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Original Article

Perceived Academic Stress and Social Support as Correlates of Type 2 Diabetes Risk Among Accounting Students in West Sulawesi, Indonesia

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Abstract

Background: University students are an underexamined group for early metabolic risk, and psychosocial factors during this period are seldom assessed alongside standard diabetes-risk screening.

Methods: This cross-sectional correlational study evaluated perceived academic stress, perceived social support, and the risk of Type 2 diabetes mellitus (T2DM) among 137 undergraduate Accounting students at a public university in West Sulawesi, Indonesia, using proportional stratified random sampling across seven class strata. Academic stress was measured using the Perceptions of Academic Stress Scale (PAS), social support using the Multidimensional Scale of Perceived Social Support (MSPSS), and T2DM risk using the Finnish Diabetes Risk Score (FINDRISC). Associations were analyzed using Spearman's rank-order correlation ($\alpha = .05$).

Result: Most students reported high academic stress (54.0%) and high perceived social support (52.6%). FINDRISC identified 23.4% of students as having moderate and 3.6% as having high T2DM risk. Academic stress showed a positive correlation with T2DM risk ($r_s = 0.230$, $p = .007$), while perceived social support correlated negatively with T2DM risk ($r_s = -0.270$, $p = .001$) and with academic stress ($r_s = -0.231$, $p = .007$).

Conclusion: All associations were statistically significant but small in magnitude. These results suggest that psychosocial stress and support are already linked to early metabolic risk prior to graduation. Campus health services, especially in non-health faculties where psychosocial screening is uncommon, should include brief stress-management and social-support interventions as part of routine T2DM prevention programs.

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Keywords
Academic Stress; Perceived Social Support; Diabetes Mellitus

Background

Type 2 diabetes mellitus (T2DM) is among the most prevalent chronic non-communicable diseases worldwide. The International Diabetes Federation (IDF) estimates that approximately 588 million adults were living with diabetes in 2024, with projections exceeding 652 million by 2050; more than 90% of these cases are classified as T2DM (1). This epidemic now affects not only middle-aged and elderly populations but also increasingly impacts young adults aged 18–25 years, as evidenced by the rising prevalence of risk factors such as impaired fasting glucose, abdominal obesity, insulin resistance, and physical inactivity (2,3). Indonesia ranks fifth globally, with an estimated 20.4 million people affected (1), and this number is expected to rise in the coming decade. Psychosocial factors within university environments have emerged as important, modifiable determinants of metabolic risk, highlighting the need for targeted research in young adult populations.

University students represent a distinct and largely underexamined risk group for T2DM. The transition to hUniversity students constitute a distinct and underexamined risk group for T2DM. The transition to higher education frequently disrupts established lifestyle habits, leading to declines in physical activity, deterioration in dietary quality, irregular sleep patterns, and increased academic demands (2,3). Among these psychosocial challenges, academic stress is particularly prominent. Academic stress occurs when students perceive that institutional demands, such as examinations, coursework deadlines, performance expectations, and career uncertainty, exceed their coping resources (4,5). This perception activates the body's stress response, which has well-documented metabolic consequences. Specifically, perceived academic stress stimulates the hypothalamic-pituitary-adrenal (HPA) axis, leading to the release of adrenocorticotropic hormone and subsequent cortisol secretion from the adrenal cortex (6). Chronic or repeated exposure to stress maintains elevated cortisol levels, promoting hepatic gluconeogenesis, suppressing peripheral insulin secretion, increasing visceral fat accumulation, and progressively impairing insulin sensitivity, thereby elevating T2DM risk (6–8). These mechanisms are supported by evidence linking psychological stress to insulin resistance and impaired glucose regulation, including in non-diabetic adult populations (7,9). However, direct causal evidence in young university populations remains limited. Economics programs are typically characterized by intensive quantitative coursework, competitive grading, high career uncertainty, and externally-driven performance pressures. They may lack embedded health literacy or psychophysiological support structures available in health sciences curricula (4). Whether these features translate into comparatively higher stress than in other disciplines remains

an empirical question not addressed in the present study; however, such stressor characteristics have been documented across multiple faculties (4,5), and the relative absence of this population from the T2DM risk literature warrants investigation. Prior studies have largely focused on medical, nursing, or general student populations (2,3,10). This constitutes a meaningful evidence gap that the present study addresses.

In addition to direct stress exposure, psychosocial resources that buffer the health effects of stress are also critical. Perceived social support, defined as an individual's subjective assessment of the availability and adequacy of support from family, friends, and significant others, has been consistently linked to beneficial health outcomes, including reduced physiological stress reactivity and lower metabolic risk (11,12). The stress-buffering hypothesis (12) posits that social support provides its protective effects primarily during periods of elevated stress by reducing the perceived imbalance between demands and resources, thereby attenuating the physiological stress response. Consistent with this hypothesis, perceived social support has been associated with lower cortisol reactivity under stress and healthier coping behaviors, both of which may decrease metabolic risk (9,13). Jafry (2021) found that perceived social support was inversely associated with stress-related health outcomes, with the strongest protective effects observed among individuals experiencing high stress levels (11). A recent large cohort study of young adults (18–34 years) in the U.S. *All of Us*Research Program (n = 14,217) reported that greater loneliness, perceived stress, and discrimination, as well as lower social support and neighborhood social cohesion, were each independently associated with higher odds of prediabetes or type 2 diabetes. Young adults with the most adverse combined psychosocial profile, identified through latent class analysis, had more than twice the odds of prediabetes or T2DM compared to those with the most favorable profile (14). Whether perceived social support is similarly associated with T2DM risk alongside academic stress in young Indonesian university students has not been empirically examined, a gap addressed by the present study.

Although psychosocial contributors to metabolic risk are increasingly recognized, the independent associations of perceived academic stress and perceived social support with T2DM risk among non-health university students in Indonesia have not been empirically examined together. Existing Indonesian studies are limited in scope, often lacking a mechanistic framework or simultaneous examination of both psychosocial variables. The present study addresses this gap by investigating, in a sample of economics faculty students, the correlations among perceived academic stress, perceived social support, and FINDRISC-measured T2DM risk. Specifically, the study examines the correlations among perceived academic stress, T2DM risk, perceived social support, and T2DM risk. The findings aim to inform evidence-based campus health promotion strategies targeting psychosocial determinants of metabolic health in young adults.

Methods

Research Design

This study employed a cross-sectional descriptive correlational design.

Sample/Participants

The total population comprised 207 students distributed across seven classes. A sample of 137 participants was selected using stratified random sampling with proportional allocation across all seven classes, determined by the Slovin formula at a 5% margin of error. All 137 invited students completed the questionnaires, yielding a 100% response rate. Proportional stratified random sampling was therefore chosen over simple random or total sampling because it increases the precision of estimates by ensuring that key subgroups are represented in proportion to their size and reduces within-stratum variability compared to unstratified approaches (15). Inclusion criteria were active enrollment in the Accounting Study Program and willingness to provide informed consent. Students with a prior confirmed clinical diagnosis of T2DM or other chronic metabolic diseases were excluded from participation. Two participants who self-reported a history of elevated blood glucose (without confirmed clinical diagnosis) were retained in the analysis, as they did not meet the pre-specified exclusion criterion of confirmed clinical diagnosis.

Questionnaire

Data were collected using three validated self-report instruments. Perceived academic stress was measured using the Perception of Academic Stress Scale (PAS) (5), an 18-item instrument rated on a five-point Likert scale that assesses four dimensions: pressures to perform, workload, academic self-perception, and time constraints. Perceived social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS) (16), a 12-item instrument measuring the perceived availability of support from family, friends, and significant others on a 7-point Likert scale. A Rasch-model validation of the Indonesian-language MSPSS in a sample of 495 Indonesian vocational-college cadets supported its unidimensional structure and demonstrated good person-item reliability (Cronbach's α = .85, item reliability = .99), indicating that the translated scale performs well among young Indonesian adults in an educational setting (17). T2DM risk was measured using the Finnish Diabetes Risk Score (FINDRISC), a validated non-invasive eight-item screening tool assessing age, BMI, waist circumference, physical activity, dietary habits, history of elevated blood glucose, antihypertensive medication use, and family history of diabetes (18); a Bahasa Indonesia translation of FINDRISC (FINDRISC-BI), validated in a sample of 1,403 Indonesian adults recruited from Java and Sulawesi, demonstrated acceptable diagnostic accuracy for undiagnosed T2DM (AUC = 0.73, 95% CI 0.67–0.78; optimal cut-off ≥9) and for dysglycaemia (AUC = 0.72, 95% CI 0.69–0.75; optimal cut-off ≥8), supporting the applicability of the FINDRISC-BI in an Indonesian population that includes Sulawesi (19). Scores range from 0 to 26 and are categorized as: low (< 7 points), slightly elevated (7–11 points), moderate (12–14 points), high (15–20 points), and very high (≥ 21 points) (20). In the present study, the 'low' and 'slightly elevated' categories were collapsed into a single 'low risk' category, and no participants scored in the 'very high' range; results are therefore presented across three categories: low, moderate, and high.

Data Collection

Study was conducted in May 2025 from undergraduate students of the Accounting Study Program, Faculty of Economics, at a public university in West Sulawesi, Indonesia. BMI and waist circumference were measured directly by trained researchers using standardized protocols (stadiometer and non-elastic tape measure; participants in a standing position with shoes removed).

Data Analysis

Data were analyzed using descriptive statistics for univariate analysis and Spearman's rank-order correlation for bivariate analysis, with a significance level set at $\alpha = .05$. Fisher's exact test was used for cross-tabulation analyses when expected cell frequencies were below 5, as was the case for the high-risk T2DM subgroup (n = 5). Effect size for Spearman correlations was interpreted using Cohen's (1988) benchmarks: small (rs = 0.10–0.29), medium (0.30–0.49), and large (≥ 0.50).

Ethical Clearance

Ethical clearance from the Research Ethics Committee of Universitas Widya Nusantara (approval No. 001612/KEP Universitas Widya Nusantara/2025, issued 16 May 2025).

Result and Discussion

Demographic of Participants

The full sociodemographic and clinical profile of the sample is summarized in Table 1.

Table 1. Characteristics of Nurse Respondents (n = 137)

Characteristic	n	Percentage (%)
Sex		
Female	117	85.4
Male	20	14.6
Age (years), Mean ± SD	19.97 ± 0.419	Range: 19-21
BMI Category		
Underweight	24	17.5
Normal	73	53.3
Overweight	16	11.7
Obese	24	17.5
Family History of T2DM		
Yes	37	27.0
No	100	73.0
History of Elevated Blood Pressure		
Yes	6	4.4
No	131	95.6

A total of 137 undergraduate Accounting students participated in the study. The mean participant age was 19.97 years, reflecting a homogeneous sample of young adults in the late-adolescent to early-adulthood developmental stage. Most participants were female (n = 117, 85.4%), while males comprised 14.6% (n = 20) of the sample. Regarding body composition, 53.3% (n = 73) of students had a normal BMI, 17.5% (n =

24) were underweight, 11.7% (n = 16) were overweight, and 17.5% (n = 24) were classified as obese. A family history of type 2 diabetes mellitus (T2DM) was reported by 27.0% (n = 37) of participants, and 4.4% (n = 6) reported a prior history of elevated blood pressure. Two participants (1.5%) reported a personal history of elevated blood glucose without a confirmed clinical diagnosis. In accordance with the operationalized exclusion criteria, these participants were retained in the analysis.

Univariate Analysis

Table 2. Univariate Distribution of Perceived Academic Stress, Perceived Social Support, and T2DM Risk (n = 137)

Variable	n	Percentage (%)
Perceived Academic Stress (PAS)		
Low	10	7.3
Moderate	53	38.7
High	74	54.0
Perceived Social Support (MSPSS)		
Low	18	13.1
Moderate	47	34.3
High	72	52.6
T2DM Risk		
Low	100	73.0
Moderate	32	23.4
High	5	3.6

Table 2 presents the univariate distribution of the three study variables. Most students (54.0%, n = 74) reported high academic stress, with 38.7% (n = 53) at moderate and 7.3% (n = 10) at low levels. For perceived social support, 52.6% (n = 72) reported high support, 34.3% (n = 47) moderate, and 13.1% (n = 18) low, indicating that most students had access to social resources despite high stress. Regarding T2DM risk measured by FINDRISC, 73.0% (n = 100) were at low risk, 23.4% (n = 32) at moderate risk, and 3.6% (n = 5) at high risk, with no students in the very high-risk category. Although most students were at low risk, the fact that about one in four had elevated FINDRISC scores highlights the early presence of modifiable risk factors in this population.

Bivariate Analysis

Table 3. Cross-Tabulation of Perceived Academic Stress and T2DM Risk Categories (n = 137)

Academic Stress	Low Risk		Moderate Risk		High Risk		p-value
	n	%	n	%	n	%	
Low	10	100.0	0	0.0	0	0.0	
Moderate	42	79.2	11	20.8	0	0.0	0.050
High	48	64.9	21	28.4	5	6.8	
Total	100	73.0	32	23.4	5	3.6	

The bivariate associations between academic stress, perceived social support, and T2DM risk are shown in Tables 3 and 4. Cross-tabulation of academic stress categories against T2DM risk categories (Table 3) revealed a gradient pattern. All students in the low-stress group (100%) were classified at low T2DM risk. Among students with high academic stress, 64.9% were at low risk, 28.4% at moderate risk, and 6.8% at high risk. This pattern indicates an increase in T2DM risk as academic stress rises. Regarding perceived social support (Table 4), students with high social support were mostly at low risk of T2DM (80.6%, n = 58). Students with low social support showed a different distribution: only 33.3% (n = 6) were at low risk, 55.6% (n = 10) at moderate risk, and 11.1% (n = 2) at high risk. This pattern suggests an inverse association between the level of social support and the T2DM risk category.

Table 4. Cross-Tabulation of Perceived Social Support and T2DM Risk Categories (n = 137)

Social Support	Low Risk		Moderate Risk		High Risk		p-value
	n	%	n	%	n	%	
Low	6	33.3	10	55.6	2	11.1	
Moderate	36	76.6	8	17.0	3	6.4	0.001
High	58	80.6	14	19.4	0	0.0	
Total	100	73.0	32	23.4	5	3.6	

Spearman's rank-order correlation analysis was performed to assess the strength and direction of associations among the three study variables (Table 5). Perceived academic stress showed a statistically significant positive correlation with T2DM risk score (rs = 0.230, p = .007), suggesting that higher academic stress is associated with higher FINDRISC scores. Perceived social support exhibited a statistically significant negative correlation with T2DM risk score (rs = −0.270, p = .001), indicating that greater perceived social support is associated with lower FINDRISC scores. A statistically significant negative correlation was also found between perceived academic stress and perceived social support (rs = −0.231, p = .007), suggesting that students with higher academic stress tend to report lower levels of perceived social support. Although all associations were statistically significant, their magnitudes were small, consistent with expectations for the psychosocial correlates of early-stage metabolic risk in a young, non-clinical population.

Table 5. Spearman's Rank-Order Correlations Among Study Variables (n = 137)

Variable	Academic Stress	Social Support	T2DM Risk
1. Academic Stress	-		
2. Social Support	-0.231**	-	
3. T2DM Risk	0.230**	-0.270*	-

Note. *$p < .05$ (two-tailed); **$p < .01$ (two-tailed). All correlations represent small effect sizes

DISCUSSION

This study found that perceived academic stress and perceived social support were each significantly associated with the risk of T2DM among undergraduate accounting students at a public university in West Sulawesi, Indonesia. Most students reported high academic stress, which was positively correlated with FINDRISC scores; conversely, higher perceived social support was associated with lower T2DM risk and was itself inversely correlated with academic stress.

The prevalence of high perceived academic stress observed in this sample is consistent with patterns reported in comparable university populations. Ruiz-Camacho & Gozalo (2025) documented that academic stressors, including beliefs about performance, academic overload, and examination demands, were the dominant contributors to psychological distress across undergraduate fields of study, with substantial stress responses reported regardless of faculty type (4). The accounting curriculum, characterized by intensive quantitative coursework, competitive grading, and career-related pressures, likely creates conditions for sustained academic stress. Although a direct comparison with other disciplines was beyond the scope of this study, such stressor patterns are consistent with findings across multiple faculties (4,5). That 54% of this sample reported high-level stress, despite a mean age of just 19.97 years, underscores the early onset of academic stress burden and its potential downstream health implications if left unaddressed.

The finding that 27.0% of students were classified as having moderate-to-high T2DM risk by FINDRISC, despite a sample mean age under 20 years, warrants careful interpretation. FINDRISC was originally developed and validated for middle-aged and older Finnish adults (20); its predictive validity in young Indonesian populations has not been formally established, and findings should be interpreted as indicative of an accumulating burden of risk factors rather than absolute T2DM risk estimates. Abd El-Razik Siam et al. (2023) similarly found that 61.9% of Saudi university students aged 17–26 were at intermediate-to-high risk using a comparable tool (AUSDRISK), with obesity, physical inactivity, and positive family history as the most prevalent contributing factors (3). In the present study, 27.0% of participants reported a family history of T2DM and 17.5% were obese, both established FINDRISC risk components indicating that metabolic vulnerability in this young population is already structurally present and not solely attributable to psychosocial exposures. By contrast, a cross-sectional FINDRISC-based screening of 341 university students in Spain (mean age 23.5 years) reported a considerably lower moderate-to-high-risk prevalence of 4.98%, despite the sample's slightly older age profile (21). This divergence suggests that population-specific factors, such as family history prevalence, dietary patterns, and BMI distribution rather than instrument performance alone, likely drive differences in FINDRISC-based risk estimates across cultural and demographic contexts, reinforcing the importance of interpreting FINDRISC scores as population-relative rather than universally calibrated.

The significant positive correlation between perceived academic stress and T2DM risk is theoretically grounded in the HPA axis–metabolic stress pathway. When psychological stressors are perceived as exceeding available coping resources, the

hypothalamic-pituitary-adrenal axis is activated, triggering the release of adrenocorticotropic hormone and subsequent cortisol secretion from the adrenal cortex (6). Under chronic academic stress conditions, sustained cortisol hypersecretion stimulates hepatic gluconeogenesis, suppresses peripheral insulin secretion, promotes visceral fat accumulation, and progressively impairs insulin sensitivity; these metabolic alterations are collectively captured by FINDRISC items, including BMI, waist circumference, and physical activity (6,7,22). It is plausible that behavioral correlates of academic stress, including reduced physical activity, irregular dietary patterns, and poor sleep, may also contribute to elevated FINDRISC scores, as suggested by studies in comparable university populations (2,3); however, these pathways were not directly measured in the present study and cannot be confirmed from cross-sectional data alone.

The weak-to-moderate magnitude of the observed correlation ($r_s = 0.230$) is consistent with expectations in a young adult sample, where the biological effects of stress-induced metabolic dysregulation are likely still in their early, subclinical stages, and where significant individual variability in coping capacity modulates the stress-to-risk pathway.

The significant negative correlation between perceived social support and T2DM risk ($r_s = -0.270$, $p = .001$) was the strongest association observed in this study. Students with higher perceived social support tended to have lower FINDRISC scores. This finding is consistent with the stress-buffering hypothesis articulated by Schwarzer & Knoll (2007), which posits that perceived social support exerts its protective effects primarily during periods of elevated stress by reducing the perceived imbalance between demands and available resources, thereby dampening the physiological stress response (12). Biologically, higher perceived support has been associated with reduced HPA axis reactivity and lower cortisol levels under stress, mechanisms that may help reduce downstream metabolic risk, though these pathways were not directly tested in the present study (7,12). Behaviourally, prior research suggests that individuals with stronger social support may be more likely to maintain health-promoting behaviors, including physical activity and adequate dietary intake, under stress (2,11,23), though the present study did not directly assess behavioral mediators. The cross-tabulation data further illustrate this pattern: among students with low perceived social support, 55.6% were at moderate risk and 11.1% at high risk of T2DM, compared to only 19.4% at moderate risk and 0% at high risk among those with high perceived social support. While this descriptive gradient is consistent with the proposed protective role of social support, the cross-sectional design precludes causal inference, and unmeasured confounders may contribute to this pattern.

The additional finding that academic stress and perceived social support were themselves significantly and negatively correlated adds a further layer to these results. Rather than operating as independent, parallel predictors of T2DM risk, academic stress and social support appear to be inversely linked, suggesting that high stress may itself reduce perceived availability of support. This is consistent with the resource depletion perspective in stress theory, in which chronic stressors gradually exhaust psychological resources over time (11), potentially contributing to both direct and indirect pathways to

metabolic risk, although this compounding mechanism was not directly tested (12). Jafry et al. (2021) similarly found that perceived social support attenuated the association between stress and health outcomes, with the protective effect most prominent among individuals experiencing higher stress levels (10); although that study was conducted in a homeless adult population and direct generalization requires caution, the direction of this relationship is consistent with present findings. Future research employing hierarchical moderated regression would allow direct testing of whether perceived social support formally moderates the academic stress-T2DM risk association, a question the present cross-sectional bivariate design was not powered to answer but that the patterns observed here strongly motivate.

The predominance of female participants in this sample is a notable demographic characteristic that warrants consideration. Prior research shows mixed findings regarding gender differences in academic stress and social support, while some studies report higher stress levels among female students (4), others find higher academic dissatisfaction among male students instead (24), and He et al. (2025) note that women tend to report both higher stress and higher perceived social support than men (25). The female-dominated composition of this sample may therefore have influenced the observed distributions of both stress and support scores and limited the generalizability of the findings to mixed-sex student populations. Sex-stratified analyses were not feasible in the present study given the highly imbalanced distribution (85.4% female, 14.6% male); future studies with balanced sex representation are needed to determine whether the stress–T2DM risk and support T2DM risk associations differ by sex.

Taken together, these findings suggest that perceived academic stress and perceived social support are each significantly associated with T2DM risk in this young Indonesian student population, a group that has received limited attention in the psychosocial-metabolic risk literature. Both associations were small and of comparable magnitude (r_s = 0.230 vs. 0.270), and the difference between them is not statistically meaningful. University health services in non-health faculties should consider integrating psychosocial risk screening alongside routine health promotion, addressing both stress management and strengthening social support. These findings support a broader case for targeting psychosocial determinants of metabolic health early in adulthood, before risk accumulation becomes clinically consequential.

Conclusion

This study found that among Accounting students at a public university in West Sulawesi, Indonesia, both perceived academic stress and perceived social support were significantly, though modestly, associated with FINDRISC-measured T2DM risk. These factors were also inversely correlated. Higher academic stress was associated with increased T2DM risk, supporting the stress-related metabolic pathway theory. In contrast, higher social support was linked to lower T2DM risk, consistent with the stress-buffering hypothesis. Because the study was cross-sectional and the associations were small, these results indicate that psychosocial risk factors are present in this population, but do not

establish causality or clinical significance. The inverse relationship suggests that academic stress and social support may influence each other, so interventions targeting one could affect the other. Campus and community health nurses can play a key role in implementing brief, low-cost psychosocial screening and stress-management programs in non-health faculties, where such efforts are currently rare, to complement conventional metabolic risk prevention. Due to the single-program, single-institution sample and the predominance of female participants, these findings should not be generalized beyond similar student populations. Future longitudinal studies with multivariable designs, biochemical outcomes (fasting plasma glucose, HbA1c), and sex-balanced samples are needed to clarify causal mechanisms, the moderating role of social support, and the broader applicability of these psychosocial pathways.

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Declaration of Conflict of Interest
None.

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Author Contributions
SU: Conceptualization, methodology, investigation, data collection, formal analysis, writing-original draft preparation. KH, BN, I, NAD, E: Conceptualization, methodology, formal analysis, writing-review and editing, supervision, Methodology, writing-review and editing, supervision. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement
The dataset generated and analysed during the current study is available from the corresponding author upon reasonable request.

Declaration of the Use of AI in Scientific Writing
The authors declare that artificial intelligence (AI) tools were used solely to assist in language refinement and improving the clarity of the manuscript. The AI did not contribute to the study design, data analysis, or interpretation of results.

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