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Financial strain as a moderator in the relationship between family support and perceived stress

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Abstract

This study examines how financial strain moderates the association between family support and perceived stress among undergraduate students in Malaysia. Drawing on stress and coping theory, the conservation of resources theory, and the buffering hypothesis of social support, the research framework integrates three variables: family support as the independent variable, perceived stress as the dependent variable, and financial strain as the moderating factor. The framework posits that family support may serve as a protective resource associated with lower stress, though its effectiveness may vary across levels of financial demand. Data were collected from 387 students across 20 public universities through a web-based questionnaire, and moderated regression analysis was employed. Results indicate that family support is significantly associated with lower perceived stress, yet this negative association is attenuated under high financial strain. The interaction effect was significant, with simple slope analysis showing that the stress-buffering role of family support is stronger when financial strain is low and weaker when financial strain is high. This finding highlights the mechanism through which financial hardship reduces the psychological benefits of family support. The study makes a unique contribution by extending prior research that largely examined family support or financial strain in isolation, offering new evidence of their interactive effects in a multicultural Malaysian context. Practically, the findings suggest that interventions combining financial literacy, debt management, and family-focused support programs are essential for reducing stress and improving student well-being.

Keywords Family support, Financial strain, Perceived stress, Socioeconomic

1 Introduction

The transition to university is a critical phase in a student's life, marked by significant challenges, including academic pressures, career-related concerns, and societal expectations. These stressors may significantly affect psychological health and general well-being. In Malaysia, the prevalence of mental health issues has shown a concerning increase, rising from 11.2% in 2006 to 29.2% in 2015 among adults [20]. According to



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Hamzah et al. [21], university students are particularly vulnerable, with mental health problems reportedly doubling from 10% in 2011 to 20% in 2016. Moreover, studies by Ediz et al. [16] and Fauzi et al. [17] found that medical students have mental issues such as anxiety, depression, and suicidal feelings. Despite government initiatives to promote mental health awareness, stigma and negative perceptions toward mental health persist, particularly in certain communities. More recent surveys indicate that nearly one in three Malaysian undergraduates experience moderate to severe psychological distress, a trend that mirrors global concerns about the mental health crisis in higher education [24]. This highlights the pressing need to investigate the causes and effects of stress among Malaysian university students and to develop effective strategies to support their mental health and academic success.

Family support plays a pivotal role in helping university students navigate these challenges by providing emotional stability and practical assistance [18]. Additionally, support from friends and loved ones plays a vital role in reducing the harmful impact of stress on mental well-being [40]. Research demonstrates that robust social support systems enable students to better manage academic and financial pressures while adapting to the demands of university life. Family support, in particular, serves as an essential resource during times of heightened stress, acting as both an emotional anchor and a protective factor against its adverse impacts. An et al., [5] stated that the strong association between family support and improved mental health, emphasizing its effectiveness in reducing stress, anxiety, and depression across various contexts.

Although family support is widely recognized as a critical protective factor, its role cannot be understood in isolation from financial realities. Malaysian undergraduates are predominantly drawn from low- to middle-income households, with the median monthly household income in 2022 recorded at RM 6,338 [15]. At the same time, Malaysia's household debt-to-GDP ratio remains among the highest in Asia, recorded at approximately 84.5% in 2022 [7]. These figures underscore that financial stress is not peripheral but central to students' lived experiences, and that it can directly undermine the psychological benefits of family support.

Financial challenges have become a significant concern for Malaysian university students, largely due to rising tuition costs, higher living expenses, and the need for essential academic resources such as textbooks and technology. A study highlights the strong link between financial stress and students' well-being. Mohamad et al. [38] emphasize that financial support plays a crucial role in shaping anxiety levels among university students, with those lacking adequate financial resources being more prone to heightened anxiety. Similarly, Fauzi et al. [17] establish a direct correlation between financial strain and mental health issues, particularly stress, anxiety, and depression (SAD), all of which negatively impact students' academic performance. These findings suggest that financial insecurity extends beyond economic hardship, significantly influencing students' psychological health and educational outcomes.

At the global level, students face increasing exposure to economic instability, inflationary pressures, and uncertain job markets. Research from Europe and North America shows that financial difficulties are among the strongest predictors of student stress, often exceeding academic workload. In Malaysia, where graduate employability and financial literacy remain pressing policy concerns, undergraduates are positioned at the intersection of educational strategies and broader economic development. This context

underscores the need to investigate how family resources interact with financial strain to influence stress outcomes.

Beyond its immediate effects on mental health, financial stress can create long-term disadvantages. Students experiencing financial difficulties may struggle academically, which in turn affects their career prospects, perpetuating a cycle of financial instability. Research indicates that financial distress is widespread among Malaysian students across various academic disciplines.

Lestari et al. [34] similarly report that students frequently express concerns about their financial situation, leading to emotional distress and a decline in their overall academic experience. Therefore, this issue needs to be handled seriously with the support of the entire society. The family support is widely recognized as a key protective factor; its effectiveness can be influenced by financial challenges. Wang et al., [49] found that social support's ability to mitigate the negative effects of stress depends on the family's financial stability. When financial difficulties surpass the family's capacity to provide emotional or practical assistance, the protective role of family support weakens. Financial stress poses a significant threat to the psychological well-being of university students.

The relationship between family support and stress has been widely studied in existing research [33, 52]. However, the role of financial factors in moderating this relationship has received limited attention, especially within the multicultural Malaysian context. This gap is critical because financial stress is a pervasive issue among students that can undermine the protective role of family support. Financial challenges may not only increase perceived stress directly but also weaken the stress-buffering function of family support. When families themselves are under economic pressure, their ability to provide effective emotional and financial support diminishes, leaving students more vulnerable. For instance, while family support often provides emotional stability and reduces stress, financial hardships can heighten stress levels and weaken the positive effects of family support by creating additional sources of strain.

This study seeks to address this gap by examining the association between family support and perceived stress, with financial strain as a moderating factor, among Malaysian undergraduates. By integrating stress and coping theory [32], conservation of resources theory [22], and the buffering hypothesis of social support [13], this research provides a theoretically grounded framework to explain how family support and financial strain jointly influence students' well-being. It makes a unique contribution by offering empirical evidence on how financial strain alters the protective role of family support in a multicultural Malaysian setting, highlighting the urgency of interventions that combine financial literacy, debt-reduction strategies, and family-oriented support programs to improve student mental health and academic performance.

2 Literature review

2.1 Underpinning theory

The stress and coping theory [32], the conservation of resource (COR) theory [22], and the buffering hypothesis of social support [13] provide a complementary framework for explaining how family support influences perceived stress among undergraduate students, particularly when financial strain is present as a moderator.

According to stress and coping theory, stress arises when there is an imbalance between external demands and the resources available to cope with them. For students,

financial challenges become a critical stressor when they are perceived as exceeding personal coping capacities, thereby threatening psychological well-being. This highlights the need for effective coping mechanisms to manage stress in higher education settings. COR theory extends this perspective by emphasizing that stress results from the loss, or threat of loss, of valuable resources. In the student context, financial strain represents such a loss because it depletes emotional and psychological resources, thereby exacerbating perceived stress.

The buffering hypothesis of social support adds an interactive lens, suggesting that family support can reduce the adverse impact of stress by replenishing emotional and psychological resources. In line with COR theory, family support represents a form of resource gain that offsets the depletion caused by financial strain. When family support is strong, students may experience a sense of security and emotional replenishment, which counterbalances the negative effects of financial challenges. However, under conditions of severe financial strain, the buffering effect of family support may be weakened, as the overwhelming pressure of financial instability can overshadow the benefits of emotional support [14].

2.2 Perceived stress

Lazarus and Folkman [32] emphasize that individuals shape perceived stress through their appraisal of situations and coping abilities. Perceived stress is a common experience among individuals, particularly students, and is influenced by a wide range of factors, from academic pressures to socio-environmental conditions. Perceived stress among students is shaped by academic, personal, socio-environmental, financial, and health-related factors. Academic pressures are among the primary contributors to student stress. Heavy workloads, high-stakes exams, and stringent performance expectations are significant sources of stress. Students in professional programs often report higher stress levels than their peers in non-professional courses due to the specialized demands of their studies and future career responsibilities [36, 46, 47]. This pressure is intensified in competitive environments, underscoring the need for effective coping mechanisms. Individual traits also significantly influence stress levels. High self-esteem and cognitive strategies, like positive reframing and problem-solving, enhance resilience and reduce stress [28, 48].

Apart from that, financial strain and family pressure are the most common factors that contribute to stress in students. Those from lower-income backgrounds or studying abroad often face financial difficulties, including tuition fees and living expenses. Family-related stress, including conflicts or high expectations, further exacerbates their challenges, especially for students balancing academic and familial responsibilities [4, 46].

2.3 Social support as a coping strategy

Social support is an effective coping mechanism for reducing stress and improving mental health across various populations and contexts. It acts as a buffer, fostering emotional resilience and enhancing coping strategies, as shown in studies of cardiac patients [44] and perinatal women [23]. Kristiana et al. [31] conducted a meta-analysis to examine the role of social support in alleviating acculturation stress among international students.

Social support, such as family support, plays a crucial role in helping students manage stress. Past studies consistently show that individuals who perceive greater family

support experience lower stress levels. Family support is often identified as the most impactful source of social support, enabling students to handle challenging situations more effectively (Aziz et al., 2022) [8, 51]. Moreover, family support not only reduces stress but also provides a protective buffer against its effect on mental well-being, aiding in the relief of depression and anxiety symptoms [50].

Past studies conducted in Malaysia indicated that perceived social support, including family support, has a significantly negative correlation with psychological distress, such as depression, anxiety, and stress, among university students. This suggests that higher levels of family support are associated with lower levels of stress and psychological distress [42, 45]. In summary, research consistently highlights a positive link between social support and perceived stress. Based on Lazarus and Folkman's stress and coping theory, support from family and others plays a crucial role in shaping how individuals interpret and manage stress, ultimately affecting their mental well-being. Thus, this study explores the effect of family support on perceived stress and focuses on financial strain as a moderating variable of perceived stress.

2.4 Financial strain and perceived stress

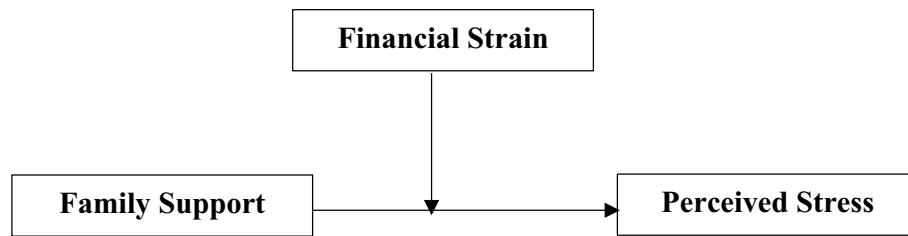
Financial strain is one of the most salient sources of stress for students. According to Cohen and Wills [13], when financial needs are adequately met, students can benefit more from family support because they are not preoccupied with survival concerns. Conversely, when financial strain is high, the effectiveness of family support in alleviating stress may be reduced. Financial difficulties can serve as an overwhelming stressor, overshadowing the emotional benefits of support, and contributing to higher perceived stress even when family support is present [41]. Empirical evidence shows that financial strain is linked with higher rates of depression and anxiety, and this association is evident across high-income as well as middle- and lower-income contexts [9, 19]. In student populations, financial instability not only heightens stress but may also divert time and attention away from academic commitments, thereby undermining performance [1, 25, 37, 39].

In the Malaysian higher education context, the interaction between family support and financial strain remains pivotal in understanding student performance. While family support often enhances motivation and emotional resilience, its benefits are frequently diminished under conditions of financial hardship. In Malaysia, where many undergraduates come from diverse socioeconomic backgrounds and often rely on both family resources and government financial aid [27], it is unclear how financial strain interacts with family support to influence perceived stress. By focusing on this moderating effect in the Malaysian higher education context, the present study fills an important gap by extending prior work that has largely examined only direct relationships among financial strain, support, and stress.

Therefore, this study proposes that financial strain could affect the relationship between the family support students receive and their perceived stress. Thus, this study proposes the hypotheses as follows:

H1 Family support is negatively associated with perceived stress.

H2 Financial strain negatively moderates the relationship between family support and perceived stress.

**Fig. 1** Research framework**Table 1** Survey invitations

Stage	Total
Invitations sent	450
Responses received	410
Excluded	23 (due to incomplete responses or failed attention checks)
Final analytic sample	387 (response rate = 86%)

This study proposes a research framework (Fig. 1) in which family support is the independent variable, perceived stress the dependent variable, and financial strain the moderating factor. While prior studies confirm that family support reduces stress and enhances well-being [35], the moderating role of financial strain remains insufficiently explored. Past studies, such as Roohafza et al. [43] and Israel et al. [26], examine only the direct relationship between social support and stress, with limited attention to how financial difficulties may alter this association. Addressing this gap, the present study investigates the interaction between family support and financial strain among Malaysian undergraduates, contributing to a clearer understanding of how these factors jointly shape students' psychological well-being and academic performance.

3 Materials and methods

3.1 Participants and sampling

This study employed a convenience sampling strategy targeting undergraduate students enrolled in public universities across Malaysia. The sampling frame was derived from the Directory of Public Universities published by the Department of Higher Education Malaysia, which listed 20 public universities at the time of data collection. Public universities were chosen because they share similar demographic characteristics, including a high proportion of students from low- to middle-income households, which is directly relevant to the study's variables of financial strain and family support. This focus also reflects previous empirical work in Malaysia that has highlighted undergraduates' vulnerability in public institutions to financial and psychological stressors [10].

Table 1 shows the survey invitations were disseminated through faculty WhatsApp groups and student representatives, with participation restricted to students who accessed the online questionnaire using a verified institutional email address. The survey was hosted on a secure platform with end-to-end encryption. The recruitment process is summarized below:

Inclusion criteria required participants to be currently enrolled as full-time undergraduates in a Malaysian public university, aged 18 or above, and willing to provide informed consent. Exclusion criteria included postgraduate students, part-time students, and respondents who failed attention checks.

The final sample size of 387 was sufficient for regression analyses, exceeding minimum thresholds recommended by power analysis [12]. The response rate of 86% was calculated based on valid completed questionnaires (387) divided by the total number of invitations sent (450). While convenience sampling enhanced feasibility, potential biases remain, as participation depended on accessibility and willingness to engage. This may limit generalizability to the entire undergraduate population of 551,082 students across Malaysian public universities (Fig. 2).

3.2 Data collection instruments

The questionnaire was structured into three distinct sections, with the first section dedicated to collecting demographic information. This section gathered essential details such as gender, year of study, and race, providing a foundational understanding of the respondents' backgrounds. Additionally, academic performance was assessed using the Cumulative Grade Point Average (CGPA), with a range of 0.00 (lowest) to 4.00 (highest). Including CGPA enabled the study to explore potential relationships between academic achievement and other variables under investigation. However, while demographic data provides valuable context, it also introduces potential limitations, as self-reported CGPA may be subject to inaccuracies or social desirability bias. Moreover, relying solely on broad demographic categories may overlook nuanced factors, such as socioeconomic status and institutional differences, that could further influence the study's outcomes. Despite these limitations, the structured demographic section aimed to establish a clear respondent profile, ensuring that variations in academic and personal backgrounds were adequately captured for analysis.

The following portion of the evaluation examined students' perceived stress levels through the use of a 5-point Likert scale, which captured the frequency of stress

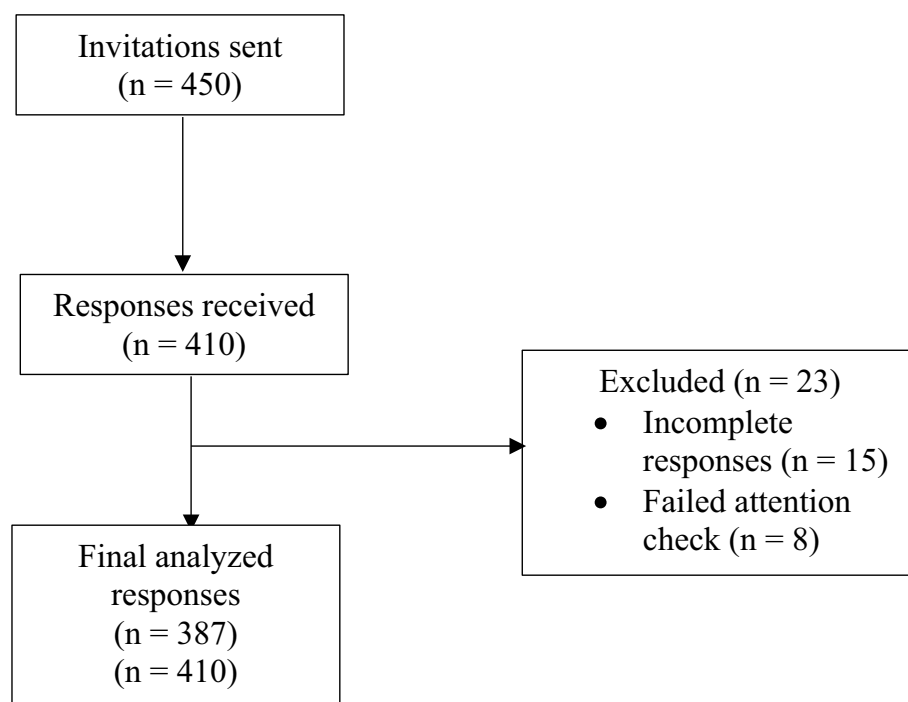


Fig. 2 Participant recruitment and flow diagram (adapted from CONSORT guidelines to suit survey research)

experiences from “never” to “very often.” Furthermore, financial concerns and family support were evaluated using a 5-point Likert scale to assess agreement or disagreement with the presented statements. Perceived stress was quantified using a five-item subscale focusing on the frequency of nervous or stressed feelings. A five-item questionnaire evaluating financial practices, including emergency savings, purchasing non-essential items, and reliance on debt for living expenses, constituted the financial difficulties component. The measures for financial strain and family support were adopted from scales widely utilized in prior research. Given that these instruments were originally developed in diverse cultural settings, a pilot study was conducted to assess their suitability for Malaysian undergraduate students. The pilot study findings affirmed the reliability and validity of the scales for use within this specific population. The adaptation process retained five items from the original Perceived Stress Scale [13], and modified minor wording in two items for cultural clarity, while all five items for financial strain and family support were adapted without altering their conceptual meaning.

3.3 Procedure and ethics

The survey was conducted online between February to May 2025. Participants provided electronic informed consent prior to participation, which explained the study’s aims, the voluntary nature of participation, anonymity, and the right to withdraw at any time. Data were stored securely in password-protected files, accessible only to the research team, and will be retained for five years before destruction in line with ethical standards.

Ethical approval for this research was obtained from the Research Ethics Committee, Universiti Malaysia Perlis (UniMAP) under the Office of the Deputy Vice Chancellor (Research and Innovation) (Approval Ref: UniMAP/PTNC(P&I)/JKETIKA (30), Date: 12 September 2024). When recruiting students from multiple institutions, permission letters were obtained from relevant university administrators. To ensure data quality, two attention-check items (e.g., “Please select ‘Strongly Agree’ for this item”) were embedded in the questionnaire. Cases failing these checks or providing incomplete responses were excluded ($n = 23$).

3.4 Data analysis

The statistical analysis was performed using IBM SPSS Statistics version 23.0. Descriptive statistics, including mean, standard deviation, skewness, kurtosis, and percentiles, were calculated to provide a comprehensive overview of the dataset. The normality of the variables was evaluated by examining skewness and kurtosis, providing a robust basis for subsequent inferential analyses.

Data analysis was conducted using IBM SPSS Statistics version 23.0. Initial descriptive statistics (mean, standard deviation, skewness, kurtosis, percentiles) were computed. Missing data were minimal (< 3% per variable) and were handled using listwise deletion. A moderated multiple regression analysis was performed to test whether financial strain moderated the relationship between family support and perceived stress. Following Aiken and West [3], predictors were mean-centered prior to creating the interaction term to reduce multicollinearity. The model was specified as follows:

$$Ps_i = \beta_o + \beta_1 (FS_i^c) + \beta_2 (FinS_i^c) + \beta_3 (FS_i^c * FP_i^c) + \epsilon_i$$

Where:

PS_i represents perceived stress for student (dependent variable).

FS_i^c represents mean centered family support (independent variable).

FP_i^c represents mean centered financial strain (moderator).

$FS_i^c \times FP_i^c$ represents the interaction term between family support and financial strain.

β_o is the intercept.

β_1 are regression coefficients.

ϵ_i is the error term.

Regression outputs included unstandardized coefficients (β), standard errors (SE), 95% confidence intervals, p-values, R^2 , ΔR^2 , and effect sizes (f^2) for each model block. Variance inflation factors (VIFs) were calculated to check multicollinearity. Model assumptions were evaluated using residual plots (linearity, homoscedasticity), normal probability plots (normality of residuals), and influence diagnostics (Cook's distance).

3.5 Reliability testing

The reliability analysis presented in Table 2 provides significant insights into the internal consistency and measurement reliability of the primary constructs examined in this study. The perceived stress construct demonstrates high reliability, with a Cronbach's Alpha of 0.885, indicating that the selected items consistently and accurately measure perceived stress. This strong internal consistency enhances confidence in the validity of the perceived stress assessment.

Similarly, the financial strain construct shows robust reliability, with a Cronbach's Alpha of 0.842, indicating that the items capture the construct's dimensions. A reliability coefficient exceeding 0.8 is generally regarded as excellent, underscoring the effectiveness of the financial strain scale employed in this study. The family support construct also displays commendable reliability, with a Cronbach's Alpha of 0.822, confirming that the items consistently and effectively measure this dimension. This ensures a dependable evaluation of students' family support within the study's context. Each construct comprises five items, providing a balanced and comprehensive representation of the dimensions being measured. With Cronbach's Alpha values exceeding 0.8 for perceived stress, financial strain, and family support, the results affirm strong internal consistency and validate the reliability of the measurement instruments utilized in this research.

4 Results

4.1 Demographic profile

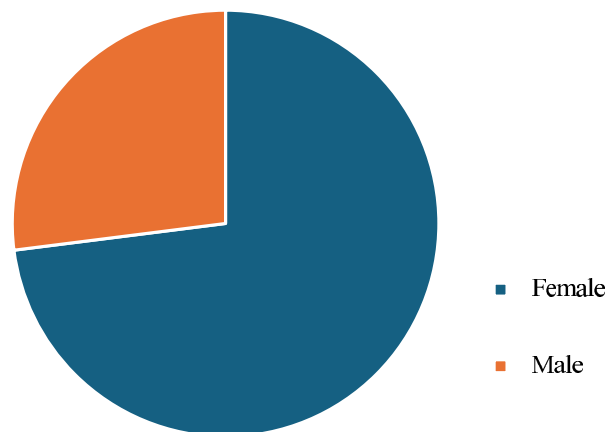
A total of 387 undergraduates from Malaysian public universities participated. Table 3; Figs. 3, 4 and 5 summarize the demographic distribution. The majority were female (73%), Malay (61%), and reported a CGPA between 3.00 and 3.99 (87%). These characteristics are consistent with the national undergraduate profile, where women and Malays are the majority in public higher education.

Table 2 Reliability analysis

Construct	Cronbach's alpha	Number of items	Interpretation
Perceived stress	0.885	5	High reliability
Financial strain	0.842	5	High reliability
Family support	0.822	5	High reliability

Table 3 Demographic profile

Designation	Total	Percentage (%)
Students	387	100
Gender		
Female	283	73
Male	104	27
Race		
Chinese	50	13
Indian	28	7
Malay	234	61
Others	75	19
CGPA		
0.00-0.99	16	4
2.00-2.99	35	9
3.00-3.99	336	87

**Fig. 3** Gender

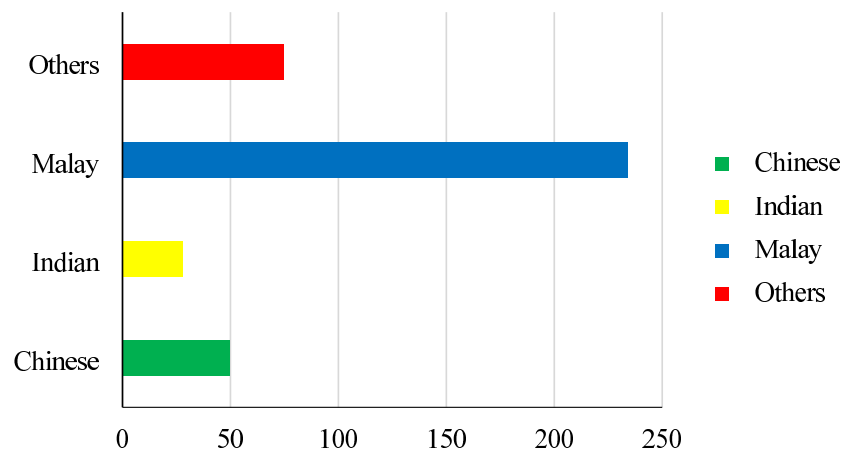
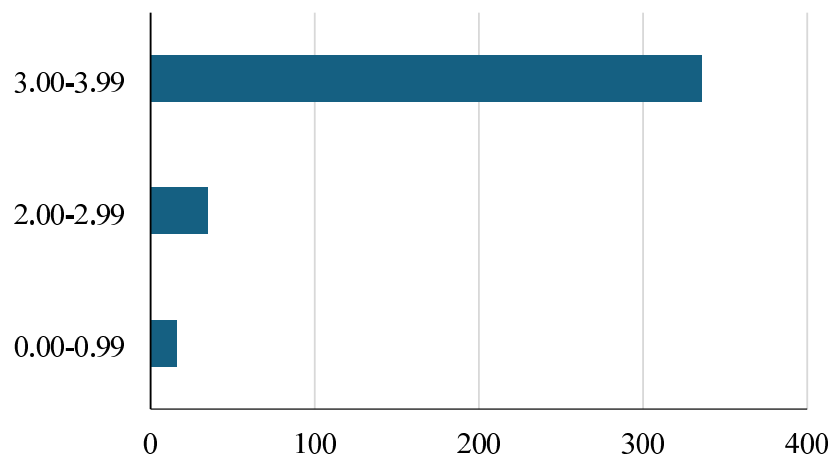
4.2 Descriptive statistics and correlations

Table 4 presents descriptive statistics. Respondents reported moderate perceived stress ($M = 3.46$, $SD = 0.72$), relatively low financial strain ($M = 2.47$, $SD = 0.65$), and high family support ($M = 3.90$, $SD = 0.81$). Normality checks indicated acceptable skewness and kurtosis (all within ± 1).

Pearson correlations (Table 5) showed that perceived stress was positively correlated with financial strain ($r = .27$, $p < .001$) and negatively correlated with family support ($r = -.16$, $p < .01$). Financial strain and family support were moderately and negatively correlated ($r = -.31$, $p < .001$).

4.3 Moderated regression analysis

Hierarchical regression tested the moderating role of financial strain (Table 6). In Model 1, family support significantly predicted lower perceived stress ($\beta = -0.25$, $p < .001$). In Model 2, when only financial strain was included, it positively predicted perceived stress ($\beta = 0.26$, $p < .001$). In Model 3, both predictors were entered simultaneously; financial strain remained significant ($\beta = 0.26$, $p < .001$), while the effect of family support became nonsignificant ($B = -0.09$, $p = .10$). Finally, Model 4 introduced the interaction

**Fig. 4** Race**Fig. 5** CGPA**Table 4** Descriptive statistics

	Minimum	Maximum	Mean	Skewness	Kurtosis
Perceived stress	1	5	3.4615	−0.187	−0.331
Financial strain	1	5	2.4687	0.44	−0.379
Family support	1	5	3.8951	−0.76	0.547

Table 5 Pearson correlation results

Perceived stress	Perceived stress	Financial strain	Family support
	1	0.265	−0.159
Financial strain	0.265	1	−0.310
Family support	−0.159	−0.310	1

term, which was significant ($\beta = 0.06, p < .001$), indicating that financial strain moderated the effect of family support on stress. Regression assumptions were evaluated and found to be satisfactory. Residual and scatter plots indicated no violation of linearity, normality, or homoscedasticity. Influence diagnostics showed no influential outliers

Table 6 Regression results

Model 4						
	Unstandardized coefficients		Sig.	95.0% Confidence interval for β		VIF
	β	Std. error		Lower bound	Upper BOUND	
(Constant)	3.24	0.277	< 0.001	2.696	3.785	
Financial strain	0.23	0.05	< 0.001	0.132	0.327	1.106
Family support	−0.089	0.054	0.1	−0.195	0.017	1.106
Model 3						
	Unstandardized coefficients		Sig.	95.0% Confidence interval for β		VIF
	β	Std. error		Lower bound	Upper bound	
(Constant)	2.832	0.125	< 0.001	2.587	3.077	
Financial strain	0.255	0.047	< 0.001	0.162	0.348	1
Model 2						
	Unstandardized coefficients		Sig.	95.0% Confidence interval for β		VIF
	β	Std. error		Lower bound	Upper bound	
(Constant)	4.109	0.209	< 0.001	3.697	4.52	
Family support	−0.166	0.053	0.002	−0.269	−0.063	1
Model 1						
	Unstandardized coefficients		Sig.	95.0% Confidence interval for β		VIF
	β	Std. error		Lower bound	Upper bound	
(Constant)	3.864	0.21	< 0.001	3.45	4.278	
Family support	−0.247	0.054	< 0.001	−0.353	−0.141	1.113
Interaction	0.06	0.013	< 0.001	0.035	0.085	1.113

(maximum Cook's $D = 0.12$, all < 1.0). Variance Inflation Factor (VIF) values ranged from 1.00 to 1.11, confirming the absence of multicollinearity. Model explanatory power was modest ($R^2 = 0.025$ – 0.079 ; see Table 7). Standardized coefficients (β) are reported in Table 6, and effect-size values (f^2) indicate small-to-moderate effects across models: $f^2 = 0.027$ (Model 1), 0.026 (Model 2), 0.075 (Model 3), and 0.015 (Model 4).

4.4 Simple slopes and interaction effect

Table 8 presents the exact ± 1 SD values used to generate the interaction plot for Family Support and Financial Strain. Family Support ranged from 3.07 to 4.74, while Financial Strain ranged from 1.50 to 3.38 for the simple slopes analysis. Figure 6 shows that the negative relationship between family support and perceived stress depends on the level of financial strain. When financial strain is low (-1 SD = 1.50), higher family support is associated with a more pronounced reduction in perceived stress, indicating that family support effectively serves as a protective factor under low financial pressure. However, when financial strain is high ($+1$ SD = 3.38), the slope becomes much flatter, meaning that family support still helps lower stress, but its effect is weaker. This pattern reflects the significant interaction in which financial strain diminishes the stress-buffering impact of family support.

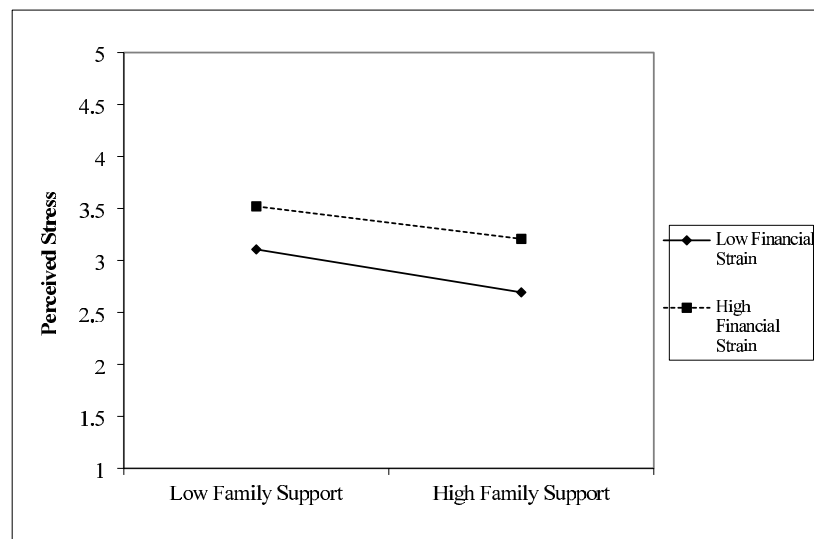
Table 9 shows that family does not significantly predict perceived stress at either low or high levels of financial strain. At low financial strain (-1 SD), the slope was negative but non-significant ($b = -0.157$, $p = .269$), indicating only a small, non-reliable reduction in stress. At high financial strain ($+1$ SD), the slope was even weaker and remained

Table 7 Model summary

Model 4						
R	R Square	Adjusted R Square	Change statistics			
			R Square Change	df1	df2	Sig. F Change
.277 ^a	0.077	0.072	0.077	2	384	< 0.001
Model 3						
R	R Square	Adjusted R Square	Change statistics			
			R Square Change	df1	df2	Sig. F Change
.265 ^a	0.07	0.068	0.07	1	385	< 0.001
Model 2						
R	R Square	Adjusted R Square	Change statistics			
			R Square Change	df1	df2	Sig. F Change
.159 ^a	0.025	0.023	0.025	1	385	0.002
Model 1						
R	R Square	Adjusted R Square	Change statistics			
			R Square Change	df1	df2	Sig. F Change
.281 ^a	0.079	0.074	0.079	2	384	< 0.001

Table 8 ± 1 SD values used for plotting the interaction between family support and financial strain

Variable	Low (-1 SD)	High ($+1$ SD)
Family support	3.07	4.74
Financial strain	1.5	3.38

**Fig. 6** Interaction graph**Table 9** Simple slopes of family support at ± 1 SD of financial strain (J–N Method)

Moderator level	Simple slope (b)	t-value	p-value
Low financial strain (-1 SD = 1.50)	−0.157	−1.110	0.269
High financial strain ($+1$ SD = 3.38)	−0.044	−0.170	0.866

non-significant ($b = -0.044$, $p = .866$). Overall, the moderation pattern suggests that, while the relationship is negative at both levels, neither simple slope is statistically significant.

5 Discussion

This study investigated the moderating role of financial strain on the relationship between family support and perceived stress among Malaysian undergraduates. The results confirmed three key findings: (1) higher family support is associated with lower stress, (2) financial strain significantly predicts higher stress, and (3) the protective effect of family support weakens under financial strain.

5.1 Family support as a protective factor

Consistent with Aziz et al. [6] and Acoba [2], family support was found to reduce perceived stress by offering emotional support, a sense of belonging, and practical assistance. In Malaysia's collectivist cultural context, where family ties are central, this protective role is especially salient. Students with strong family bonds tend to demonstrate resilience and better psychological well-being, enabling them to navigate academic challenges more effectively.

5.2 Financial strain as a stressor

Echoing Khoo and Farah [29] and Kovar et al. [30], financial strain emerged as a significant source of stress, independent of family support. Students struggling with tuition fees, living expenses, and family financial obligations often experience uncertainty about their academic continuity and quality of life. For low-income students, subjective perceptions of financial insecurity are particularly damaging, triggering anxiety and diminished academic focus.

5.3 Moderation of family support by financial strain

The novel contribution of this study is the demonstration that financial strain moderates the family support–stress link. While previous studies (e.g., [11]) explored financial strain as a moderator in other populations, this study extends the evidence to Malaysian undergraduates. The findings suggest that when students' families themselves are under financial stress, the intended support may inadvertently become an additional pressure. Students may feel guilt or obligation, reducing the stress-buffering benefits of family involvement. Thus, financial strain can erode the protective role of family support, creating a complex interplay that amplifies stress.

5.4 Theoretical and practical implications

The results reinforce stress–coping theory and family systems perspectives by showing that the effectiveness of social support depends on the context of financial conditions. For practice, universities should expand counselling services to integrate financial literacy and family engagement programs. For policy, targeted scholarships, emergency aid,

and cost-reduction measures (housing, educational materials) are vital to alleviate financial stress.

While this study offers new insights, its reliance on cross-sectional, self-report data limits causal inference. The convenience sample of public university students may also restrict generalizability to other contexts. Future research should adopt longitudinal designs, include private institutions, and examine broader socio-economic variables.

5.5 Contribution to sustainable development goals

This study also contributes to the global sustainability discourse by aligning its findings with the United Nations' Sustainable Development Goals (SDGs). The results support SDG 3 (Good Health and Well-being) by demonstrating how family support and financial stability jointly shape students' psychological health, a fundamental dimension of overall well-being. Concurrently, the study advances SDG 4 (Quality Education) by emphasising the importance of equitable access to education that is not compromised by excessive financial stressors. When financial strain weakens the protective benefits of family support, students' capacity to thrive both academically and personally becomes constrained. These findings highlight the need for integrated policies that address both psychosocial and economic determinants of stress. By doing so, universities and policymakers can design targeted interventions that not only strengthen student mental health but also foster sustainable, inclusive educational environments that contribute to broader social resilience.

6 Conclusion

This study examined how family support and financial strain interact to influence perceived stress among Malaysian undergraduates. The findings confirm that while family support plays a crucial role in fostering resilience and promoting psychological health, its protective effect is significantly weakened when students face financial hardship. By identifying this moderating role of financial strain, the study advances existing knowledge by illustrating that family support alone is insufficient to buffer stress without complementary economic stability. This contribution enriches the literature on student well-being, especially in contexts where financial insecurity is widespread.

The study also offers value to theoretical models of stress and coping by positioning financial strain as a contextual factor that shapes the strength of the association between family support and perceived stress. This highlights the importance of studying the interplay between social and economic resources rather than examining them in isolation. Future research could explore longitudinal and cross-cultural designs to establish causality and generalizability, while interdisciplinary approaches that integrate psychology, education, and economics may provide deeper insights into student well-being.

For higher education institutions, the findings emphasize the need for holistic student support services. Counselling and wellness programs should be broadened to address not only academic and psychological stressors but also financial challenges. Practical measures could include financial literacy workshops, targeted stress management training, and family engagement initiatives that strengthen communication and emotional

support. By embedding these practices into campus life, universities can foster a more supportive environment for students.

At the policy level, the results point to the critical role of financial aid in reducing stress among undergraduates. Expanding scholarships, grants, and emergency funding mechanisms, alongside initiatives to reduce the cost of housing, transportation, and educational resources, can directly alleviate financial strain. On a societal level, community-based family counselling programs and public awareness campaigns can help normalize mental health discussions, reduce stigma, and empower families to provide effective support. Such interventions can create a broader safety net that reinforces both family and institutional support systems.

In conclusion, this study shows that the protective benefits of family support are contingent on financial circumstances. By linking psychological well-being with economic realities, it offers actionable insights for researchers, practitioners, and policymakers. A combined strategy that integrates family-oriented interventions with targeted financial aid measures holds promise for reducing stress among undergraduates and fostering healthier, more sustainable educational environments. These findings not only highlight practical pathways to strengthen family and institutional support systems but also lay the groundwork for broader discussions on sustainability, particularly regarding student well-being and equitable access to education.

7 Limitations and suggestions for future research

This study has several limitations that open important avenues for future research. Firstly, the focus was limited to students in public universities, which restricts the scope of the findings. Since private university students may face different financial and academic conditions, future research should broaden the sample to include both public and private institutions to achieve a more rigorous, representative analysis. Secondly, the study examined only family support as the independent variable. While this is a key source of social support, students also receive assistance from peers, friends, and university counsellors. Future research should incorporate multiple forms of support to enhance the scientific depth of the framework and capture a fuller picture of protective resources.

Thirdly, financial strain was the sole moderating factor considered. Other factors such as academic workload, social pressures, and access to mental health services may also influence the relationship between support and stress. In addition, the study relied on Likert-scale items that were treated as approximately continuous to facilitate regression analysis, a common but imperfect assumption that may not fully capture the ordinal nature of the responses. Lastly, the study was conducted solely within the Malaysian context. Although this provides important local insights, it limits the applicability of the findings to other cultural or economic settings. Comparative research across different countries would not only strengthen generalisability but also enhance the practical value of the study by guiding the development of culturally sensitive policies and interventions.

Appendix A

See Table [10](#).

Table 10 Constructs and items

Constructs		Items
Perceived Stress	PS1	In the past month, how often have you felt upset due to something unexpected?
	PS2	In the past month, how often have you felt unable to control the important things in your life?
	PS3	
	PS4	In the past month, how often have you felt nervous or stressed?
	PS5	In the past month, how often have you felt unconfident in your ability to handle your personal problems?
Financial Strain	FP1	In the past month, how often have you felt that things were not going your way?
	FP2	There is no excess of money to make savings
	FP3	I borrow money from my friend to cover living expenses
	FP4	I have no saving for emergencies
	FP5	I am unable to buy the items I want
Family Support	FS1	I cannot focus on lessons due to financial problems
	FS2	My family always provides encouragement during challenging times at university
	FS3	My family often asks if I am okay
	FS4	I feel comfortable discussing my academic and personal challenges with my family
	FS5	I feel comfortable discussing my academic and personal challenges with my family

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Author contributions

Mohd Juraij Abd Rani: Methodology, Validation. Mohd Shahidan Shaari: Findings, Data Analysis, Interpretation of Result and funding acquisition. Nor Hidayah Harun: Literature Framework, Theoretical Underpinnings. Faiz Masnan: Resources, Limitations, Future Recommendations. Abdul Hayy Haziq Mohamad: Introduction, Literature Framework Checking References, Formatting. Muhammad Baqir Abdullah: Future Recommendations.

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Data availability

The de-identified dataset and codebook are available from the corresponding author upon reasonable request, subject to Institutional Review Board conditions and confidentiality protections. Requests should be directed to jurairjani@unimap.edu.my.

Declarations**Ethics approval and consent to participate**

This study received ethical approval from the Research Ethics Committee of Universiti Malaysia Perlis (UniMAP), under the Office of the Deputy Vice Chancellor (Research and Innovation), with Reference No: UniMAP/PTNC(P&I)/JKETIKA (30), dated September 23, 2024. The research was conducted in accordance with the ethical guidelines established by the UniMAP Research Management Centre (RMC) and overseen by the institutional ethics committee. The research was conducted in accordance with the ethical principles of the Declaration of Helsinki. All participants were university students aged 20 years and above, and informed consent was obtained from each participant prior to data collection. No sensitive data was collected.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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