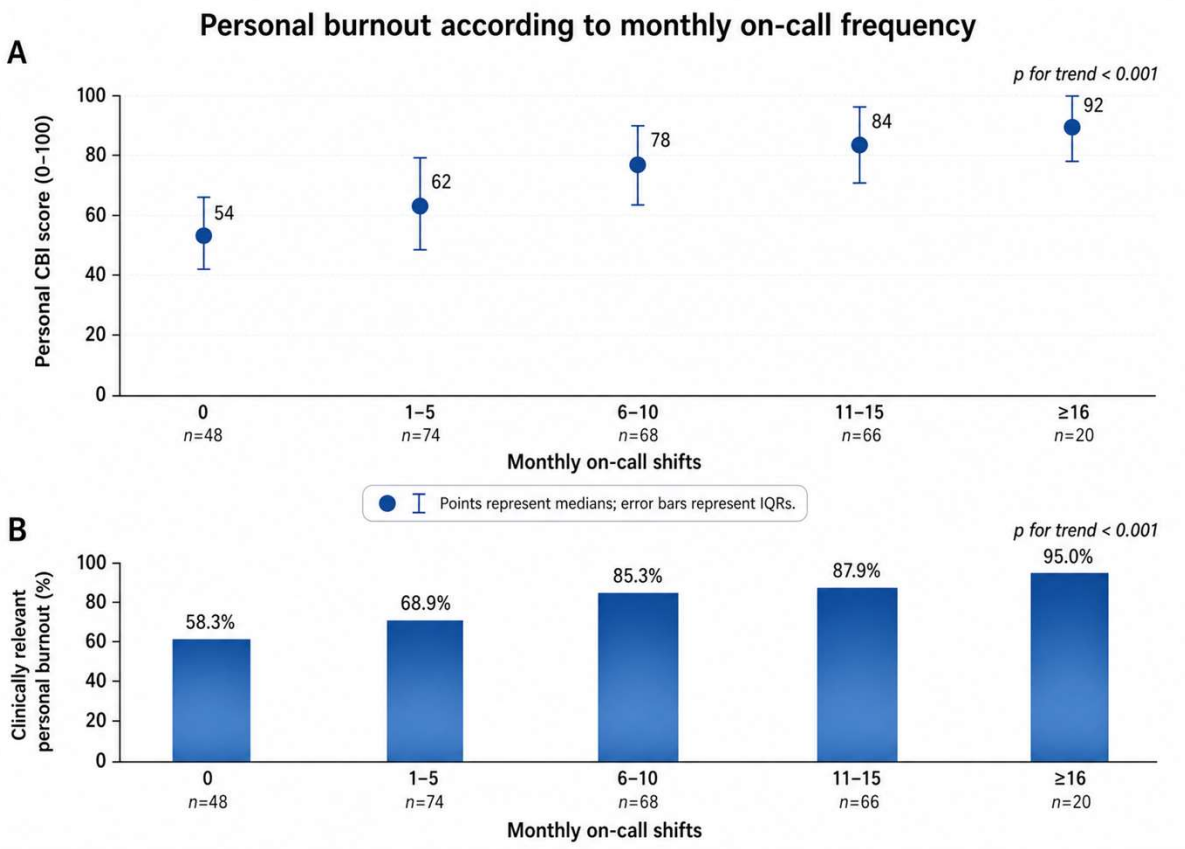
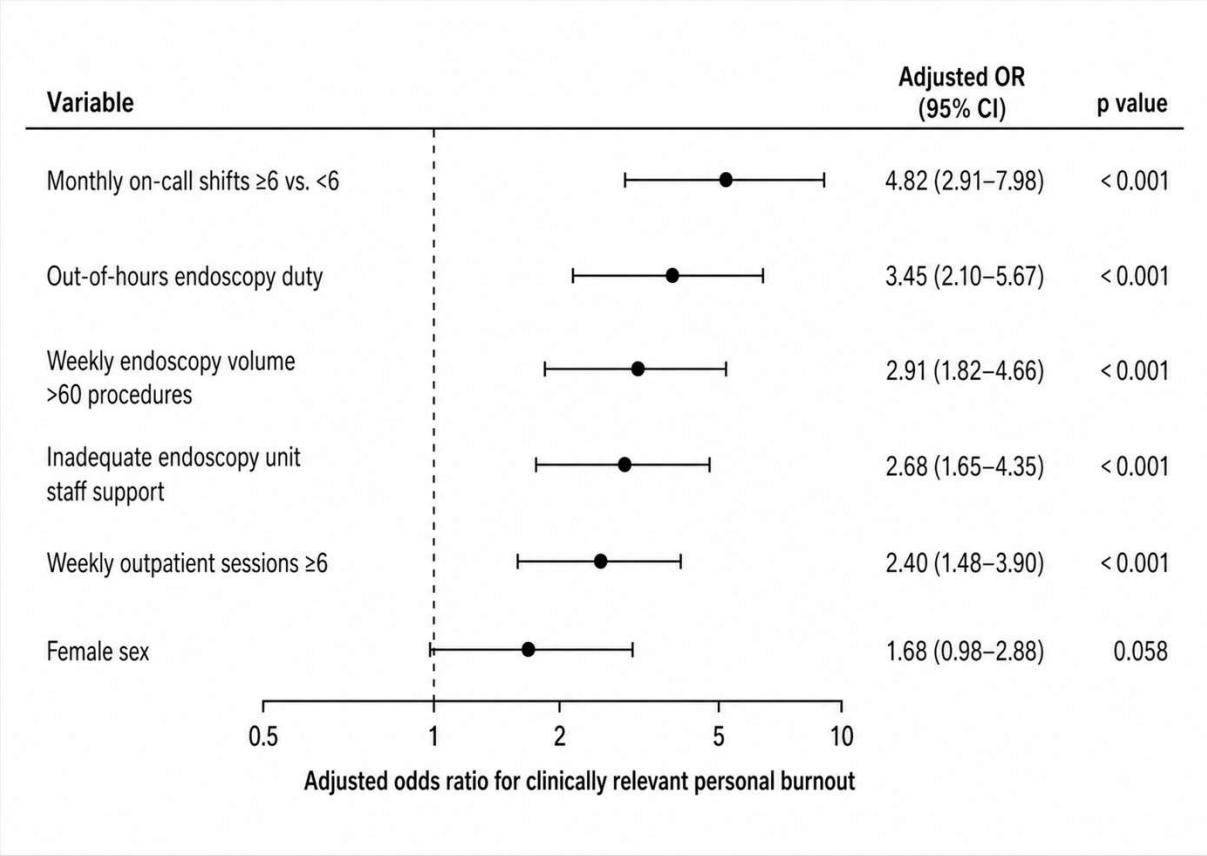


Figure 3. Factors associated with clinically relevant personal burnout.

Forest plot displaying adjusted odds ratios and 95% confidence intervals for factors independently associated with clinically relevant personal burnout in multivariable

logistic regression. Clinically relevant personal burnout was defined as a personal Copenhagen Burnout Inventory score of ≥50. The model included monthly on-call burden (≥6 vs <6 shifts), out-of-hours endoscopy duty, weekly endoscopy volume (>60 vs ≤60 procedures), inadequate endoscopy unit staff support, weekly outpatient session burden (≥6 vs <6 sessions), and female sex, and was adjusted for age, marital status, dependents, and years of professional experience. The dashed vertical line denotes an odds ratio of 1. CBI, Copenhagen Burnout Inventory; CI, confidence interval; OR, odds ratio.