PREVALENCE OF BURNOUT AND ITS ASSOCIATED RISK AND PROTECTIVE FACTORS AMONG NURSING STUDENTS IN SAUDI ARABIA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Abstract

Background
Burnout is increasingly recognized as a significant occupational health concern among nursing students worldwide. Despite growing evidence of its adverse academic and psychological consequences, Saudi-specific prevalence estimates remain inconsistent, and no previous synthesis has quantitatively pooled findings from this population.

Aim
This systematic review and meta-analysis aimed to estimate the pooled prevalence of burnout and its three core dimensions, emotional exhaustion, depersonalization, and reduced personal accomplishment among undergraduate nursing students in Saudi Arabia, and to synthesize associated risk and protective factors.

Methods
A comprehensive systematic search was conducted across five electronic databases, PubMed, MEDLINE, CINAHL Complete, Scopus, and Web of Science, from February to April 2026. Observational studies employing validated burnout measurement instruments and conducted among undergraduate nursing students in Saudi Arabia were eligible for inclusion. Methodological quality was independently appraised using the Joanna Briggs Institute (JBI) prevalence checklist. A random-effects meta-analysis with a variance-stabilizing transformation was used to estimate the pooled prevalence, and heterogeneity was quantified using the I^2 statistic. This review was prospectively registered with PROSPERO (CRD420261320297).

Results
Six studies (N = 1,851 participants) met the inclusion criteria; four reported overall burnout (N = 1,298). The pooled prevalence of overall burnout was 43% (95% CI: 20%–67%). Reduced personal accomplishment was the most prevalent dimension (59%), followed by depersonalization (52%) and emotional exhaustion (41%). Heterogeneity was extremely high across all outcomes ($I^2 > 95\%$). Narrative synthesis, guided by the Job Demands–Resources (JD-R) framework, identified academic workload, clinical placement stress and maladaptive coping strategies as significant risk factors. In contrast, resilience, adaptive coping and self-efficacy emerged as protective factors.

Conclusion
Burnout is prevalent and multidimensional among nursing students in Saudi Arabia, with nearly half affected. These findings underscore the need for theory-informed, multi-level interventions that address both academic demands and personal resources. The limited number of eligible studies restricts subgroup analysis and publication bias assessment, highlighting the urgent need for methodologically rigorous primary research in this region.

Keywords
burnout; nursing students; academic stress; Saudi Arabia; meta-analysis; systematic review; Job Demands–Resources; prevalence

Introduction

Burnout is a work-related psychological syndrome characterized by emotional exhaustion, depersonalization (or cynicism), and reduced personal accomplishment (1,2). Although originally conceptualized within occupational settings, burnout has increasingly been recognized in academic populations, particularly among students enrolled in health-related disciplines (3). The conceptualization of student burnout parallels occupational burnout, reflecting chronic exposure to academic stressors, emotional demands, and sustained performance pressures.

Nursing students have been consistently reported to experience elevated levels of stress and burnout throughout their education (4). Nursing education combines intensive theoretical coursework with clinical placements that expose students to emotionally and physically demanding situations (5,6). Clinical exposure to patient suffering, performance evaluations, heavy academic workload, and role-related pressures are among the most commonly identified stressors in this population (5,6). In addition, nursing education entails progressive professional formation and the development of clinical responsibility, which may further amplify perceived stress during training (7).

International evidence indicates that burnout among nursing students is a growing global concern. A recent systematic review and meta-analysis estimated that approximately one-quarter of nursing students worldwide experience burnout, with emotional exhaustion being the most prevalent dimension (4). Burnout in this population has been associated with diminished academic engagement, increased psychological distress, reduced well-being, and heightened risk of program attrition (3). These consequences extend beyond individual student outcomes and may ultimately threaten workforce sustainability and quality of patient care.

In Saudi Arabia, nursing education is characterized by rigorous curricula, extensive clinical training hours, and increasing expectations aligned with the national healthcare transformation goals outlined in Saudi Vision 2030. Emerging local evidence suggests substantial levels of burnout among Saudi nursing students, particularly in emotional exhaustion and depersonalization (8,9). Recent studies have reported high burnout levels among undergraduate nursing students, especially during clinical training (9,10), and sociocultural and educational structures may further influence how stress and burnout are experienced and disclosed in this context. Despite this growing body of primary research, findings remain fragmented, with substantial variation in measurement tools, reported prevalence rates, and identified risk factors across studies (9,10).

To date, no study has quantitatively synthesized burnout prevalence or systematically examined associated risk and protective factors among Saudi nursing students. International meta-analyses provide global estimates (4), but these findings are not directly generalizable to Saudi Arabia, given context-specific educational structures, sociocultural expectations, and evolving workforce demands. Without pooled national data, policymakers and educational leaders lack robust evidence to guide curriculum reform, student support strategies, and workforce planning. This systematic review and meta-analysis addresses this gap by generating pooled national prevalence estimates and synthesizing the academic, psychological, and contextual determinants of burnout among Saudi nursing students.

Objectives

The review focused on undergraduate nursing students in Saudi Arabia (population), burnout (outcome), and its three core dimensions, as measured by validated instruments, in academic and clinical training settings (context). The primary objective was to estimate the pooled prevalence of overall burnout among nursing students in Saudi Arabia. Specifically, the review aimed to: (1) estimate the pooled prevalence of overall burnout; (2) estimate the pooled prevalence of each core burnout dimension - emotional exhaustion, depersonalization (or cynicism), and reduced personal accomplishment; and (3) identify and synthesize academic, psychological, demographic, and contextual risk and protective factors associated with burnout in this population. Where sufficient data were available, subgroup analyses were planned to explore potential sources of heterogeneity, including measurement instruments, geographic region and academic year.

Methods

Theoretical framework

This review is informed by the Job Demands–Resources(JD-R) model (11,12,13), a widely applied theoretical framework for understanding the development of burnout in occupational and performance-based contexts. The JD-R model proposes that burnout emerges when chronic environmental demands exceed an individual's available psychological, social, and organizational resources. Within nursing education, students are exposed to multiple concurrent academic and clinical demands, including intensive coursework, high-stakes examinations, extended clinical hours, exposure to patient suffering, and sustained performance pressures (5,6) that may activate the health-impairment pathway described in the model, progressively leading to emotional exhaustion, depersonalization, and reduced personal accomplishment. Conversely, personal and institutional resources, including resilience, adaptive coping strategies, self-efficacy, social support, and positive learning environments, may buffer against burnout risk (4,6). The JD-R framework provides a theoretically grounded structure for interpreting both the pooled prevalence estimates and the identified risk and protective factors synthesized in this review, situating burnout within the dynamic interplay between educational demands and available resources.

Study design and review registration

This systematic review and meta-analysis were conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement (14). The review was prospectively registered with the International Prospective Register of Systematic Reviews (PROSPERO; registration number: CRD420261320297) before data collection. The methodological approach to quantitative synthesis followed established guidance for meta-analytic modelling, heterogeneity assessment, and bias evaluation in nursing research (15,16).

The following research questions guided the review:

1. What is the pooled prevalence of burnout among nursing students in Saudi Arabia?

2. What is the pooled prevalence of each burnout dimension, emotional exhaustion, depersonalization, and reduced personal accomplishment?

3. What academic, psychological, and contextual risk and protective factors are associated with burnout in this population?

These questions were structured using the Population–Exposure–Outcome (PEO) framework, which is recommended for prevalence and exposure-focused systematic reviews (17).

Eligibility criteria

Eligibility criteria were defined a priori to ensure clarity, reproducibility, and methodological consistency, in accordance with PRISMA 2020 recommendations (14).

Population

Studies were eligible if they included undergraduate nursing students enrolled in accredited Saudi Arabian universities. Studies that recruited mixed health-discipline samples were retained only if nursing-specific data could be extracted independently as a separate component.

Outcomes

Studies were required to report at least one of the following: the prevalence of overall burnout; sufficient data to calculate prevalence (i.e., the number of participants exceeding established cut-off thresholds); or the prevalence of individual burnout dimensions (emotional exhaustion, depersonalization, or reduced personal accomplishment). Burnout was required to be measured using a validated instrument, such as the Maslach Burnout Inventory (MBI) or its validated student adaptation (MBI-SS) (2).

Study design

Eligible designs included quantitative observational studies, specifically cross-sectional and cohort designs, which are methodologically appropriate for prevalence estimation and for examining associated factors (15).

Language and publication status

Only peer-reviewed articles published in English were eligible for inclusion. No restrictions on publication date were applied. Grey literature, including theses, dissertations, and conference abstracts, was excluded to ensure methodological consistency and to restrict inclusion to rigorously peer-reviewed evidence (14).

Information sources and search strategy

A comprehensive and systematic electronic search was conducted across five databases: PubMed, MEDLINE, CINAHL Complete (accessed via the Saudi Digital Library), Scopus, and Web of Science. The search was conducted from February to April 2026. Search strategies were constructed using controlled vocabulary (MeSH terms) and free-text keywords related to three core concepts: burnout, nursing students, and Saudi Arabia. Boolean operators (AND, OR) were used to combine search terms, and strategies were tailored to each database's indexing system and controlled vocabulary. The complete PubMed search strategy is presented in Appendix A. In addition, the reference lists of all included studies were manually screened to identify any eligible studies not captured through the electronic searches.

Study selection process

All records retrieved from database searches were imported into reference management software (EndNote) and duplicate records were removed before screening. Two reviewers (NA and BA) independently screened all titles and abstracts against the predefined eligibility criteria. Full-text articles for all potentially eligible records were subsequently retrieved and independently assessed by the same two reviewers. Discrepancies at either the title/abstract or full-text screening stage were resolved through discussion and consensus between the two reviewers; no formal inter-rater reliability statistic was calculated. When consensus could not be reached, a third reviewer (MA) served as adjudicator and made the final determination. This structured multi-reviewer selection process reduces the risk of selection bias and strengthens the overall methodological rigor of the review (14). The complete study selection process is illustrated in a PRISMA 2020 flow diagram.

Data collection process

A standardized, pilot-tested data extraction form was developed a priori in accordance with best practices for systematic reviews and quantitative synthesis (15,16). Two reviewers (NA and BA) independently extracted data from each included study, and all extracted items were subsequently cross-checked for accuracy and completeness. Discrepancies were resolved through discussion and consensus, when agreement could not be reached. MA reviewed the contested items and made the final determination. This multi-reviewer extraction process strengthens reliability and minimizes the risk of data extraction errors (14).

Data items

All data items were predefined before extraction in accordance with PRISMA 2020 recommendations (14). Extracted variables included: study characteristics (first author, publication year, geographic region within Saudi Arabia); methodological features (study design, total sample size); participant characteristics (gender distribution, academic year or level); burnout measurement instrument and cut-off classification criteria; prevalence estimates for overall burnout and each subscale; identified risk and protective factors; and the statistical methods employed. The complete data

Risk of bias assessment

The methodological quality of each included study was independently assessed by two reviewers (NA and MA) using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Studies Reporting Prevalence Data (18). This tool evaluates key quality domains, including sampling adequacy, measurement validity, and the appropriateness of statistical analysis for prevalence research. When disagreements arose, BA adjudicated and made the final determination. Studies were categorized as low (7–9 criteria met), moderate (4–6 criteria met), or high (≤3 criteria met) risk of bias. A summary of the risk of bias assessments for all included studies is presented in the Results section (Table 2).

Data synthesis and meta-analysis

A narrative synthesis was first conducted to summarize the characteristics of included studies and to describe reported risk and protective factors across studies. Where at least three studies reported comparable prevalence outcomes for the same burnout construct, quantitative pooling was undertaken.

Given the anticipated clinical and methodological heterogeneity across institutions, geographic regions within Saudi Arabia, and burnout measurement instruments, pooled prevalence estimates were calculated using a random-effects model. Between-study variance (τ^2) was estimated using the restricted maximum-likelihood (REML) method, which yields more stable variance estimates than the traditional DerSimonian–Laird approach, particularly when the number of included studies is small.

Because prevalence data are bounded proportions that may exhibit unstable variance near 0 or 1, a Freeman–Tukey double arcsine transformation was applied before pooling. Studies were weighted by inverse variance, and pooled estimates were subsequently back-transformed to the original proportion scale for clinical interpretation. Separate meta-analyses were conducted for overall burnout, emotional exhaustion, depersonalization, and reduced personal accomplishment. All pooled estimates are reported with 95% confidence intervals (CIs). All statistical analyses were conducted in R (version 4.5.2) using the meta and metafor packages.

Assessment of heterogeneity

Statistical heterogeneity across studies was assessed using Cochran's Q statistic, the between-study variance estimate (τ^2), and the I^2 statistic, which reflects the proportion of total variability in effect estimates attributable to between-study heterogeneity rather than sampling error. I^2 values exceeding 75% were interpreted as indicating substantial heterogeneity. Confidence intervals for τ^2 and τ were derived using the Q-profile method.

Subgroup and sensitivity analyses.

Pre-specified subgroup analyses were planned for implementation where sufficient data were available to explore potential sources of heterogeneity. Subgroups were defined according to: burnout measurement instrument (MBI vs. MBI-SS); geographic region within Saudi Arabia; and cut-off classification criteria (standard published thresholds, study-specific criteria, or percentile-based classifications). Between-subgroup differences were tested using mixed-effects models. Meta-regression analyses were additionally performed to examine whether publication year was independently associated with burnout prevalence. Sensitivity analyses were conducted using leave-one-out procedures, in which each study was sequentially removed to evaluate its influence on the pooled prevalence estimate and heterogeneity statistics.

Publication bias

Formal assessment of publication bias using funnel plot asymmetry or Egger's regression test was not conducted in this review. As fewer than 10 studies were included in each meta-analysis, these methods lack adequate statistical power and reliability for meaningful interpretation, and their application is not recommended under these conditions (14).

Certainty of evidence

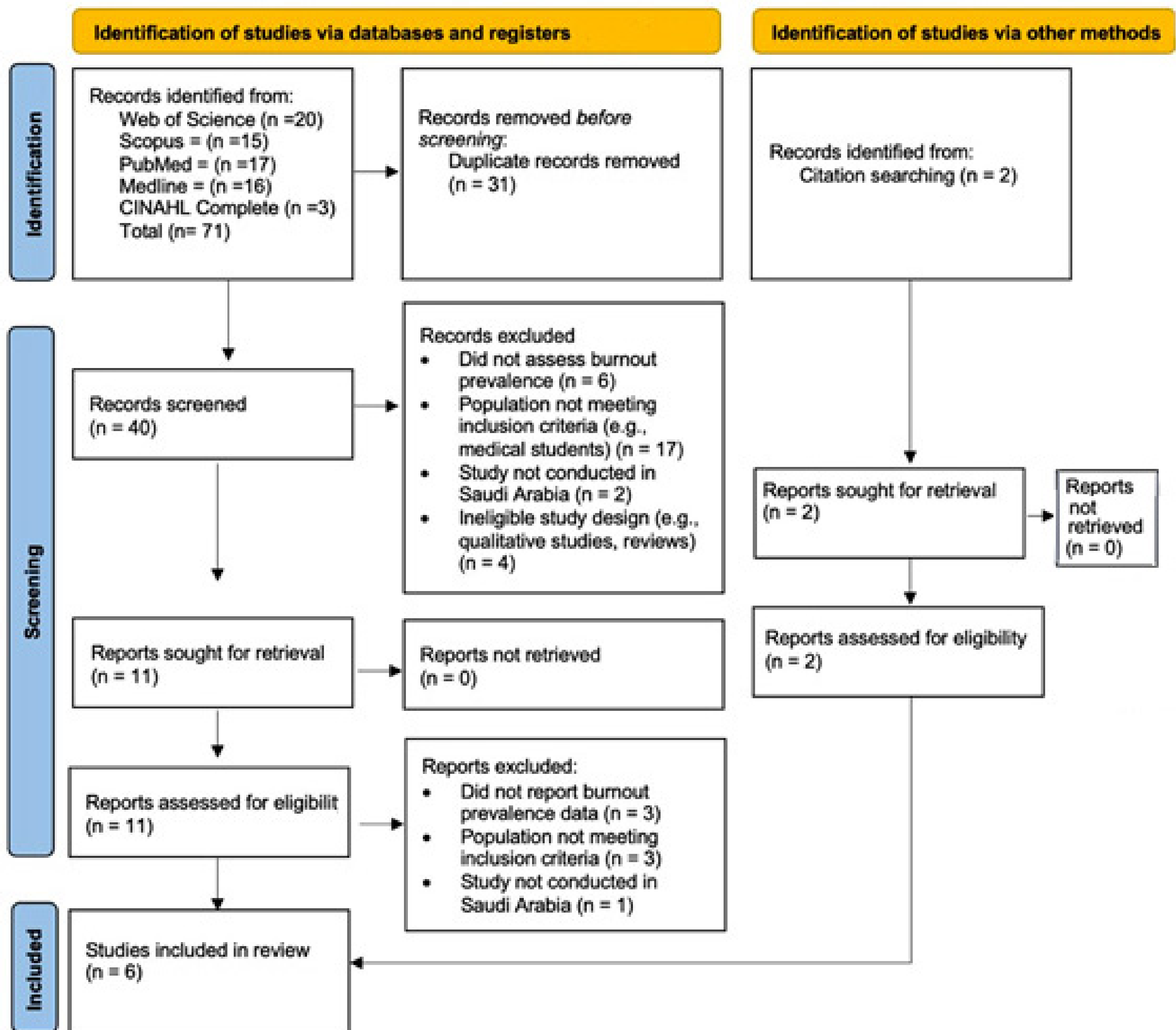
Formal grading of evidence certainty using the GRADE framework was not applied, as the review focused on prevalence estimation from observational cross-sectional studies for which GRADE criteria are not routinely indicated. Methodological quality was instead systematically appraised using the JBI Critical Appraisal Checklist for Prevalence Studies (18), and all findings were interpreted in the context of the risk-of-bias profile of the included evidence base.

Results

Study selection

The database search identified 71 records across five electronic databases (Web of Science, n = 20; Scopus, n = 15; PubMed, n = 17; MEDLINE, n = 16; CINAHL Complete, n = 3). After removing 31 duplicate records, 40 records remained and were screened by title and abstract. Of these, 29 were excluded at the screening stage: six did not assess burnout prevalence, 17 involved populations that did not meet inclusion criteria, two were not conducted in Saudi Arabia, and four used ineligible study designs. Eleven full-text articles were retrieved and independently assessed for eligibility; seven were subsequently excluded (three did not report burnout prevalence data, three included ineligible populations, and one was not conducted in Saudi Arabia), leaving four eligible studies from the database search. An additional two records identified through citation searching were assessed for eligibility, and both met the inclusion criteria. In total, six studies were included in the systematic review and meta-analysis (Figure 1 -).

Figure 1. PRISMA 2020 Flow Diagram Showing the Study Selection Process



Study characteristics

Six cross-sectional studies conducted in Saudi Arabia met the eligibility criteria, comprising a total of 1,851 nursing students. Sample sizes ranged from 205 to 564 participants. Studies were conducted in Riyadh (k = 3), Dammam (k = 1), Madinah (k = 1), and across multiple Saudi nursing programs (k = 1). Burnout was assessed using either the Maslach Burnout Inventory (MBI; k = 3) or the Maslach Burnout Inventory–Student Survey (MBI-SS; k = 3). Considerable variability in cut-off classification criteria was observed: standard recommended thresholds (k = 4), study-specific cut-offs (k = 1), and percentile-based classification (k = 1). Study characteristics are presented in Table 1.

Table 1. Characteristics of included studies

Study	Region	N	Instrument & cut-off	Overall (%)	EE (%)	DP (%)	PA (%)	Risk factors	Protective factors
Alemam et al., 2023[8]	Riyadh	205	MBI-SS; EE ≥12.5, CY ≥7.5, rPE ≥10.5	62.0	69.8	72.7	66.8	Lower GPA	Exercise; sleep duration
Altharman et al., 2023[9]	Multiple	564	MBI; EE >30, DP >12, PA <33	65.0	42.0	54.0	77.0	Higher GPA	Psychological resilience
Alghamdi, 2024[18]	Dammam	243	MBI-SS; EE ≥16, CY ≥11, PA ≤23	18.1	30.0	16.0	39.5	NR	Psychological resilience
Andargeery et al., 2025[19]	Riyadh	286	MBI-SS; study-specific cut-offs	28.0	30.1	32.2	25.5	Lower GPA; low English proficiency; lack of interest; low peer support	Self-efficacy; positive learning experience
Andargeery et al., 2024[20]	Riyadh	237	MBI; standard scoring	NR	43.5	77.6	74.3	Academic stress; psychological distress	NR
Moafa et al., 2025[10]	Madinah	316	MBI; percentile (≥75th EE/DP; ≤25th PA)	NR	30.0	59.0	66.0	Maladaptive coping	Adaptive coping

Risk of bias assessment

Five of the six included studies were rated as low risk of bias (JBI scores 8–9/9), and one study was rated as moderate risk of bias (Andargeery et al., 2024;20 score: 8/9, with one item rated unclear). No studies were rated as high risk of bias, indicating an overall acceptable methodological quality of the included evidence base. Full item-level ratings are presented in Table 2.

Table 2. JBI critical appraisal results for included studies

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Total	Risk of bias
Alemam et al., 2023[8]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	Low
Altharman et al., 2023[9]	Y	N	Y	Y	Y	Y	Y	Y	Y	8	Low
Alghamdi, 2024[18]	Y	N	Y	Y	Y	Y	Y	Y	Y	8	Low
Andargeery et al., 2025[19]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	Low
Andargeery et al., 2024[20]	Y	Y	Y	Y	Y	Y	Y	Y	U	8	Moderate
Moafa et al., 2025[10]	Y	Y	Y	Y	Y	Y	Y	Y	Y	9	Low

Pooled prevalence estimates

A summary of all pooled prevalence estimates, heterogeneity statistics, and between-study variance parameters is presented in Table 3.

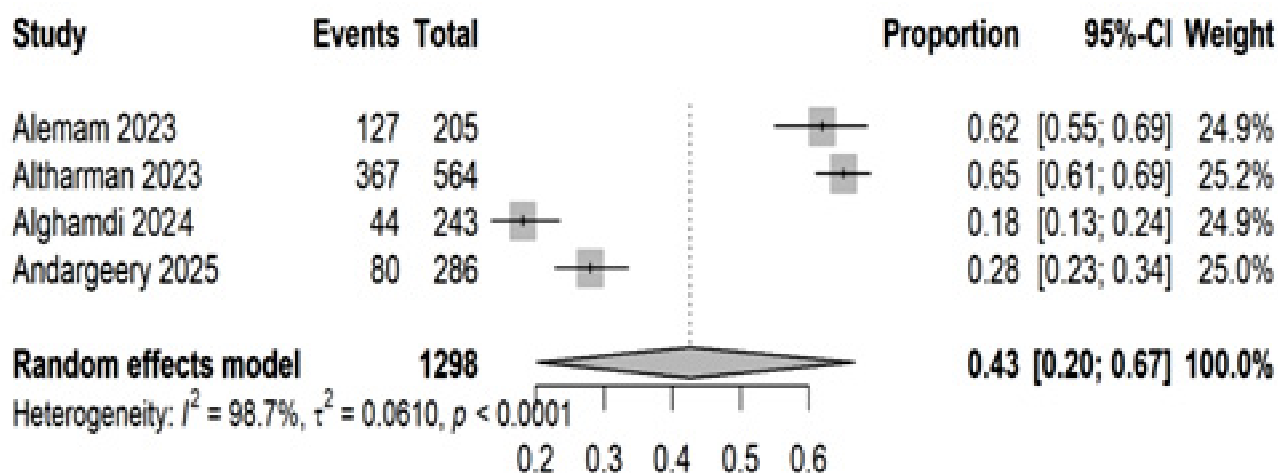
Table 3. Summary of pooled prevalence estimates from random-effects meta-analysis

Outcome	k	N	Pooled prevalence	95% CI	Q (df)	p	I^2	τ^2	τ
Overall burnout	4	1,298	43%	20–67%	234.70 (3)	<.0001	98.7%	0.0610	0.247
Emotional exhaustion	6	1,851	41%	29–53%	113.29 (5)	<.0001	95.6%	0.0237	0.154
Depersonalization	6	1,851	52%	32–71%	308.51 (5)	<.0001	98.4%	0.0622	0.249
Reduced personal accomplishment	6	1,851	59%	41–75%	293.54 (5)	<.0001	98.3%	0.0459	0.214

Pooled prevalence of overall burnout

Four studies comprising 1,298 nursing students reported overall burnout, defined as the concurrent presence of high emotional exhaustion, high depersonalization, and low personal accomplishment. The pooled prevalence of overall burnout was 43% (95% CI: 20%–67%). Statistical heterogeneity was extremely high: Q(3) = 234.70, $p < .0001$, $I^2 = 98.7\%$, $\tau^2 = 0.0610$, $\tau = 0.247$. The wide confidence interval and large τ value confirm that true burnout prevalence varied substantially across settings, and the pooled estimate should be interpreted as a central tendency across heterogeneous study contexts rather than a precise point estimate. The pooled prevalence of overall burnout is presented in Figure 2.

Figure 2. Forest plot of the pooled prevalence of overall burnout among nursing students in Saudi Arabia

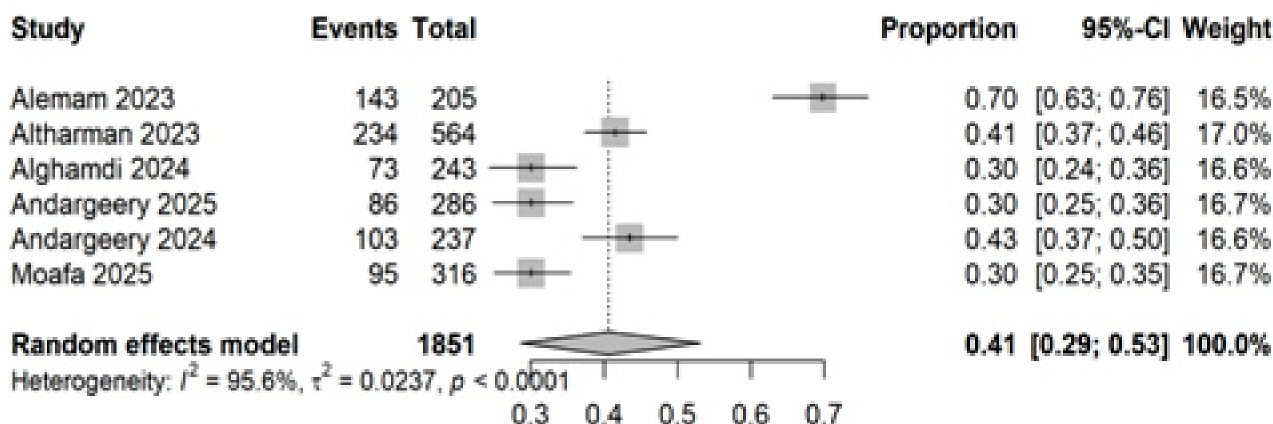


Pooled prevalence of burnout dimensions

Emotional exhaustion

All six studies (N = 1,851) contributed to the meta-analysis of emotional exhaustion (EE). The pooled prevalence of high EE was 41% (95% CI: 29%–53%), Q(5) = 113.29, $p < .0001$, $I^2 = 95.6\%$, $\tau^2 = 0.0237$, $\tau = 0.154$. Approximately two in five nursing students met criteria for high emotional exhaustion (Figure 3).

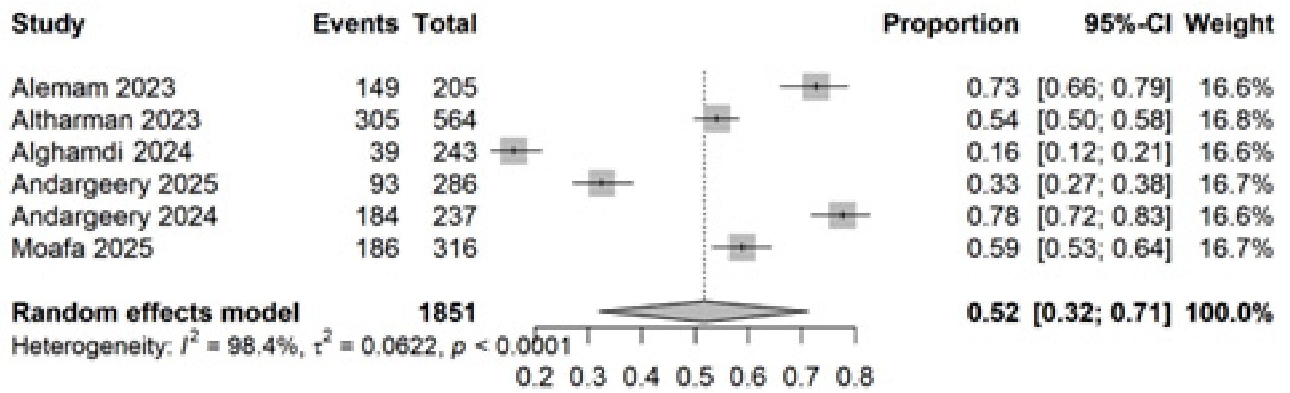
Figure 3. Forest plot of pooled prevalence of high emotional exhaustion among nursing students in Saudi Arabia



Depersonalization

All six studies (N = 1,851) were included in the meta-analysis of depersonalization (DP). The pooled prevalence of high DP was 52% (95% CI: 32%–71%), $Q(5) = 308.51$, $p < .0001$, $I^2 = 98.4\%$, $\tau^2 = 0.0622$, $\tau = 0.249$. Approximately one in two nursing students reported high depersonalization, though estimates varied markedly across settings (Figure 4).

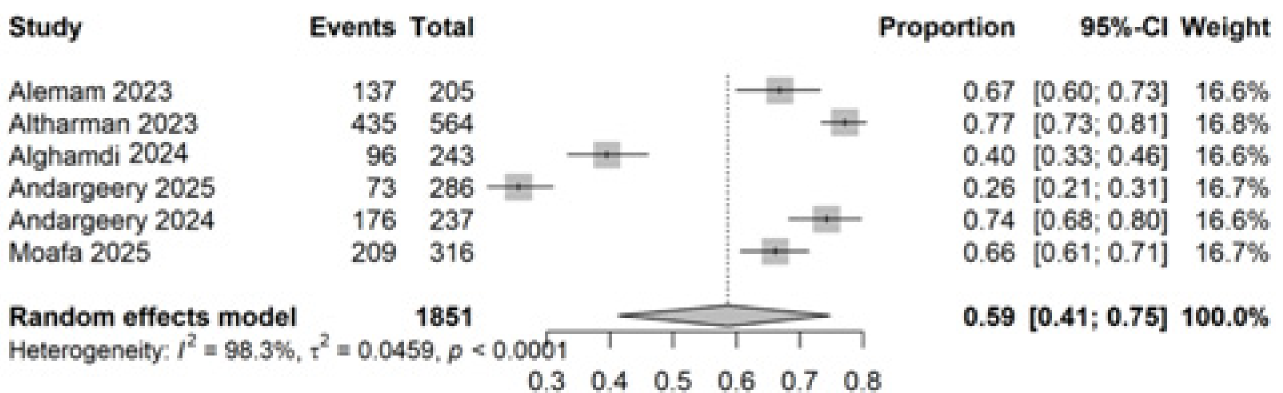
Figure 4. Forest plot of pooled prevalence of high depersonalization among nursing students in Saudi Arabia



Reduced personal accomplishment

All six studies (N = 1,851) were included in the meta-analysis of reduced personal accomplishment (PA). The pooled prevalence was 59% (95% CI: 41%–75%), $Q(5) = 293.54$, $p < .0001$, $I^2 = 98.3\%$, $\tau^2 = 0.0459$, $\tau = 0.214$. Among the three burnout dimensions, reduced personal accomplishment demonstrated the highest pooled prevalence, suggesting that feelings of diminished professional efficacy represent the most prevalent burnout-related challenge among Saudi nursing students (Figure 5).

Figure 5. Forest plot of pooled prevalence of reduced personal accomplishment among nursing students in Saudi Arabia



Subgroup analyses

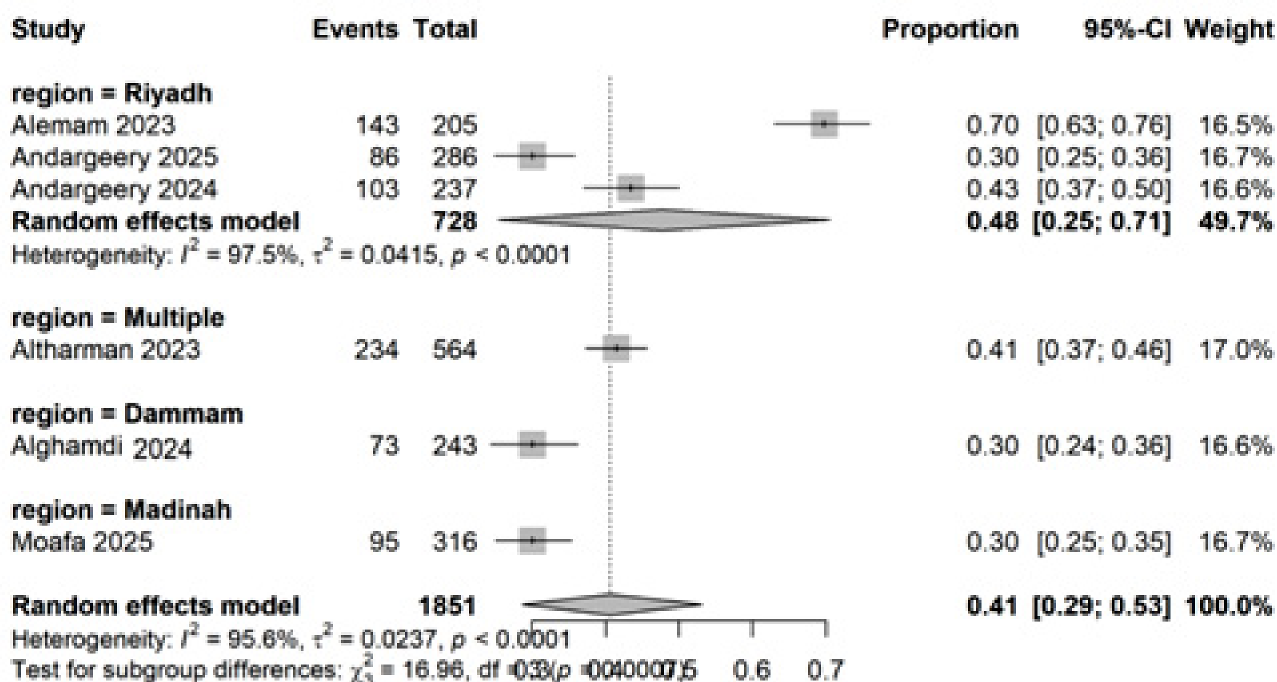
Pre-specified subgroup analyses were conducted to explore potential sources of the consistently extreme heterogeneity observed across all outcomes. Moderators examined were: measurement instrument (MBI vs. MBI-SS), geographic region within Saudi Arabia, and cut-off classification criteria.

Emotional exhaustion: moderator analyses

By instrument. The pooled prevalence of high EE was 43.1% for MBI-SS studies and 38.2% for MBI studies. The test for subgroup differences was not statistically significant (Q(1) = 0.12, p = .73), indicating that instrument type did not significantly moderate EE prevalence.

By region. Regional subgroup differences were statistically significant (χ^2 = 16.96, df = 3, p < .0001). Pooled EE prevalence estimates were: Riyadh (k = 3): 48% (95% CI: 25%–71%), I^2 = 97.5%, τ^2 = 0.0415; Multiple programs (k = 1): 41%; Dammam (k = 1): 30%; Madinah (k = 1): 30%. Although EE prevalence was highest in Riyadh-based samples, caution is warranted, as three of the four regional subgroups were represented by a single study, limiting the stability of the estimates (Figure 6).

Figure 6. Forest plot of pooled prevalence of high emotional exhaustion by geographic region in Saudi Arabia



By cut-off criteria. The test for subgroup differences was not statistically significant (Q(2) = 3.57, p = .168), indicating that cut-off methodology did not significantly explain between-study heterogeneity in EE.

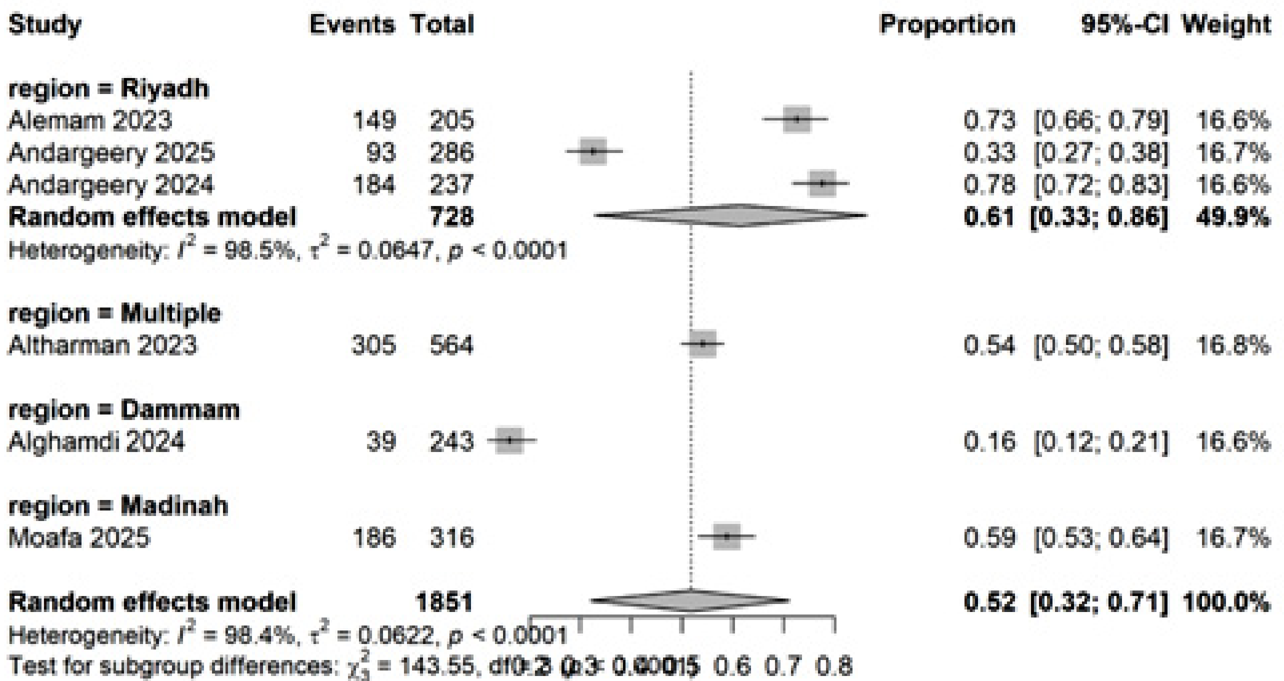
Meta-regression by publication year. Publication year was not a statistically significant predictor of EE prevalence (β = −0.0852, p = .206; R^2 = 10.97%), indicating no clear temporal trend.

Depersonalization: moderator analyses

By instrument. Studies using the MBI reported a higher pooled DP prevalence (63.8%) compared with MBI-SS studies (39.5%). The test for subgroup differences was not statistically significant (Q(1) = 1.58, p = .208).

By region. Regional subgroup differences were statistically significant (χ^2 = 143.55, df = 3, p < .0001). Pooled DP prevalence estimates were: Riyadh (k = 3): 61% (95% CI: 33%–86%), I^2 = 98.5%, τ^2 = 0.0647; Multiple programs (k = 1): 54%; Dammam (k = 1): 16%; Madinah (k = 1): 59%. As with EE, three regional subgroups were represented by a single study each (Figure 7).

Figure 7. Forest plot of pooled prevalence of high Depersonalization by geographic region in Saudi Arabia.



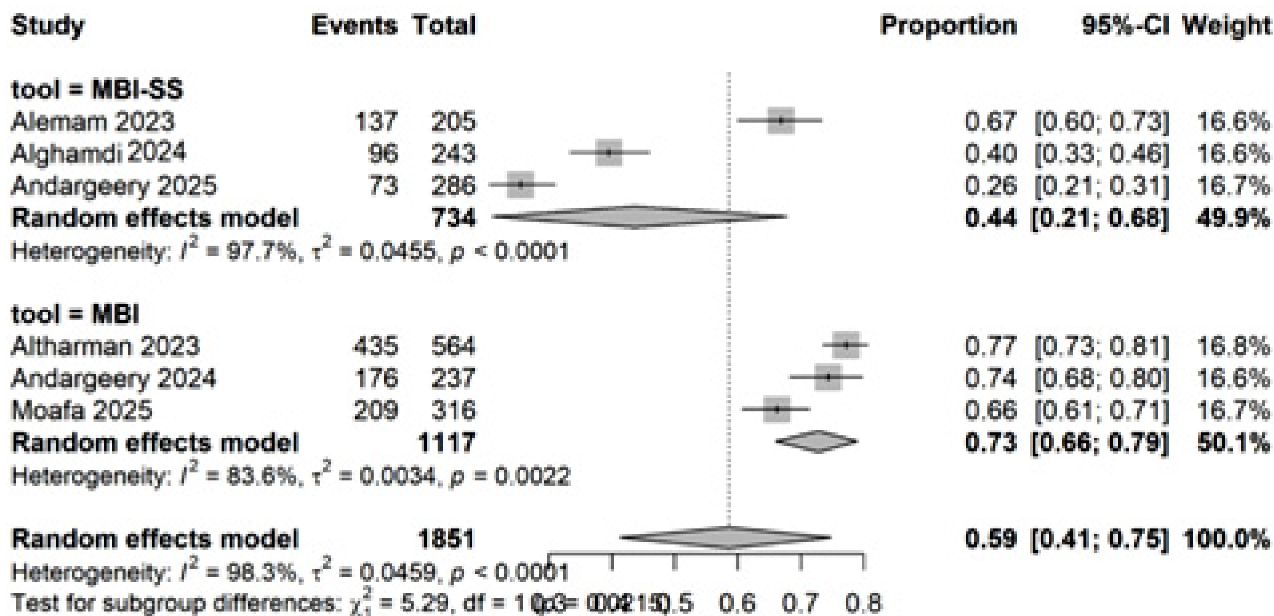
By cut-off criteria. The test for subgroup differences by cut-off classification was not statistically significant (p > .05), indicating that cut-off methodology did not significantly moderate DP prevalence.

Meta-regression by publication year. Publication year was not a statistically significant predictor of DP prevalence (β = 0.0051, p = .968; R^2 = 0%), indicating no temporal trend.

Reduced personal accomplishment: moderator analyses.

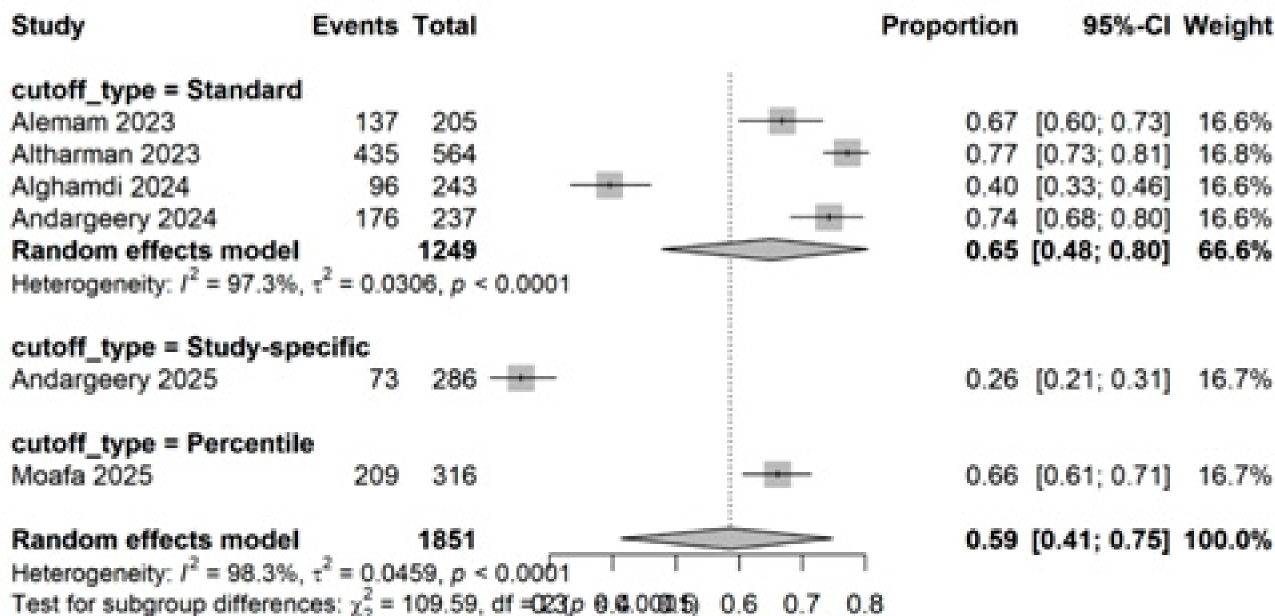
By instrument. Instrument type significantly moderated PA prevalence ($\chi^2 = 5.29$, df = 1, p = .0215). MBI studies yielded a substantially higher pooled prevalence (73%; 95% CI: 66%–79%, $I^2 = 83.6\%$, $\tau^2 = 0.0034$) than MBI-SS studies (44%; 95% CI: 21%–68%, $I^2 = 97.7\%$, $\tau^2 = 0.0455$), indicating that instrument selection materially influences estimates of reduced personal accomplishment (Figure 8).

Figure 8. Forest Plot of Reduced Personal Accomplishment by Measurement Instrument



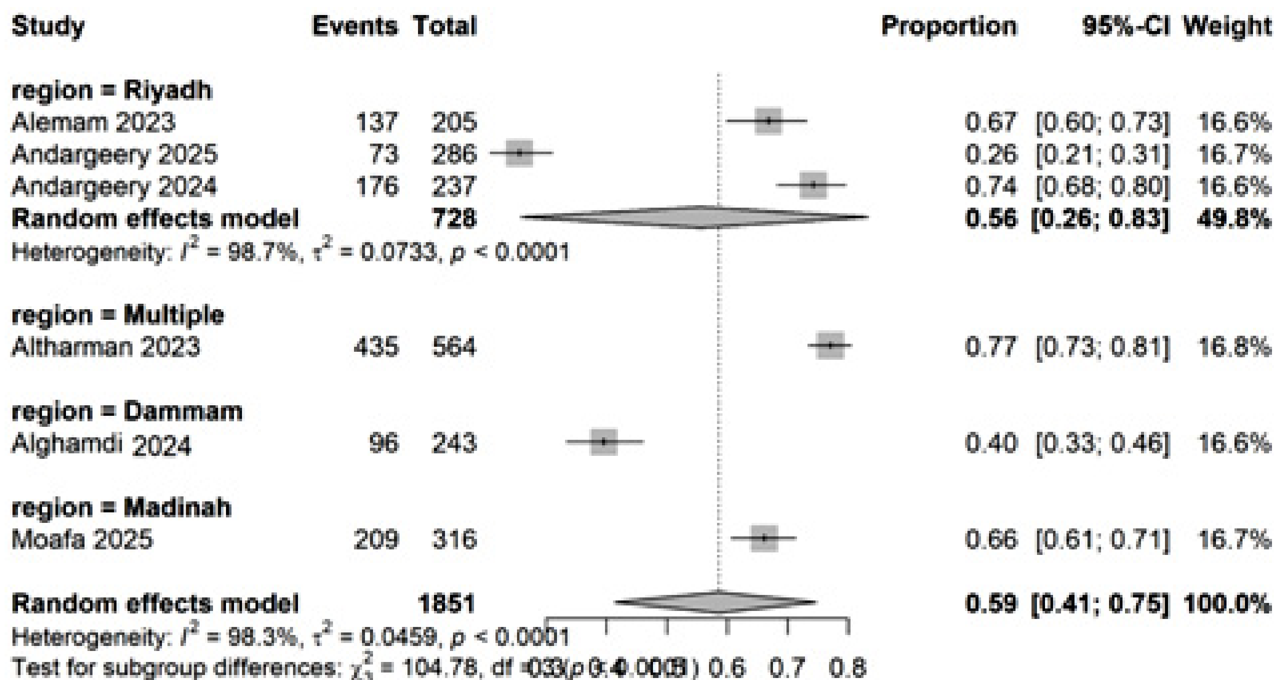
By cut-off criteria. Cut-off classification significantly moderated PA prevalence ($\chi^2 = 109.59$, df = 2, p < .0001). Standard thresholds yielded a pooled prevalence of 65% (95% CI: 48%–80%, $I^2 = 97.3\%$, $\tau^2 = 0.0306$); study-specific criteria: 26%; percentile-based thresholds: 66%. The markedly lower prevalence with study-specific cut-offs highlights the substantial impact of classification methodology on reported burnout rates (Figure 9).

Figure 9. Forest Plot of Reduced Personal Accomplishment by Cut-Off Classification



By region. Regional differences were statistically significant ($\chi^2 = 104.78$, df = 3, $p < .0001$). Pooled PA estimates were: Riyadh (k = 3): 56% (95% CI: 26%–83%, $I^2 = 98.7\%$, $\tau^2 = 0.0733$); Multiple programs (k = 1): 77%; Dammam (k = 1): 40%; Madinah (k = 1): 66%. Interpretation is limited by single-study representation in three regional subgroups (Figure 10).

Figure 10. Forest Plot of Reduced Personal Accomplishment by Geographic Region



Meta-regression by publication year. Publication year was not a statistically significant predictor of PA prevalence ($\beta = -0.0742$, $p = .474$; $R^2 = 0\%$), indicating no temporal trend.

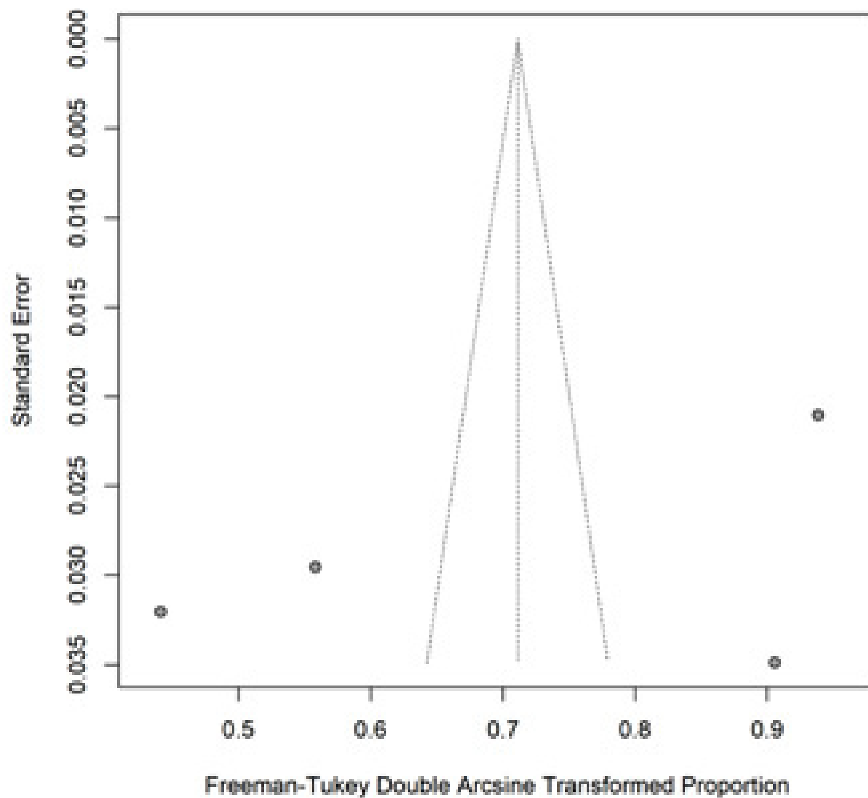
Sensitivity analyses

Leave-one-out sensitivity analyses were conducted for all four outcomes. For overall burnout, sequential study removal produced only modest changes in pooled prevalence, with heterogeneity remaining extremely high across all iterations (I^2 range: 98.0%–99.1%). For emotional exhaustion, estimates remained stable with I^2 persistently above 95% across all models. For depersonalization, pooled estimates ranged from 46% to 60%, compared with the original estimate of 52%, and I^2 consistently exceeded 97.2%. For reduced personal accomplishment, pooled estimates ranged from 55% to 65%, compared with the original estimate of 59%, and I^2 remained above 96.4% across all iterations. Across all outcomes, leave-one-out analyses confirm that the observed variability reflects genuine between-study differences rather than the influence of any single study, supporting the robustness of the meta-analytic results.

Publication bias

Formal statistical testing for publication bias using funnel plot asymmetry or Egger's regression test was not conducted, as the number of studies per outcome (k = 4 for overall burnout; k = 6 for burnout dimensions) fell below the recommended threshold of 10 studies for reliable application of these tests (14). Funnel plots were visually inspected for overall burnout. However, some asymmetry was apparent; interpretation is severely limited by the small number of studies and extremely high between-study heterogeneity, which can independently distort funnel plot symmetry irrespective of true publication bias. Conclusions regarding potential publication bias should therefore be interpreted with considerable caution (Figure 11).

Figure 11. Funnel plot of overall burnout prevalence among nursing students in Saudi Arabia.



Risk and protective factors associated with burnout

Because predictors were operationalized and reported inconsistently across studies, with variation in instruments, cut-off criteria, and effect size metrics, quantitative pooling of risk and protective factor data was not feasible. Findings are summarized narratively within the Job Demands–Resources (JD-R) framework (11,12,13).

Job demands and risk factors

Academic performance. GPA showed mixed associations with burnout across studies. Alemam et al. (8) reported that lower GPA was associated with higher EE ($p = .005$), higher cynicism ($p < .001$), and reduced professional efficacy ($p < .001$). Similarly, Andargeery et al. (14) found that lower GPA was associated with higher academic burnout ($t(284) = 2.011$, $p = .045$). In contrast, Altharman et al. (9) reported that higher GPA was associated with higher burnout ($p = .037$), while Alghamdi (18) found no significant association. These inconsistent findings suggest that unmeasured contextual factors may moderate the relationship between academic performance and burnout.

Academic and psychological strain. Andargeery et al. (20) reported that academic stress and burnout dimensions significantly predicted psychological distress ($p < .05$), with EE and DP demonstrating significant positive associations with distress ($p < .01$), consistent with the health-impairment pathway of the JD-R model.

Motivational and social demands. Andargeery et al. (19) found that lack of interest in nursing was associated with higher burnout ($t(284) = -3.855$, $p < .001$), lack of peer support with increased burnout ($t(284) = -2.626$, $p = .009$), and lower English proficiency with higher burnout levels ($F(2, 283) = 4.328$, $p = .014$).

Maladaptive coping. Moafa et al. (10) reported that avoidance, denial, behavioural disengagement, and self-blame were each significantly associated with higher EE and DP ($p < .05$), functioning as demand-amplifying factors within the JD-R framework.

Job resources and protective factors

Psychological resilience. Resilience was the most consistently identified protective factor. Altharman et al. (9) reported that higher resilience was associated with lower DP ($r = -.12$, $p = .04$) and higher PA ($r = .43$, $p < .001$). Alghamdi (18) found resilience was negatively correlated with overall burnout ($r = -.147$, $p = .022$), EE ($r = -.348$, $p < .001$), and cynicism ($r = -.528$, $p < .001$), and positively correlated with PA ($r = .596$, $p < .001$).

Health-promoting behaviours. Alemam et al. (8) found that higher exercise frequency was associated with lower EE ($p = .002$), lower cynicism ($p = .006$), and lower reduced professional efficacy ($p = .031$). Longer sleep duration was additionally associated with lower EE ($p = .045$).

Self-efficacy and learning environment. Andargeery et al.(19) reported that higher self-efficacy was negatively correlated with academic burnout ($p < .05$), and that a positive learning experience was associated with significantly lower burnout levels ($p < .05$).

Adaptive coping strategies. Moafa et al. (10) found that problem-focused coping, social support seeking, positive reframing, and planning were each associated with higher PA and lower overall burnout levels ($p < .05$).

Discussion

Principal findings

This systematic review and meta-analysis synthesized national evidence on burnout among undergraduate nursing students in Saudi Arabia. Across six cross-sectional studies (N = 1,851), the pooled prevalence of overall burnout was 43% (95% CI: 20%–67%). Dimension-specific analyses demonstrated that 41% of students reported high emotional exhaustion, 52% reported high depersonalization, and 59% reported reduced personal accomplishment, the latter representing the most prevalent burnout dimension across the included evidence base.

This dimensional ordering differs from many international syntheses, in which emotional exhaustion typically emerges as the dominant dimension (4). The prominence of reduced personal accomplishment in the Saudi context may reflect a sustained perception of inadequacy in meeting academic and clinical expectations, a pattern consistent with the health-impairment pathway of the Job Demands–Resources (JD-R) model, (11,12,13) in which chronically unmet demands progressively erode individuals' sense of professional efficacy. However, given the extremely high heterogeneity across all outcomes ($I^2 > 95\%$), dimensional differences should be interpreted with considerable caution, as variability across institutions and measurement approaches limits the ability to draw definitive conclusions.

Consistent with the JD-R framework, included studies identified academic stress, lower GPA, lack of peer support, and maladaptive coping as factors associated with higher burnout. In contrast, resilience, self-efficacy, adaptive coping, exercise, and supportive learning environments were associated with lower levels of burnout. Emotional exhaustion likely reflects cumulative exposure to workload and clinical stressors, while depersonalization may represent a psychological distancing response to sustained, unrelieved strain.

Interpretation in the context of existing literature

Meta-analytic evidence suggests that approximately one-quarter of nursing students experience burnout (4). The pooled overall prevalence identified in this review, 43%, appears substantially higher, suggesting that Saudi nursing students may face a disproportionate burden. Direct comparison must nonetheless be approached cautiously, as differences in operational definitions, measurement instruments, and cut-off criteria meaningfully influence prevalence estimates across studies.

Subgroup analyses confirmed that methodological factors materially moderate observed prevalence. The measurement instrument significantly moderated the prevalence of reduced personal accomplishment, with MBI studies yielding substantially higher estimates (73%) than MBI-SS studies (44%), and cut-off classification criteria further influenced this dimension ($\chi^2 = 109.59$, $p < .0001$). These findings underscore the methodological sensitivity of burnout measurement and the importance of standardized criteria in prevalence research. Regional subgroup analyses revealed statistically significant differences across burnout dimensions; however, three of the four regional subgroups were represented by a single study, limiting the robustness of geographic comparisons. Meta-regression analyses did not identify a statistically significant association between publication year and any burnout outcome. However, the small number of studies likely constrained statistical power to detect temporal trends.

Collectively, these findings indicate that burnout among Saudi nursing students is both substantial and highly variable. Institutional context, measurement methodology, and classification thresholds each appear to contribute to the wide dispersion of prevalence estimates, and pooled values should be interpreted as aggregated indicators rather than precise national rates.

Associated risk and protective factors

Narrative synthesis revealed consistent demand–resource patterns across studies. Academic stressors, including examination pressure, clinical training demands, lack of peer support, lower GPA, and maladaptive coping, were associated with higher burnout levels, consistent with international evidence characterizing nursing education as a high-demand environment (5,6). Notably, the association between GPA and burnout was inconsistent across studies: lower GPA was associated with higher burnout in two studies, (8,20) whereas one study reported the reverse, (9) and another found no significant association (19). This inconsistency suggests that the relationship between academic performance and burnout may be context-dependent and moderated by unmeasured institutional or individual factors.

Resilience emerged as the most consistently identified protective factor (9,18) and was associated with lower burnout across multiple dimensions. Self-efficacy, adaptive coping strategies, positive learning environments, exercise frequency, and adequate sleep were additionally identified as protective resources (8,10,19). Within the JD-R framework, these variables function as personal and contextual resources that may buffer the impact of sustained academic and clinical demands. However, most evidence was derived from cross-sectional bivariate or regression analyses that lacked comprehensive adjustment for confounders, precluding causal inference regarding any identified associations.

Implications for nursing education and policy

The prevalence estimates observed in this review suggest that psychological well-being warrants strategic attention within Saudi nursing programs. Interventions targeting both demand reduction and resource enhancement appear warranted. Structured mentorship, timely performance feedback, resilience training, and systematic monitoring of workload distribution represent feasible institutional

strategies. Given the prominence of reduced personal accomplishment, educational approaches that reinforce competence development and mastery experiences may be particularly relevant. Early identification of students experiencing elevated burnout could facilitate preventive support before progression to more severe psychological distress.

From a workforce perspective, burnout during training may influence long-term professional engagement and retention within the Saudi healthcare system. Within the context of Saudi Vision 2030 healthcare transformation goals, addressing burnout at the educational level is therefore not only a student well-being imperative but also a workforce sustainability priority.

Strengths and Limitations

This review represents the first quantitative synthesis of burnout prevalence among undergraduate nursing students in Saudi Arabia, providing nationally specific evidence that broader international meta-analyses cannot capture. Methodological rigor was strengthened through a comprehensive systematic search across five databases, independent multi-reviewer screening and data extraction, and standardized JBI risk-of-bias assessment. The application of a random-effects model with Freeman–Tukey double arcsine transformation and REML estimation enhanced the statistical stability of pooled estimates in the presence of substantial between-study variability. Subgroup analyses, leave-one-out sensitivity analyses, and meta-regression further improved the robustness and transparency of findings.

Several limitations must nonetheless be acknowledged. All included studies employed cross-sectional designs, precluding causal inference. Non-probability sampling was common, which may limit the representativeness of findings at a national level. Variation in burnout instruments (MBI vs. MBI-SS) and cut-off classification criteria contributed substantially to the heterogeneity observed, limiting the precision of pooled estimates. Reliance on self-reported measures may introduce social desirability or recall bias, and most primary studies did not adjust for potential confounders. At the review level, restriction to English-language peer-reviewed literature may introduce both language and publication bias. The small number of eligible studies ($k = 4–6$ per outcome) constrained moderator analyses and precluded formal testing for small-study effects. The magnitude of heterogeneity across all outcomes ($I^2 > 95\%$) means that pooled estimates should be interpreted as broad aggregated indicators rather than definitive national prevalence rates.

Future research

Future studies should prioritize longitudinal designs to clarify burnout trajectories across academic progression and to examine the temporal relationship between demands, resources, and burnout outcomes. Standardization of measurement tools and classification thresholds across Saudi institutions is essential to improve the comparability and interpretability of future evidence. Multi-institutional studies using probability sampling would substantially enhance national representativeness. Intervention-focused research is urgently needed to evaluate the effectiveness of theory-informed, multi-level strategies, including resilience-building programs, workload optimization, and peer support initiatives, within Saudi nursing education.

Conclusion

This systematic review and meta-analysis provides the first pooled national estimates of burnout among undergraduate nursing students in Saudi Arabia. The findings demonstrate that burnout is prevalent and multidimensional within this population, with 43% meeting criteria for overall burnout. Reduced personal accomplishment was the most prevalent dimension (59%), followed by depersonalization (52%) and emotional exhaustion (41%).

Interpretation of these estimates must be approached with caution, given the extremely high between-study heterogeneity and substantial variability in measurement instruments and cut-off classifications; pooled values should therefore be regarded as aggregated indicators rather than precise national rates. Guided by the JD-R framework, the observed pattern suggests a sustained imbalance in which academic and clinical demands chronically exceed available personal and institutional resources. Although causal inference is precluded by the cross-sectional design of included studies, the evidence collectively highlights the need for structured, theory-informed institutional strategies that both mitigate excessive demands and strengthen protective resources. Addressing burnout at the educational level is critical not only for student well-being but also for the long-term sustainability of the nursing workforce within the Saudi healthcare system.

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Appendices

Appendix A. PubMed Search Strategy

The following search strategy was used in PubMed (February–April 2026). Strategies were adapted for each of the remaining four databases (MEDLINE, CINAHL Complete, Scopus, and Web of Science) using equivalent controlled vocabulary and free-text terms appropriate to each database's indexing system.

PubMed Search String:

((“burnout”[Title/Abstract] OR “academic burnout”[Title/Abstract])

AND (Nurs*[Title/Abstract])

AND (student*[Title/Abstract])

AND (“Saudi*”[Title/Abstract] OR “KSA”[Title/Abstract]))

Search period: February to April 2026

Language filter: English only

Publication type: Peer-reviewed articles only; no date restrictions applied

Records retrieved from PubMed: n = 17

Appendix B. Data Extraction Framework

The following standardized data extraction framework was developed a priori and piloted in one study before full extraction. Two reviewers (NA and BA) independently extracted data from all included studies using this template. Discrepancies were resolved through discussion, with MA adjudicating when consensus could not be reached.

Variable category	Items extracted
Study identification	First author, publication year, geographic region within Saudi Arabia, journal name
Study design	Study design type, setting (university/college name), data collection period, sampling method
Participants	Total sample size (N), gender distribution (% female/male), academic year or level, response rate (if reported), mean age (if reported)
Burnout instrument	Instrument name (MBI or MBI-SS), version, subscale scoring method, cut-off criteria for overall burnout and each dimension (EE, DP/CY, PA), and Cronbach's alpha if reported
Outcome data — prevalence	Prevalence of overall burnout (%); prevalence of high EE (%); prevalence of high DP/cynicism (%); prevalence of low PA (%); number of participants above cut-off for each dimension
Risk factors	Identified academic, psychological, demographic, and contextual risk factors; statistical test used; effect size (r, OR, β); p-value
Protective factors	Identified personal and institutional protective factors; statistical test used; effect size; p-value
Statistical methods	Analytical methods used by study authors (e.g., descriptive statistics, Pearson/Spearman correlation, regression, ANOVA, t-test)
Risk of bias	JBI Critical Appraisal Checklist scores (Q1–Q9); overall risk of bias rating (low/moderate/high)
Additional notes	Any limitations noted by authors, assumptions made during extraction, and data requiring author clarification

Note. EE = emotional exhaustion; DP = depersonalization; PA = personal accomplishment; MBI = Maslach Burnout Inventory; MBI-SS = MBI Student Survey; JBI = Joanna Briggs Institute; NR = not reported.

Appendix C. Narrative Synthesis of Risk and Protective Factors Mapped to the JD-R Framework

The following table presents a comprehensive synthesis of all statistically reported risk and protective factors across included studies, organized within the Job Demands–Resources (JD-R) framework. Demands are factors associated with higher burnout levels; resources are factors associated with lower burnout or higher personal accomplishment.

Study	Factor	JD-R category	Burnout outcome	Statistical association
Alemam et al., 2023	Lower GPA	Demand	EE	p = .005
	—	Demand	Cynicism (CY)	p < .001
	—	Demand	Reduced PE	p < .001
	Higher exercise frequency	Resource	EE	p = .002
	—	Resource	CY; Reduced PE	p = .006; p = .031
	Longer sleep duration	Resource	EE	p = .045
Altharman et al., 2023	Higher GPA	Demand	Overall burnout	p = .037
	Psychological resilience	Resource	DP	r = −.12, p = .04
	—	Resource	PA	r = .43, p < .001
Alghamdi, 2024	Psychological resilience	Resource	Overall burnout	r = −.147, p = .022
	—	Resource	EE	r = −.348, p < .001
	—	Resource	CY	r = −.528, p < .001
	—	Resource	PA	r = .596, p < .001
Andargeery et al., 2025	Lower GPA	Demand	Academic burnout	t(284) = 2.011, p = .045
	Lower English proficiency	Demand	Burnout	F(2, 283) = 4.328, p = .014
	Lack of interest in nursing	Demand	Burnout	t(284) = −3.855, p < .001
	Lack of peer support	Demand	Burnout	t(284) = −2.626, p = .009
	Higher self-efficacy	Resource	Academic burnout	p < .05
	Better learning experience	Resource	Burnout	p < .05
Andargeery et al., 2024	Academic stress	Demand	Psychological distress	p < .05
	EE & DP	Demand	Psychological distress	p < .01
Moafa et al., 2025	Maladaptive coping (avoidance, denial, disengagement, self-blame)	Demand	EE & DP	p < .05
	Adaptive coping (problem-focused, social support, positive reframing, planning)	Resource	PA & overall burnout	p < .05