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Perceived stress, coping strategies, and academic performance among students at a health training institution in Ghana: a cross-sectional study

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Abstract

Background

Stress is common in health-professions education, but its association with academic performance may depend on students' psychosocial and educational circumstances. Evidence from Ghanaian health-training institutions remains limited. This study assessed perceived stress, coping strategies, social support, and academic performance among nursing, midwifery, and nurse-assistant students and examined factors independently associated with academic performance.

Methods

A cross-sectional survey yielded 997 submissions, of which 992 were eligible and included in descriptive analyses. Perceived stress, coping, social support, personality traits, and self-reported academic performance were assessed using adapted questionnaire items. Scale reliability, descriptive and bivariate statistics, multivariable linear regression, and logistic-regression sensitivity analysis were conducted. Linear models used HC3 heteroskedasticity-robust standard errors.

Results

Among 992 respondents, mean perceived stress was 19.08 (SD 4.03), and 87.9% had moderate stress. Valid cumulative GPA was available for 977 respondents (mean 2.43, SD 0.84), and 58.4% reported a referral or resit. Perceived stress was not independently associated with GPA (B = 0.002, 95% CI -0.011 to 0.015). Adaptive coping was positively associated with GPA (B = 0.184, 95% CI 0.086 to 0.282), whereas maladaptive coping was negatively associated (B=-0.108, 95% CI -0.200 to -0.016). Social support was not independently associated with GPA. In the logistic sensitivity analysis, perceived stress was not associated with referral or resit, whereas adaptive coping was associated with lower odds (OR = 0.64, 95% CI 0.50 to 0.83).

Conclusion

Moderate perceived stress was common but was not independently associated with either academic outcome. Adaptive and maladaptive coping showed small, opposing associations with GPA. Because the study was cross-sectional and relied on self-reported academic outcomes, the findings do not establish directionality. Prospective multicentre studies using verified academic records and locally validated measures are needed.

Introduction

Stress remains a major concern in higher education because of its effects on students' psychological well-being, learning processes, and academic outcomes. Recent evidence from higher education has linked academic stress with poorer mental well-being, reduced engagement, and adverse educational functioning, with Pascoe et al. showing that stress affects both secondary and tertiary learners and Ramón-Arbués et al. reporting high levels of depression, anxiety, and stress among university students [1], [2]. The issue is especially pronounced in health professional education because students must meet classroom, laboratory, and clinical expectations, often under continuous supervision and evaluation. In this context, nursing and midwifery students occupy a vulnerable position because they are expected to master theoretical content while also developing safe practice competence in emotionally demanding clinical environments [3], [4], [5].

Within nursing and midwifery education, stress is generated by a combination of academic, clinical, interpersonal, and environmental demands. Heavy coursework, frequent tests, fear of failure, time pressure, and the challenge of translating theory into patient care repeatedly appear in the literature as dominant stressors [6], [7], [8]. Clinical training adds further pressure through patient-care responsibilities, unfamiliar settings, communication demands, fear of making mistakes, and interactions with instructors and healthcare professionals [9], [10], [11]. In Ghana, Anaman-Torgbor and colleagues reported that academic-related stress among nursing students was widespread and manifested through cognitive, emotional, and behavioural symptoms, indicating that stress is not simply a subjective inconvenience but a measurable educational and psychosocial concern [12].

The educational importance of stress lies in its potential association with academic performance. Stress can impair concentration, memory, motivation, and decision-making, all of which are central to learning, assessment performance, and clinical judgement [1], [13]. In nursing education, academic and clinical stress has also been associated with burnout, psychological distress, and reduced academic functioning [14], [15]. Nevertheless, observed stress-performance associations vary across settings and measures. Coping resources, social environments, study behaviours, and individual characteristics may help account for differences in academic performance among students reporting similar levels of stress [16], [17], [18].

Coping describes the cognitive and behavioural responses students use when managing academic and clinical demands. The transactional model of stress and coping proposes that responses depend on individuals' appraisal of demands and available resources [19]. Student coping strategies include problem-focused responses, emotional regulation, avoidance, support-seeking, acceptance, humour, and religious or spiritual coping [7], [20]. Nursing research generally associates adaptive coping with better adjustment and avoidant or maladaptive coping with greater psychological difficulty [3], [17], [21]. These findings support examining coping alongside perceived stress as a potentially modifiable correlate of academic performance, without assuming a temporal mediating process.

Social support is another psychosocial factor relevant to students' learning and well-being. It includes emotional, informational, educational, and instrumental assistance from family, peers, instructors, and

other significant persons. Choi and colleagues conceptualised support for nursing students as both structural and functional, incorporating social integration, support networks, educational support, psychosocial support, and instrumental support [22]. Supportive clinical environments have been associated with lower stress and greater satisfaction with learning experiences [18], while peer support can provide psychological safety after critical clinical incidents [23]. Social support was therefore included as a concurrent psychosocial correlate of stress and academic performance.

Personality traits may influence how students appraise stressors, regulate emotions, and select coping responses. The Big Five framework describes conscientiousness, neuroticism, extraversion, agreeableness, and openness [24], [25]. Studies of nursing students have also reported relationships between personality traits, academic achievement, anxiety, sleep quality, and social factors [16], [26]. Personality was included descriptively in this study, but trait-specific interpretation depended on adequate measurement reliability.

Although research on stress among nursing and midwifery students is growing, several gaps remain. Much of the evidence has focused on stress prevalence, stressors, psychological distress, or burnout rather than academic performance as the principal educational outcome [3], [8], [14]. Fewer studies have examined perceived stress together with coping and social support in one adjusted model. Context-specific evidence from Ghana and comparable settings also remains limited, despite evidence that academic-related stress is common among Ghanaian nursing students [12]. Identifying concurrent factors associated with academic outcomes can inform the design of student-support services and generate hypotheses for prospective educational research.

Against this background, the study assessed perceived stress, coping strategies, perceived social support, personality traits, and academic performance among nursing, midwifery, and nurse-assistant students at a health training institution in Ghana. It also examined which psychosocial and educational characteristics were independently associated with cumulative GPA and whether the main findings were consistent for referral or resit status.

Study Objectives

The general objective was to assess perceived stress, coping strategies, social support, and academic performance among nursing, midwifery, and nurse-assistant students and to examine factors independently associated with academic performance.

The specific objectives were to describe perceived stress and the reliability of the adapted psychosocial measures; examine bivariate associations among stress, coping, social support, and academic performance; estimate adjusted associations with cumulative GPA; and assess the consistency of the findings using referral or resit status as a secondary academic outcome.

We hypothesised that higher perceived stress and maladaptive coping would be associated with poorer academic performance, whereas adaptive coping and greater perceived social support would be associated with better academic performance.

Methods

Study design

This study employed a cross-sectional analytical design, with perceived stress, coping, social support, personality traits, and academic performance measured in the same survey. Reporting was guided by the STROBE recommendations for cross-sectional studies [27].

Study setting

The study was conducted at the Nursing and Midwifery Training College, Tepa-Ashanti, Ghana. The college provided classroom-based theoretical instruction, skills-laboratory activities, and clinical placements; students were therefore exposed to both academic and clinical demands during their training.

Study population and eligibility criteria

The target population comprised registered nursing, midwifery, and nurse assistant students at the college. Students were eligible if they were enrolled during the study period, had completed at least one academic semester, and provided electronic informed consent. Students on leave of absence, those who declined participation, and submissions without completed consent were excluded.

Sample size determination

The source population comprised all 2,200 nursing, midwifery, and nurse assistant students officially enrolled at the college during the study period. Although the study adopted a census-oriented recruitment approach by targeting all eligible students, a minimum sample size was calculated to ensure adequate statistical precision. Cochran's formula for a cross-sectional survey was applied using a 95% confidence level, a 5% margin of error, and a population proportion of 0.50. The proportion of 0.50 was selected because no sufficiently reliable prior estimate was available and because it maximised variability, thereby producing the most conservative sample-size requirement. The initial calculation yielded 384 participants. After allowing an additional 10% for potential non-response or incomplete questionnaires, the minimum recruitment target was increased to approximately 422 participants. A finite-population correction was not applied because retaining the unadjusted estimate provided a more conservative sample-size requirement and greater statistical precision. Ultimately, 992 students provided

consent and participated in the study, substantially exceeding the minimum required sample size and representing approximately 45.1% of the eligible student population.

Sampling procedure

All eligible students across Levels 100–300 were targeted for participation. However, recruitment followed a non-probability, class-based convenience sampling approach. The electronic survey link was disseminated through the established communication channels of the respective nursing, midwifery, and nurse assistant classes, and students who received the link were invited to participate voluntarily. Because participation depended on students accessing the communication platforms and choosing to complete the survey, the achieved sample was considered a self-selected convenience sample rather than a census or probability sample. Although the total enrolled student population was known, the number of eligible students who actually received or viewed the survey invitation could not be verified. Consequently, a conventional response rate based on confirmed survey receipt could not be calculated.

Variables and measurement

Perceived stress was the primary exposure, and self-reported cumulative grade point average (GPA) was the primary outcome. Referral or resit status was examined as a secondary outcome. Adaptive coping, maladaptive coping, and perceived social support were included as psychosocial predictors. Age, gender, programme, level of study, weekly study hours, sleep quality, and financial difficulty were included as adjustment variables. Personality traits were summarised descriptively, but unreliable trait scores were excluded from the multivariable models. Operational definitions and analyses are summarised in Table 1.

Perceived stress was measured using 10 items adapted from the Perceived Stress Scale [28], [29]. Coping was measured using adapted Brief COPE items covering active coping, planning, positive reframing, acceptance, support-seeking, religious coping, self-blame, disengagement, humour, and distraction [20]. Social support was measured using adapted Multidimensional Scale of Perceived Social Support items addressing support from a special person, family, and friends [30], [31]. Personality traits were assessed with brief Big Five items for extraversion, agreeableness, conscientiousness, neuroticism, and openness [25]. Academic performance was assessed using self-reported cumulative GPA and referral/resit status.

Table 1: Variables, measurement and analysis

Construct	Operational measurement	Role in model	Analysis
Perceived stress	Adapted 10-item perceived-stress score after reverse scoring items 4, 5, 7, and 8.	Primary exposure	Descriptive statistics, correlations, and adjusted regression
Academic performance	Primary: self-reported cumulative GPA (valid range 0–4); secondary: referral/resit status.	Primary and secondary outcomes	Multiple linear regression and logistic-regression sensitivity analysis
Coping strategies	Adaptive and maladaptive coping scores derived from adapted Brief COPE items.	Psychosocial predictors	Correlations and adjusted regression
Social support	Adapted MSPSS items covering significant others, family, and friends.	Psychosocial predictor	Correlations and adjusted regression
Personality traits	Brief Big Five traits: extraversion, agreeableness, conscientiousness, neuroticism, and openness.	Descriptive variables	Descriptive statistics and reliability assessment only
Covariates	Age, gender, programme, level of study, weekly study hours, sleep quality, and financial difficulty.	Adjustment variables	Covariate adjustment in multivariable models

Data collection procedure

Data were collected using a structured questionnaire programmed in KoboToolbox and administered through a web link (see Supplementary File 1_Perceived Stress). Data collection spanned 13 May to 17 July 2026. Electronic consent preceded the study questions, and the export contained no names or student index numbers.

Data quality control

The questionnaire incorporated adapted psychosocial items and electronic range and skip checks. Internal consistency was evaluated using Cronbach's alpha and Spearman–Brown coefficients for two-item personality traits. Reliability findings were interpreted against the conventional 0.70 group-level threshold, while recognising that adapted and very short measures require scale-specific caution. Before data collection, the questionnaire was reviewed by three experts in nursing education, midwifery education, and research methodology to assess item relevance, clarity, cultural appropriateness, and alignment with the study objectives. It was subsequently pilot-tested among 30 students – 15 nursing students and 15 midwifery students – who had characteristics comparable to the study population but

were not included in the final analysis. Feedback informed minor revisions to item wording, sequencing, and response options before the questionnaire was finalized.

Bias

Potential sources of bias included self-report, recall, social desirability, common-method, and selection bias. Anonymous electronic administration reduced the risk of identifier disclosure, but academic outcomes were not independently verified. Because all study variables were measured concurrently, temporal order and directionality could not be established.

Statistical analysis

KoboToolbox data were exported to Excel and analysed in Python 3.12 using pandas 2.2.3, NumPy 2.3.5, and purpose-written statistical routines. Records were checked for consent, duplicate UUIDs, range violations, missingness, and implausible values. PSS-10 items 4, 5, 7, and 8 and the applicable BFI-10 items were reverse-scored. Cumulative GPA values outside the prespecified 0–4 range were treated as invalid and set to missing. Continuous variables were summarised using means, standard deviations, medians, and interquartile ranges; categorical variables were summarised using counts and percentages.

Pearson correlations described bivariate associations. Multiple linear regression modelled cumulative GPA using HC3 heteroskedasticity-robust standard errors; referral/resit status was examined in a logistic sensitivity model. Models adjusted for age, gender, programme, level of study, weekly study hours, sleep quality, and financial difficulty, with focal psychosocial predictors entered simultaneously. Analyses used complete cases for the variables in each model; no values were imputed. Two-sided p values and 95% confidence intervals were reported.

Because perceived stress, coping, and academic performance were measured concurrently, the analysis was limited to associations; mediation was not estimated because the temporal ordering required for a mediating process could not be established [32]. Statistical significance was set at $p<0.05$, but interpretation prioritised effect estimates and 95% confidence intervals.

Use of generative AI-assisted tools

Generative AI-assisted tools were used to support statistical programming, language editing, and manuscript organisation. The authors reviewed and verified all data-cleaning decisions, analyses, numerical outputs, references, and interpretations and retained full responsibility for the integrity and accuracy of the work. AI tools were not listed as authors and did not independently determine the study conclusions.

Ethical considerations

Ethical approval was obtained from the Ethics Committee for Research Involving Humans (ECRIH) of the Tepa Nursing and Midwifery Training College, Ghana (Ref: ECRIH/AP/015/26). Electronic informed consent was recorded before the study questions; five respondents who declined consent were excluded. Participation was voluntary, and responses were handled anonymously and confidentially. All procedures were conducted in accordance with applicable ethical guidelines and regulations.

Results

Participant flow and analytic samples

The KoboCollect export contained 997 submissions. Five respondents declined consent and were excluded. No duplicate UUIDs were identified, leaving 992 respondents in the descriptive and scale analyses. The primary GPA analysis included 977 respondents after 15 values outside the prespecified 0–4 range were treated as invalid and set to missing. Because the denominator of eligible students who received the survey link was unavailable, a response rate could not be calculated. Participant disposition is shown in Figure 1.

Background characteristics of respondents

The mean age was 22.68 years (SD 2.93). Most respondents were female (87.4%). Nursing students comprised 44.5%, midwifery students 33.3%, and nurse assistant students 22.3%. Level 200 students represented 40.3%; Levels 100 and 300 each represented 29.8%. Participant characteristics are detailed in Table 2.

Table 2: Participant characteristics (N=992)

Characteristic	Value
Age, mean (SD)	22.68 (2.93)
Female	867 (87.4%)
Nursing	441 (44.5%)
Midwifery	330 (33.3%)
Nurse assistant	221 (22.3%)
Level 100	296 (29.8%)
Level 200	400 (40.3%)
Level 300	296 (29.8%)
Any referral/resit	579 (58.4%)

Levels of perceived stress

The mean PSS-10 score was 19.08 (SD 4.03; range 0–33). Based on conventional descriptive cut-points, 89 respondents (9.0%) had low stress, 872 (87.9%) had moderate stress, and 31 (3.1%) had high stress. Internal consistency was low (Cronbach's α=0.535), so associations involving this score should be interpreted cautiously.

Coping strategies among respondents

The mean adaptive coping score was 3.06 (SD 0.60), and the mean maladaptive coping score was 2.38 (SD 0.62), on a 1–4 scale. Reliability was acceptable for adaptive coping (α=0.799) and marginal for maladaptive coping (α=0.694).

Perceived social support

Mean perceived social support was 4.64 (SD 1.27) on a 1–7 scale. Internal consistency was excellent for the total score (α=0.912) and strong for special-person (α=0.923), family (α=0.902), and friend support (α=0.877).

Personality trait distribution

Mean scores were 2.77 for extraversion, 3.74 for agreeableness, 3.73 for conscientiousness, 2.92 for neuroticism, and 4.01 for openness. Four two-item traits showed negative reliability after standard reverse scoring; only openness showed acceptable two-item reliability (Spearman–Brown=0.588).

Personality findings were therefore treated as exploratory. Descriptive and reliability estimates for all focal scales are presented in Table 3.

Table 3: Scale descriptives and reliability

Scale	Mean (SD)	α / SB
PSS-10	19.08 (4.03)	α=0.535
Adaptive coping	3.06 (0.60)	α=0.799
Maladaptive coping	2.38 (0.62)	α=0.694
Social support	4.64 (1.27)	α=0.912
Extraversion	2.77 (0.80)	SB=−0.335
Agreeableness	3.74 (0.83)	SB=−0.125
Conscientiousness	3.73 (0.85)	SB=−0.162
Neuroticism	2.92 (0.83)	SB=−0.164
Openness	4.01 (0.84)	SB=0.588

Academic performance indicators

Among 977 respondents with valid cumulative GPA values, mean GPA was 2.43 (SD 0.84; median 2.50; interquartile range 1.84–3.00). Overall, 579 respondents (58.4%) reported at least one referral or resit.

Bivariate associations

Perceived stress was not correlated with GPA ($r=-0.013$, $p=0.690$). Adaptive coping correlated positively with GPA ($r=0.097$, $p=0.003$), whereas maladaptive coping correlated negatively ($r=-0.067$, $p=0.038$). Stress correlated negatively with adaptive coping ($r=-0.168$) and social support ($r=-0.171$), and positively with maladaptive coping ($r=0.149$) and neuroticism ($r=0.274$); all $p<0.001$. Focused bivariate associations are presented in Table 4.

Table 4: Focused bivariate correlations among primary study variables

Variables	n	r	p
Stress–GPA	977	−0.013	0.690
Stress–adaptive coping	992	−0.168	<0.001
Stress–maladaptive coping	992	0.149	<0.001
Stress–social support	992	−0.171	<0.001
Adaptive coping–GPA	977	0.097	0.003
Maladaptive coping–GPA	977	−0.067	0.038
Social support–GPA	977	0.005	0.867
Neuroticism–GPA	977	−0.055	0.083

Regression analysis

In the adjusted linear model (n=977; R^2=0.146; adjusted R^2=0.134), perceived stress was not associated with GPA (B=0.002, 95% CI -0.011 to 0.015; p=0.764). Adaptive coping was positively associated with GPA (B=0.184, 95% CI 0.086 to 0.282; p<0.001), whereas maladaptive coping was negatively associated (B=-0.108, 95% CI -0.200 to -0.016; p=0.022). Social support was not associated with GPA (B=-0.011, 95% CI -0.057 to 0.036; p=0.651). Each additional weekly study hour was associated with a 0.003-point higher GPA (95% CI 0.0003 to 0.0060; p=0.030). Focal adjusted estimates are reported in Table 5 and displayed in Figure 2.

Table 5: Adjusted linear regression for cumulative GPA, excluding the intercept (n=977)

Predictor	B	95% CI	p
Perceived stress	0.002	-0.011, 0.015	0.764
Adaptive coping	0.184	0.086, 0.282	<0.001
Maladaptive coping	-0.108	-0.200, -0.016	0.022
Social support	-0.011	-0.057, 0.036	0.651
Age, years	-0.019	-0.041, 0.003	0.084
Study hours/week	0.003	0.000, 0.006	0.030
Sleep quality	-0.039	-0.087, 0.009	0.112
Financial difficulty	-0.020	-0.062, 0.022	0.360
Male vs female	0.315	0.162, 0.468	<0.001
Prefer not to say vs female	0.577	0.076, 1.077	0.024
Nurse assistant vs midwifery	0.298	0.145, 0.451	<0.001
Nursing vs midwifery	-0.059	-0.194, 0.076	0.393
Level 200 vs Level 100	0.478	0.331, 0.626	<0.001
Level 300 vs Level 100	0.685	0.506, 0.864	<0.001

Sensitivity analyses

In the logistic sensitivity model, perceived stress was not associated with referral or resit status (OR=0.99, 95% CI 0.96 to 1.03; p=0.667). Adaptive coping was associated with lower odds of referral or resit (OR=0.64, 95% CI 0.50 to 0.83; p<0.001). Nurse-assistant students had lower odds than midwifery students (OR=0.59, 95% CI 0.41 to 0.86; p=0.005). These findings were considered secondary because both academic outcomes were self-reported.

Discussion

This study found that perceived stress was predominantly moderate but was not associated with cumulative GPA in either the bivariate or adjusted analysis. Perceived stress was also not associated with referral or resit status in the sensitivity model. Adaptive coping showed small positive associations with GPA and lower odds of referral or resit, whereas maladaptive coping showed a small negative association with GPA. Perceived social support was inversely correlated with stress but was not independently associated with either academic outcome. These results identify concurrent educational and psychosocial correlates; they do not establish the temporal direction of the relationships.

The predominance of moderate stress accords with Labrague's umbrella review of 12 reviews and 189 studies, which concluded that student nurses commonly experience moderate-to-high stress arising from academic workload, clinical placements, patient-care responsibilities, and interactions with faculty and clinical staff [33]. It is also consistent with moderate stress reported during early clinical practicum [34] and with Ghanaian evidence showing substantial academic pressure among nursing students [12]. Recent qualitative work among nursing and midwifery students in Ghana further identifies academic demands, financial strain, practical training, and fieldwork as interlocking sources of stress [35]. The present distribution therefore appears plausible in context, although the low PSS-10 reliability means the precise prevalence categories should not be treated as diagnostic estimates.

The null-adjusted stress–GPA association is not necessarily inconsistent with evidence that stress disrupts learning and well-being. Reviews link excessive or prolonged stress with impaired concentration, psychological distress, burnout, and poorer educational functioning [1], [33], but individual cross-sectional studies vary in exposure definition, timing, academic outcome, and covariate control. Stress may have nonlinear or time-dependent effects: modest arousal may coexist with adequate performance, whereas chronic or assessment-proximal stress may be more harmful. GPA is also cumulative and therefore temporally broader than a one-month PSS score. Moreover, academic performance is shaped by prior preparation, programme stage, teaching quality, study behaviour, and institutional resources. Recent Ghanaian work demonstrates that pre-tertiary preparation and study-related competencies contribute to academic outcomes, supporting a multicausal rather than stress-only account [36]. Measurement error in the PSS score would additionally attenuate associations toward the null.

The coping findings are more theoretically coherent. Lazarus and Folkman's transactional model proposes that outcomes depend not only on appraised demands but also on the resources and responses used to manage them [19]. The positive GPA association for planning, active coping, reframing, acceptance, support-seeking, and religious coping broadly agrees with the nursing-education literature, in which problem-solving, optimistic reappraisal, and help-seeking are commonly described as constructive responses [17], [33]. Conversely, disengagement, avoidance, and self-blame may consume attention without resolving academic demands. The observed associations were small, however, and should not be translated into deterministic claims about individual students.

The observed correlations among stress, coping, and GPA should not be interpreted as evidence that coping mediated an effect of stress on academic performance. Conceptual models often place coping responses between stressful experiences and student adjustment [37], and studies of nursing students show that coping patterns vary with stress exposure and clinical demands [34], [38]. However, fitting those concurrent associations as a temporal pathway would require assumptions that the present design could not test. Methodological guidance warns that cross-sectional estimates of indirect effects may be biased or misleading when exposure, proposed mediator, and outcome are measured at the same time [39]. The present findings were therefore interpreted as mutually adjusted associations. Prospective studies should measure stress before coping responses and subsequent verified academic outcomes while accounting for baseline coping and performance.

Although social support was not independently associated with GPA, it was inversely correlated with perceived stress. Nursing research links supportive clinical learning environments, supervision, peer relationships, and academic advising with lower stress or better psychological adjustment [18], [22], [40], [41]. These outcomes differ from cumulative GPA, and a broad perceived-support score may not capture educationally specific resources such as faculty feedback, clinical supervision, or timely academic assistance. Future studies should distinguish the source and function of support and examine outcomes measured after the support exposure.

The personality results required substantial restraint. Although personality traits have been associated with coping, anxiety, and academic outcomes in nursing populations [16], [42], four BFI-10 trait pairs produced negative Spearman-Brown coefficients after standard reverse scoring. Two-item measures are vulnerable to wording, cultural response patterns, and restricted construct coverage, and the Spearman-Brown coefficient is preferred to alpha for assessing their reliability [43]. These trait scores were therefore retained for descriptive transparency but excluded from multivariable modelling. Trait-specific conclusions require replication with longer, culturally evaluated measures.

The results favour layered student support rather than stress screening alone. Nursing and midwifery programmes can combine time-management and study-planning support, active problem-solving, access to counselling, peer mentoring, faculty advising, and structured debriefing after difficult clinical experiences. The positive study-hours coefficient should not be interpreted as a mandate to increase workload; support should emphasise efficient study strategies, sleep, recovery, and timely remediation. This recommendation is supported by Ji et al. [21], whose systematic review and meta-analysis included 41 controlled studies and 2,715 nursing students and found an overall beneficial effect of stress-management interventions, with effects varying by intervention type, delivery mode, duration, and session intensity. Petley et al. [44] similarly concluded that interventions targeting stressors, coping, cognitive reappraisal, or combinations of these approaches show promise, although heterogeneity limits certainty about the optimal programme. The evidence therefore supports structured, evaluated programmes rather than one-off awareness sessions.

The high referral/resit prevalence also warrants interpretation beyond individual coping. In a recent Ghanaian study of 402 nursing and midwifery students, academic level, age, language-related barriers, assessment clarity, feedback quality, and institutional support were associated with referral risk; third-year students had more than threefold higher adjusted odds of referral than second-year students [45]. That evidence complements the strong level-of-study coefficients observed in the present GPA model and reinforces the view that student performance reflects the interaction of personal resources with curriculum stage, assessment practices, feedback, language demands, and institutional support. Accordingly, remediation should combine individualised coping and study support with programme-level review of assessment design, formative feedback, clinical supervision, and transition support at academically demanding stages.

The study's strengths included a large multi-programme sample, assessment of several psychosocial domains, transparent range and duplicate checks, robust standard errors, and a secondary binary academic outcome. Important limitations remained. First, the cross-sectional design did not establish directionality; poorer academic performance could contribute to stress or coping responses rather than result from them. Second, GPA and referral or resit status were self-reported, and 15 GPA values were outside the prespecified scale; residual misclassification was possible after their exclusion. Third, single-institution, non-probability electronic recruitment may have produced selection bias. The confirmed invitation denominator was unavailable, so a conventional response rate could not be calculated and the findings should not be generalised to all Ghanaian health-professions students. Fourth, collecting all focal variables in one questionnaire raised the possibility of common-method and social-desirability bias. Fifth, the PSS-10 showed low internal consistency, and most BFI-10 trait pairs were unreliable. Measurement error may therefore have attenuated or destabilised associations. Finally, the single-site design did not permit estimation of institution-level effects.

Future research should use prospective, multicentre designs with institution-verified GPA and referral records. Stress, coping, and academic outcomes should be measured sequentially, with repeated assessments around examinations and clinical placements to distinguish acute from chronic experiences. Adapted instruments should undergo cognitive interviewing, confirmatory factor analysis, and measurement-invariance testing across programme, level, sex, and language groups. Longer validated personality measures should replace two-item trait scores. Intervention studies should test whether active-coping support, academic advising, peer support, and structured clinical supervision improve both student well-being and verified educational outcomes.

Conclusion

Among nursing, midwifery, and nurse-assistant students, moderate perceived stress was common but was not independently associated with cumulative GPA or referral or resit status. Adaptive and maladaptive coping showed small, opposing associations with GPA, and adaptive coping was associated with lower odds of referral or resit. These cross-sectional associations do not establish directionality. Health-training institutions should evaluate structured academic and coping support, while prospective multicentre research should use verified academic records and locally validated psychosocial measures.

Abbreviations

BFI-10
10-item Big Five Inventory
CI
confidence interval
ECRIH
Ethics Committee for Research Involving Humans

GPA
grade point average
HC3
heteroskedasticity-consistent standard error estimator
IQR
interquartile range
MSPSS
Multidimensional Scale of Perceived Social Support
OR
odds ratio
PSS-10
10-item Perceived Stress Scale
SD
standard deviation
STROBE
Strengthening the Reporting of Observational Studies in Epidemiology.

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Ethics Committee for Research Involving Humans (ECRIH) of the Tepa Nursing and Midwifery Training College, Ghana (Ref: ECRIH/AP/015/26). Electronic informed consent was recorded before the study questions; five respondents who declined consent were excluded. Participation was voluntary, and responses were handled anonymously and confidentially. All procedures were conducted in accordance with applicable ethical guidelines and regulations.

Consent for publication

Not applicable.

Availability of data and materials

The de-identified dataset and analysis materials are available from the corresponding author on reasonable request, subject to ethical approval and institutional data-governance requirements.

Competing interests

The authors declare no competing interests.

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Authors' contributions

MBU: Conceptualisation, methodology, supervision, formal analysis, and writing - original draft. AO: Methodology, validation, interpretation, and writing - review and editing. TAAA, IOA, LK, FTO, DO, ARN, BOA, PA, WG, FA, PNW, ABC, and ESF: Investigation, data curation, validation, interpretation, and writing - review and editing. All authors read and approved the final manuscript and agreed to be accountable for all aspects of the work.

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Figures

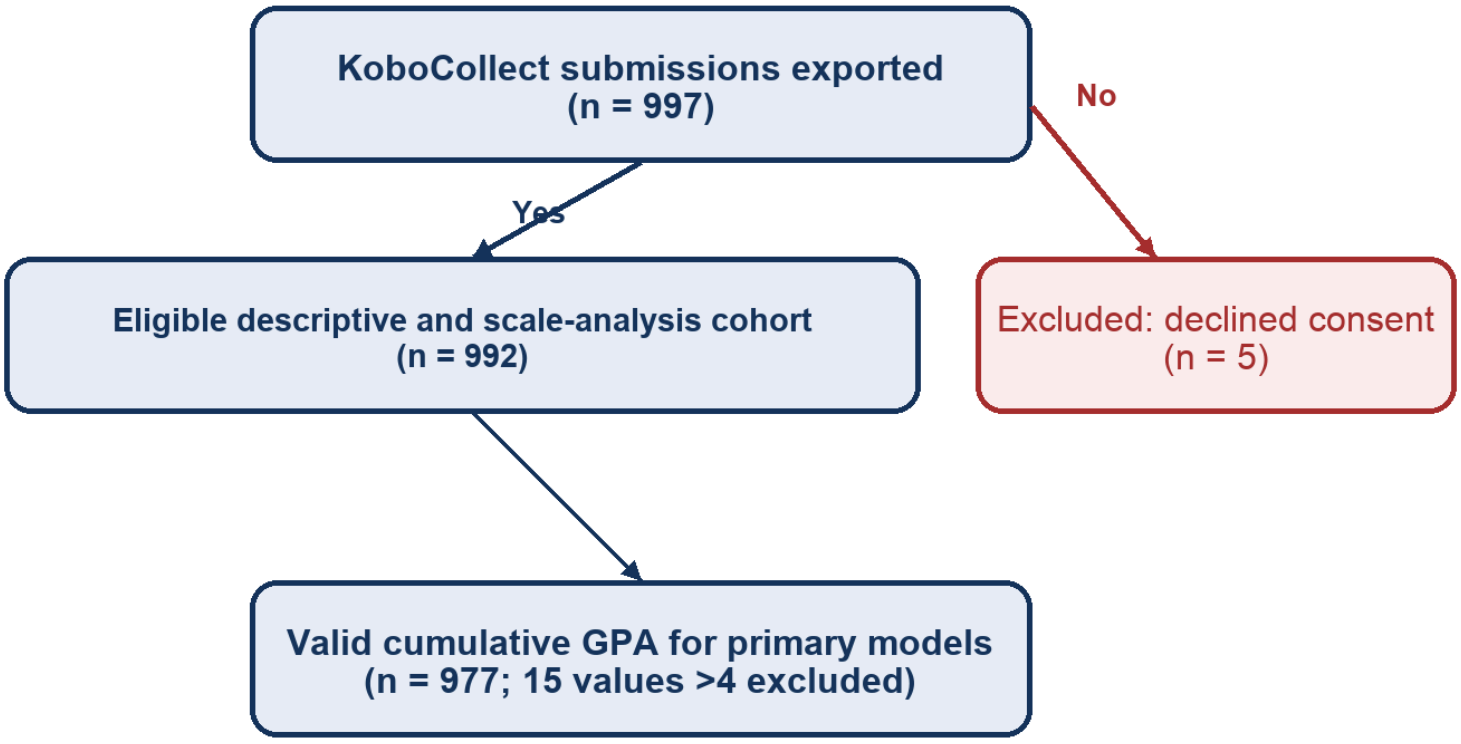


Figure 1

Flow of submissions into the analytical samples.

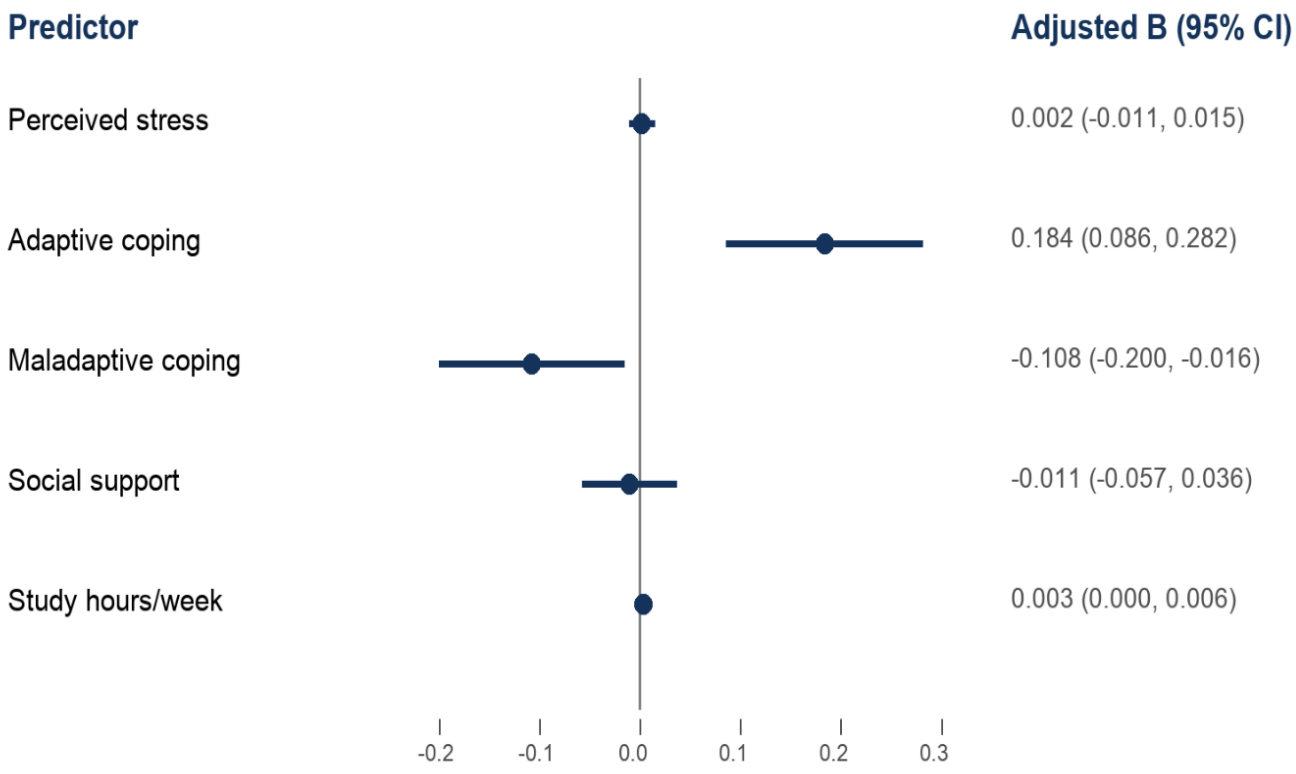


Figure 2

Forest plot of focal adjusted linear-regression coefficients for cumulative GPA. Error bars show 95% confidence intervals.

Supplementary Files

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- SupplementaryFile1PerceivedStress.pdf