

Teacher Support and Students' Academic Persistence: The Role of Learning Motivation

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This study examined the role of university students' academic persistence (mediated by learning motivation and academic engagement) as a consequence of teacher autonomy and academic and emotional support, moderated by academic resilience. A three-wave survey yielded 500 matched responses from a sample of undergraduate students. We used SmartPLS 4 to evaluate the measurement and structural models. The teacher support dimensions, which are all positive, were found to greatly improve learning motivation and hence led to an increase in academic engagement. Engagement positively influenced persistence, and motivation and engagement respectively mediated the effects of all three support dimensions. Academic resilience strengthened the engagement–persistence relationship. This model accounted for 45.4% of the variance in academic persistence and had statistically significantly higher overall predictive power than the indicator-average model and the linear model. Findings combine supportive teaching, motivation, engagement, and resilience into a cohesive account of students' ongoing university studies.

Keywords: teacher support; learning motivation; academic engagement; academic resilience; academic persistence

Introduction

Academic persistence is also defined as the continued intention and effort of students to persist in their academic studies despite academic, personal, or institutional obstacles and continues to be a measure of student success and

institutional effectiveness (Truța et al., 2018). Ability and prior achievement are not the only variables that influence persistence, but learning interactions within students' educational environments are also a factor (Kahu & Nelson, 2018). Teachers have a significant impact on

students' motivation, emotions, engagement, and desire to learn further (OECD, 2025). This influence has special significance in Pakistan, where students in universities could be under financial stress, have unequal pre-existing conditions, high expectations from their families, and a lack of institutional support in their academic pursuits.

The support from teachers needs to be conceptualized as a multi-dimensional resource instead of a single classroom behavior (Liu & Li, 2023). Autonomy support manifests as respect for students' views, providing meaningful choices, and making learning activities relevant; academic support is evident in providing clear instructions, constructive feedback, and support when they are struggling with difficult tasks; and emotional support is expressed in care for students, respect for them, being available, and trust in their ability (Reeve & Cheon, 2021). The behaviours are in line with self-determination theory, which suggests that conditions that support students' needs for autonomy, competence, and relatedness result in enduring types of motivation (Ryan & Deci, 2020). In addition, there is evidence that classroom engagement and academic emotions are positively related to supportive teacher behaviours (Sadoughi & Hejazi, 2021). Analyzing the three support dimensions individually might then reveal which teacher practices are most likely to be associated with academic persistence.

Learning motivation is an initial mechanism between teacher support and persistence. Students are more likely to self-regulate their behaviour, put in effort, and persevere through challenges when they find learning interesting, valuable, and personally meaningful (Howard et al., 2021). But motivation needs to be expressed in terms of engagement in learning before it can lead to learning results. Academic engagement refers to students' participation, emotion, and investment of their cognitive abilities in learning activities (Wong & Liem, 2022). Studies have shown that teacher support has a positive impact on motivation and emotion, thus improving engagement (Sadoughi & Hejazi, 2023).

Engagement, by itself, decreases withdrawal tendencies, as students who engage, focus, and put in an effort develop increased relationships with the studies (Ekornes, 2022). Hence, teacher support can facilitate persistence through a sequence of events: teacher support fosters learning motivation, learning motivation leads to academic engagement, and academic engagement contributes to persistence.

However, not every student might experience the same persistence results from engagement. Academic resilience allows students to overcome academic difficulties, withstand pressures, and persist in goal-directed actions when facing educational setbacks (Ayala & Manzano, 2018). Less resilient students might drop out even if they were engaged in the first place, while resilient students are more able to sustain engagement into further study. The existing literature has tended to look at the support, motivation, engagement, resilience, and persistence of teachers as isolated phenomena, with little consideration of how they interact as a whole; this is especially true of Pakistan. Current research aims to fill this void by testing the role of autonomy, academic, and emotional teacher support as predictors of academic persistence through the sequential mediation of learning motivation and academic engagement. It also explores academic resilience as a moderator of the relationship between engagement and persistence, and thus the mechanism(s) by which, and personal conditions under which, engaging in supportive teaching fosters persistence in university study.

Theoretical Linkage

The proposed framework is based on a theory of self-determination, which points to the ways in which environments can positively or negatively impact behavior by meeting or thwarting the psychological needs for autonomy, competence, and relatedness (Ryan & Deci, 2020). Teacher autonomy support meets autonomy needs through meaningful choices, consideration of students' point of view, and a decrease in control. Academic support by teachers enhances competence by providing explanations, feedback,

and help for students to handle difficult tasks. Care, respect, availability, and acceptance are communicated by teachers' emotional support, as it relates to relatedness. These needs will lead to students' internalisation of learning goals and autonomous learning motivation when they are met (Reeve & Cheon, 2021).

The mediating mechanism is learning motivation. Learners who are autonomous in their learning see learning activities as interesting, valuable, and relevant to them, and they become self-regulated in their learning by persisting in the activities (Howard et al., 2021). Academic engagement is then driven by motivation, as students need to convert their psychological will to participate into behavior, feelings, and thoughts. Engagement, then, is the act of "showing up, paying attention, joining in, planning learning and sticking with things that are hard" (Wong & Liem, 2022, p. 7). The proposed sequential pathway suggests a first step of teacher support generating motivational energy, followed by engaging energy and ultimately, increased academic persistence.

There is a boundary condition to this sequence, namely academic resilience. Students can put in effort, but get discouraged by setbacks, fail exams, be under financial strain, or have competing demands that can interrupt continued study. Resilience allows students to bounce back from adversity, self-soothe negative responses, and maintain goal-directed behavior (Ayala & Manzano, 2018). Given the positive association between academic engagement and persistence, the association should be stronger among highly resilient students, as they have a means of protecting and maintaining engagement in difficult situations. Need satisfaction, motivational internalisation, engagement, and resilience are integrated, and this provides an explanation for both the psychological process by which teacher support facilitates persistence and the personal conditions that lead to engagement leading to study.

Hypotheses Development

Teacher autonomy support and learning motivation

Teacher autonomy support is instructional behaviour that respects students' perspectives, offers meaningful choice, clarifies the worth of learning activities, and reduces excess control. According to self-determination theory, autonomy is a psychological need, and it is the key to allowing people to feel their behavior is their own choice, not someone else's. Teachers create more autonomous learning environments, which increases students' self-regulation of learning and makes learning activities more relevant to them (Bureau et al., 2022; Ryan & Deci, 2020).

Autonomy support can enhance intrinsic motivation and identified regulation. Making good choices increases students' ownership of learning, and recognizing their ideas signals that their interests and ideas are valued. Likewise, providing context for a task aids students in comprehending the significance of what they are doing and why academic work is worthwhile. These practices minimise controlled participation and focus on getting students to participate if they have enjoyed learning or if they see the learning value to them personally. The autonomy-supportive teaching approach has always been connected to greater interest, perceived competence, effort, and self-regulated learning (Reeve & Cheon, 2021). On the other hand, the control of instructional behaviour can result in compliance rather than internal motivation for sustained learning. Therefore:

H1a: Teacher autonomy support positively influences students' learning motivation.

Teacher academic support and learning motivation

Academic support for teachers includes clear explanations, constructive feedback, guidance in learning, extra help, and providing resources to accomplish academic tasks that are difficult. This assistance can help to increase students' competence by clarifying academic expectations and building the knowledge and skills that will enable them to perform successfully. Perceived competence is an important component of motivation, as students will put more effort into

activities that they feel they can do successfully (Howard et al., 2021).

Academic support might be of particular importance if students are faced with challenging material in school or if they enter university having received a less than uniform education. Feedback and explanations occur at the appropriate time and are specific to the task to enable students to quickly identify the errors, change their learning strategies, and see progress. These experiences of mastery can boost confidence and motivation to try further academic work, being seen as useful. Lack of guidance, on the other hand, can lead students to believe that when they find something hard, they are not good at it, which may de-energize them. Empirical evidence shows that students distinguish between academic support and other teacher support and that academic support has a positive impact on positive motivational and learning outcomes (Liu & Li, 2023). Therefore:

H1b: Teacher academic support positively influences students' learning motivation.

Teacher emotional support and learning motivation

Emotional support is shown by teacher care, empathy, respect, availability, encouragement, and confidence for students. These behaviours add to a psychologically safe classroom where students feel accepted and comfortable asking for help. Emotional support is considered relatedness from a self-determination viewpoint, as it enables students to have meaningful relationships with teachers and the learning environment.

Teacher-student relationships that are supportive can help to optimize student motivation by conveying a message that learning and growth are important. When students feel respected by their teachers, they are more willing to participate, are more willing to take intellectual risks, and are more willing to continue working after mistakes. Emotional support can also help to alleviate anxiety and avoid temporary learning setbacks becoming triggers for disengagement. Positive teacher-student relationships have been

consistently linked to higher levels of student engagement, and longitudinal studies have shown that teacher-student relationships are significant at various stages of the educational process (Quin, 2017; Roorda et al., 2017). Teacher emotional support can also foster motivation by supporting students' sense of autonomy, competence, and relatedness with peers (Ruzek et al., 2016). Therefore:

H1c: Teacher emotional support positively influences students' learning motivation.

Learning motivation and academic engagement

Learning motivation is the direction, intensity, and quality of students' willingness to engage in academic activities. Students who are motivated and see learning as interesting, valuable, or personally relevant are more likely to be ready to expend their psychological energies in learning activities. This is particularly relevant since self-regulation plays a crucial role in autonomous learning and can be a primary driver for students to voluntarily engage in learning without relying solely on external incentives and sanctions (Bureau et al., 2022).

Academic engagement is the behavior, emotions, and thoughts that emerge from this motivational state. These are called behavioural, emotional, and cognitive engagement, defined as attendance, participation, task completion, and effort, interest, enjoyment, and belonging, and strategic learning, concentration, and intellectual investment, respectively. While there is a relationship between motivation and engagement, the two are conceptually different, as motivation is a source of the reason and energy for action; engagement is a reflection of how much students are involved in learning (Wong & Liem, 2022).

This means students who have a higher learning motivation need to be more active, focus longer, and use deeper learning strategies. There is also evidence that positive motivational orientations and academic emotions are the reasons for the increased engagement in supportive learning

environments (Lei et al., 2018; Sadoughi & Hejazi, 2021). Therefore:

H2: Learning motivation positively influences students' academic engagement.

Academic engagement and academic persistence

Academic persistence is the persistence of students in relation to their efforts to persist in their learning, overcome academic struggles, and finish their learning program. One of the proximal antecedents to persistence is expected to be engagement; that is, when learners attend class regularly, engage in learning activities, and exert cognitive effort, they form stronger bonds with their learning. Academic experiences, connections, and skills build as students engage in this type of learning, enhancing the sense of benefit from staying in school.

When a student is involved in the task and keeps coming back to it, this is behavioral engagement, which helps him or her persist in the task; when the student becomes interested and identifies with the learning environment, this is emotional engagement, which helps him or her persist in the task. Cognitive engagement: Supporting students in managing challenging academic tasks by planning, strategic learning, and self-regulation. Such participation can decrease the psychological distance between students and the institutions and ease the option of withdrawal. It can be shown with research in higher education that instructional engagement and academic emotions account for relevant variances in students' discontinuation intentions (Ekornes, 2022). Likewise, students who fail in school but continue to do so regularly tend to see failures as minor events and stay in touch with their school goals (Ajjawi et al., 2020). Therefore:

H3: Academic engagement positively influences students' academic persistence.

Sequential Mediation of Learning Motivation and Academic Engagement

Teacher support can be a positive factor that helps students persist with their studies, but it can work its way into students' minds and behaviour

gradually. According to self-determination theory, supportive social contexts provide students with autonomy, competence, and relatedness, which in turn helps students to self-regulate their learning and establish an internal drive to learn (Bureau et al., 2022). Ownership of learning is found in autonomy support, academic support is found in perceived competence, and interpersonal security is found in emotional support. Overall, these enabling strategies foster students' perception of learning as interesting, worthwhile, and important.

Learning motivation is the first mediator, as it represents the psychological energy with which students react to the supportive teaching. Students who have autonomous motivation exhibit greater interest, self-regulation, effort, and persistence in learning activities when the learning activities are challenging (Jang et al., 2016). However, motivation is not sufficient to lead to the persistence of student learning unless it becomes active academic involvement. Students can appreciate learning, but may not be able to engage in regular practice, employ effective learning strategies, or focus consistently on learning activities.

Academic engagement as a second mediation role then translates students' motivational will into academic behaviour, emotional commitment, and cognitive commitment. According to student engagement theory, student motivation is an internal state while student engagement is a visible process of allocating the resources of the student to learning (Kahu & Nelson, 2018). Research indicates that supportive teacher-student relationships are positively linked with student engagement, as students are more likely to engage when they feel competent, respected, and connected to their teachers (Roorda et al., 2017). The internal psychological responses are also shown as a motivating and emotional dimension that increases academic engagement, meaning that teacher support can positively influence students' classroom engagement before their active participation in classroom activities (Sadoughi & Hejazi, 2021).

Engagement, then, helps to promote academic persistence through its ability to positively affect students' identification with their studies, academic investment, and psychological withdrawal. Engaged academic and social resources are built by students with value for continued enrolment when they attend classes, engage actively, experience interest, and use strategic learning behaviours. Disengagement, on the other hand, is linked to higher dropout thoughts and lower motivation to finish an educational programme (Truța et al., 2018).

The proposed sequence is thus a theoretically sequential one, with the teacher providing support materials that provide social support and instructional resources, which encourage learning motivation, which is manifested through academic engagement, which increases academic persistence. Failure to consider this temporal and conceptual ordering would mean that testing motivation and engagement as independent mediators is missing. The sequential mediation is a more complete account of the transformation of teacher behaviour into psychological willingness, then into academic behaviour, and finally into continued study. Therefore:

H4a: Learning motivation and academic engagement sequentially mediate the positive relationship between teacher autonomy support and academic persistence.

H4b: Learning motivation and academic engagement sequentially mediate the positive relationship between teacher academic support and academic persistence.

H4c: Learning motivation and academic engagement sequentially mediate the positive relationship between teacher emotional support and academic persistence.

Moderating Role of Academic Resilience

While academic engagement is typically associated with persistence, engagement can lead to different outcomes for different students. Frequently, students will find themselves with poor grades, fail exams, have a heavy workload, feel financial burden, feel the pressure of family responsibilities, or feel unsure of their academic abilities. This kind of hardship can be a stone that prevents children from staying in school and can

push them out, even if they have been in school. Consequently, the strength of the engagement–persistence relationship may depend upon students' academic resilience.

Academic resilience is the ability of students to adaptively overcome academic setbacks, bounce back, control negative emotions, change ineffective strategies, and persevere in attaining educational goals. It is not merely a personality trait, but a skill that can be learned and activates personal and contextual resources when challenges arise that may interfere with the student's academic performance (Cassidy, 2016). Resilience is also recognized as a key protective factor in higher education for coping with stress and maintaining academic functioning in challenging situations (Brewer et al., 2019).

In theory, the relationship between engagement and persistence should be moderated by resilience, given that it is a factor that will influence whether students continue with their current academic investment when facing challenging circumstances. Highly resilient students are less likely to view their bad performance as terminal and uncontrollable. They can ask for feedback, adjust their learning methods, find social support, and renew their commitment to the learning goals. On the other hand, students who have low resilience may view the same setback as proof of their inability to succeed, which can lead to loss of engagement and can make them more likely to drop out of school.

Empirical evidence shows that students who persist after academic failure are often those who use adaptive explanations, control their negative emotions, and have a commitment towards future educational aspirations (Ajjawi et al., 2020). Academic resilience, along with academic engagement, is also found to be a factor that helps students succeed academically and that distinguishes students who stay in school versus those who drop out (Ayala & Manzano, 2018). Research in academic buoyancy (Martin & Marsh, 2008) shows that students' capacity to cope with daily academic challenges contributes to maintaining their motivation, engagement, and

success in stressful situations. Resilience thus not only has an independent impact on persistence, but also on the academic investment made through engagement.

Thus, high academic resilience should be associated with stronger links between the components of behavioural, emotional, and cognitive engagement with continued study. At the higher end of the academic resilience continuum, then, the links between the different components of behavioural, emotional, and cognitive engagement should be stronger with continued study, as students should be able to maintain engagement despite adversity. If

resilience is low, the benefits of engagement can be diminished, as may occur when there are setbacks that can interrupt students' effort and commitment. Academic resilience being set at a 'boundary' condition on the engagement–persistence continuum, therefore, provides a theoretically meaningful context as to why similarly engaged students may make different decisions regarding their continuation. Therefore:

H5: Academic resilience positively moderates the relationship between academic engagement and academic persistence, such that the positive relationship is stronger when academic resilience is high.

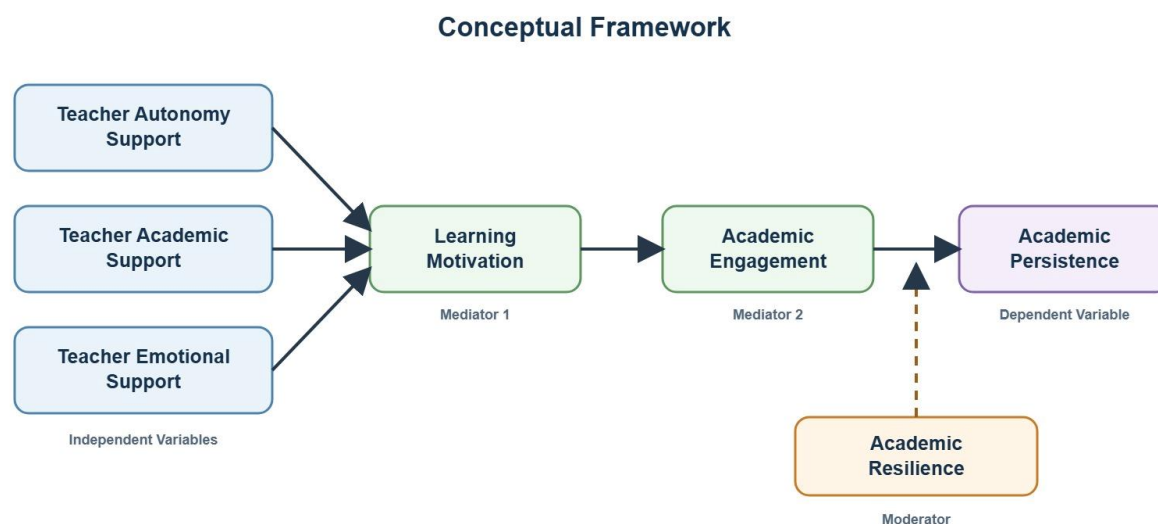


Figure # 01: Conceptual framework

Methodology

Research design

The study was of the type of quantitative, explanatory research, which involved looking into the effects of various types of teacher support on students' academic persistence. A three-wave, time-lagged survey design was employed to establish time lags between the predictors, mediators, moderators, and the outcome variable. The proposed framework included direct relationships, mediation, and moderation; thus, this design was suitable.

Time 1 data were gathered for teacher autonomy support, academic support of teachers, and

emotional support of teachers, control variables, and respondents' demographic characteristics. At Time 2 (4 weeks after Time 1), academic resilience and learning motivation were assessed. After four more weeks of intervention, academic engagement and academic persistence were assessed at Time 3. Temporal separation decreased consistency motives, the ability of the respondents to infer the hypothesized relationships, and common method bias.

Population and research setting

The population targeted was students currently pursuing undergraduate degrees in Higher Education Commission-accredited public and

private universities of Pakistan. Students at the undergraduate level were chosen because their academic experience was of such a type that persistence at this level is of particular importance, as students were faced with academic demands, adjustment issues, financial pressures, and uncertainty over programme completion.

The participants had to be in at least their 2nd semester and attend courses taught regularly by university teachers. First-semester students were not included as they may not have interacted with teachers enough to give an accurate appraisal of the teachers' support. Those taking only short professional courses, certificate courses, or courses in a non-degree program were also excluded.

Sampling procedure

A multistage stratified cluster sampling was used. In the first stage, universities were ranked based on their public/private ownership. Eight universities were chosen, of which 4 were public and 4 were private universities. The institutions involved included those in the Punjab, Sindh, KPK, Balochistan, and the Islamabad Capital Territory.

The second stage involved choosing faculties and academic departments in each university. In the third stage, intact undergraduate classes were used as sampling clusters, and the eligible students of the selected classes were invited to participate. Business and Management, Social Sciences, Natural Sciences, Engineering and Technology, and Humanities were recognized as the source programmes for recruiting students. This procedure yielded better representation across geographical areas, university ownership, academic disciplines, and years of study.

Sample-size determination

The minimum sample size was a priori determined in a statistical power analysis. The analysis was conducted at the .05 level of significance, .80 level of statistical power, with a small anticipated effect size ($f^2 = .02$), and with five predictors towards the principal

endogenous construct. The results revealed that 395 observations were needed.

In order to have sufficient power for testing direct effects, sequential mediation, moderation, control variables, and measurement-model quality, it was decided that a minimum of 500 complete responses would be needed. 685 questionnaires were sent out; adjusted for nonresponse, participant attrition, and incompleteness, questionnaires and responses that were not matched were excluded. After the data were collected and screened, 500 full matched responses were kept. The sample size in the final sample was larger than the minimum sample size requirement.

Data-collection procedure

Prior to data collection, the administrators and departmental authorities of the participating universities were contacted, and permission was given. Printed questionnaires or secure links to online surveys were given to eligible students by trained research assistants. Printed questionnaires or secure links to online questionnaires were provided to eligible students by trained research assistants. There was no academic reward or penalty related to participation, and participation was voluntary.

685 questionnaires were distributed at Time 1, and 612 of these were returned, yielding an initial return rate of 89.3%. The three dimensions of teacher support, demographic characteristics, and control variables were measured using the first wave questionnaire.

The 612 students who had participated in the first wave were given the Time 2 questionnaire 4 weeks later. The total number of students who returned the second questionnaire was 558, which is a retention rate of 91.2% from Time 1 to Time 2. This wave included the measurement of learning motivation and academic resilience.

The Time 3 questionnaire was sent to the 558 Time 2 participants after a further four-week period. 512 of 555 questionnaires were returned, a 91.8% return rate from Time 2 to Time 3. For

the final wave, academic engagement and academic persistence were measured.

Each group created its own code word with an easy-to-remember character that is unique to each group. These codes allowed for the matching of the responses without having to collect students' name and registration numbers across the three waves. In the screening of the

data, 12 cases were excluded due to problems that included extreme missing data, consistent answers across the entire instrument, extremely brief response times, or inconsistent matching codes. Thus, 500 full and satisfactory matched responses were kept. The final sample had an effective response rate of 73.0%, and a retention rate of 81.7% from Time 1 to the final matched sample.

Table 01: Response flow

Stage	Responses	Response or retention rate
Questionnaires distributed	685	100%
Time 1 responses	612	89.3%
Time 2 responses	558	91.2%
Time 3 responses	512	91.8%
Cases excluded during screening	12	2.3% of Time 3 responses
Final matched sample	500	73.0% effective response
Time 1-to-final retention	500 of 612	81.7%

Measurement instrument

Data were collected through a structured, self-administered questionnaire. Previously validated scales were adapted to measure the constructs.

Minor wording changes were made to ensure relevance to university education and the Pakistani context. All substantive items were evaluated using a five-point Likert scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*.

Table 02: Measurement instrument

Construct	Measurement source	Items
Teacher autonomy support	Learning Climate Questionnaire, Williams and Deci (1996)	6
Teacher academic support	Perceived Teacher Support Scale, Liu and Li (2023)	5
Teacher emotional support	Perceived Teacher Support Scale, Liu and Li (2023)	5
Learning motivation	Academic Self-Regulation Questionnaire, Ryan and Connell (1989)	8
Academic engagement	Utrecht Work Engagement Scale–Student, Schaufeli et al. (2002)	9
Academic persistence	College Persistence Questionnaire, Davidson et al. (2009)	5
Academic resilience	Academic Resilience Scale, Martin and Marsh (2006)	6

Teacher autonomy support reflected how teachers valued students' views, provided meaningful choices, clarified the significance of learning activities, and prompted students to make decisions. Academic support by the teacher was evaluated in terms of clarity of explanation, constructive feedback, learning guidance, additional support, and academic resources. Teacher emotional support refers to teachers' care, respect, empathy, availability, encouragement, and confidence in students' abilities.

Learning motivation measured intrinsic and identified motivations to engage in academic activities such as interest, enjoyment, value, and willingness to expend effort. Academic engagement measured the vigour, dedication, concentration and active involvement in academic work. Academic persistence included students' determination and intent to stay on program and to finish their degree. Academic resilience was assessed by the students' capacity to bounce back from poor performance, react positively to feedback, tolerate academic stress, and persist in their efforts when they experience academic difficulties.

Questionnaire adaptation and pilot testing

The questionnaire was piloted by three experts in Education, Educational Psychology, and Quantitative research. The experts judged the items in terms of relevance, clarity, representativeness, and suitability of the context. Ambiguous items were revised, but not the theoretical meaning. The questionnaire was presented in English as English is the main language of instruction in the universities involved. Vocabulary was kept simple and sentences short to aid understanding.

In a pilot study, 45 undergraduate students from two universities not used in the main survey were used. Participants rated the clarity of items, organisation of the questionnaire, instructions, and time required to complete the questionnaire. It took about 12–15 minutes to complete the questionnaire. Preliminary Cronbach's alpha coefficients for all constructs were $> .70$. The

following changes were made to the wording of four items to make them clearer; no item was deleted. The pilot responses were not included in the final data set.

Control variables

Control variables included were age, gender, academic discipline, year of study, University ownership, employment status, and perceived family socioeconomic status. These factors might impact student participation, access to learning materials, and decisions to persist in the educational system. The control variables were then correlated with academic persistence in the structural analysis to see if the hypothesized relationships were found to be significant after adjusting for demographic differences.

Common method bias

Common method bias was minimized by a number of procedural remedies. First, predictor, mediator, moderator, and outcome variables were collected at three different times. Second, participants were told that it was anonymous and that there were no right or wrong answers. Third, predictor and outcome measures were separated into different parts of the questionnaire. Fourth, the instructions were neutral, and the hypotheses were not presented to the respondents. Finally, the wording was kept to a minimum and was clear to minimize implicit meanings.

This statistical examination of common method bias followed the examination. A single-factor test by Harman was done using exploratory factor analysis (EFA) without any rotation. Because the first factor explained less than 50% of the variance, common method bias was not deemed to be a potential problem. The full collinearity variance inflation factors were also calculated, with values lower than 3.3 suggested to be an indication of the absence of common method bias from skewing the findings (Kock, 2015).

Data screening and preliminary analysis

The data were initially screened using SPSS. The questionnaires with extensive missing data or with answers that were always the same, with

inconsistent identification codes, and with unrealistically short completion time were not included. Frequencies, percentages, means, standard deviations, skewness, and kurtosis were computed to describe the sample and principal variables.

To assess for potential nonresponse bias, a comparison between the early and late respondents was conducted. For the principal constructs, independent-samples t-tests were used, and for the categorical demographic variables, chi-square tests were employed. There were no significant differences, therefore indicating the absence of nonresponse bias to a significant degree.

Data-analysis procedure

Partial least squares structural equation modelling (SmartPLS 4) was used to test the hypotheses. PLS-SEM was chosen due to the fact that the model was prediction-oriented, involved multiple predictors, two intervening variables, a specific interaction variable, control variables, and multiple endogenous constructs. It also allowed simultaneous assessment of measurement and structural models without having to assume multivariate normality (Hair et al., 2022).

Predictive assessment

PLSPredict was used 10 times with 10 folds to test the model's out-of-sample predictive performance. The PLS-SEM model prediction errors were compared with the prediction errors from a linear-model benchmark. A smaller root mean square error (RMSE) or mean absolute error (MAE) for the predictions of the PLS-SEM model implied better predictive power (Shmueli et al., 2019). Additionally, the cross-validated predictive ability test was conducted to assess if the proposed model is significantly better than the benchmark model.

Findings and Analysis

Measurement Model

Indicator reliability, consistency, and convergent validity were found to be satisfactory based on the results of the measurement model. The loadings for all of the indicators ranged from 0.786 to 0.883, with the lowest being greater than 0.708, the recommended value. Thus, all indicators accounted for over 50% of the variance in their respective constructs and were therefore included in the model. The highest loading was obtained for AE4 (0.883) and the lowest loading was obtained for LM5 (0.786), but both loads were acceptable.

Cronbach's alpha scores ranged from 0.895 to 0.946 for teacher academic support and academic engagement, respectively. The results were above the minimum required criterion of 0.70 and showed good internal consistency among the indicators. Construct reliability was satisfactory, with composite reliability coefficients ranging from 0.923 to 0.954. The internal consistency reliability coefficients were high (all above 0.75), though none were above the conservative upper limit of 0.95 except academic engagement, which just missed the mark with 0.954. This was still within an acceptable range of the threshold and did not signal a serious concern for indicator redundancy.

Convergent validity was also found to be very good as the average Variance Extracted of the items ranged from 0.688 to 0.740, which was far above 0.50. That is, for each construct, more than 50% of the variance was accounted for by the indicators. The measurement model had good reliability and convergent validity and was suitable for the subsequent assessment of the structural model.

Table 03: Measurement Model Assessment

Construct	Item	Loading	Cronbach's Alpha	CR	AVE
Academic Engagement (AE)	AE1	0.846	0.946	0.954	0.699
	AE2	0.842			

Construct	Item	Loading	Cronbach's Alpha	CR	AVE
Academic Persistence (AP)	AE3	0.827	0.912	0.934	0.740
	AE4	0.883			
	AE5	0.806			
	AE6	0.847			
	AE7	0.824			
	AE8	0.802			
	AE9	0.849			
	AP1	0.873			
	AP2	0.865			
Academic Resilience (AR)	AP3	0.857	0.921	0.938	0.715
	AP4	0.829			
	AP5	0.877			
	AR1	0.879			
	AR2	0.837			
	AR3	0.827			
	AR4	0.845			
	AR5	0.817			
	AR6	0.868			
Learning Motivation (LM)	LM1	0.862	0.935	0.946	0.688
	LM2	0.843			
	LM3	0.838			
	LM4	0.820			
	LM5	0.786			
	LM6	0.852			
	LM7	0.811			
	LM8	0.821			
Teacher Academic Support (TAC)	TAC1	0.873	0.895	0.923	0.705
	TAC2	0.813			

Construct	Item	Loading	Cronbach's Alpha	CR	AVE
Teacher Autonomy Support (TAS)	TAC3	0.850	0.919	0.937	0.713
	TAC4	0.810			
	TAC5	0.850			
	TAS1	0.857			
	TAS2	0.846			
	TAS3	0.809			
Teacher Emotional Support (TES)	TAS4	0.879	0.905	0.929	0.724
	TAS5	0.818			
	TAS6	0.856			
	TES1	0.871			
	TES2	0.848			
	TES3	0.869			
	TES4	0.822			
	TES5	0.843			

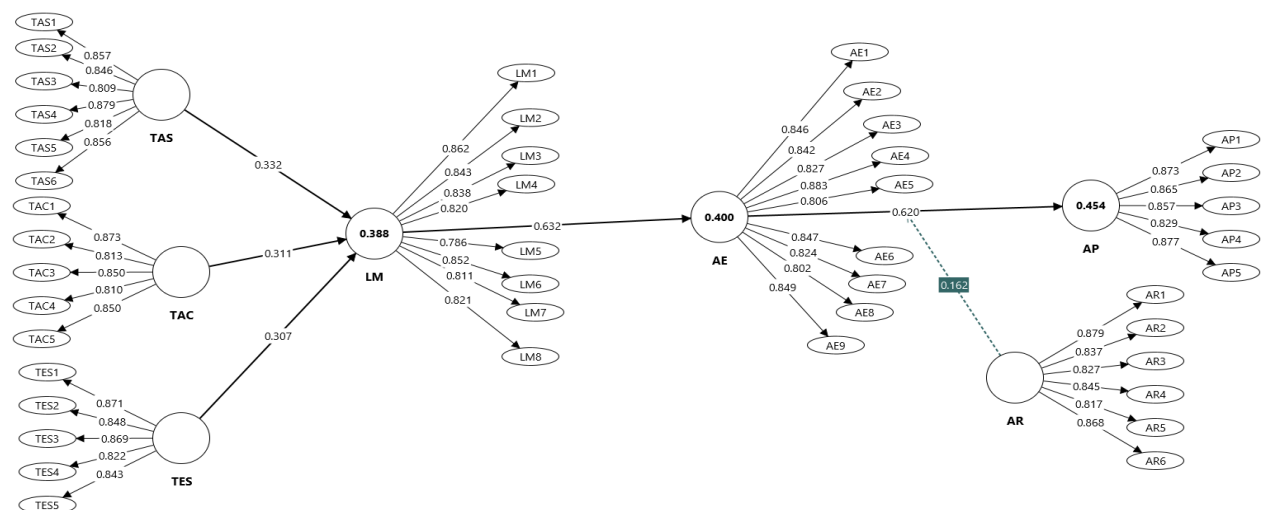


Figure 02: Measurement Model

Discriminant Validity

To check for discriminant validity between the study's constructs, the heterotrait-monotrait ratio was explored. All HTMT values were well below the conservative value of 0.85, indicating

that the constructs were empirically distinct. Academic engagement-academic persistence (0.677) and academic engagement-learning motivation (0.672) had the highest value of HTMT. These were relatively strong

relationships, which had theoretical plausibility, as motivated and interested students were likely to be more persistently engaged in their studies. However, values were still within acceptable limits and did not suggest conceptual redundancy. Academic resilience had the lowest correlations with academic engagement (0.049), learning motivation (0.061), teacher academic support (0.066), teacher autonomy support

(0.057), and teacher emotional support (0.057). Moreover, the values of the three teacher-support dimensions were between 0.076 and 0.228, which indicated that they were distinct dimensions of teacher support. The overall results of the HTMT indicated good evidence of discriminant validity and justified moving forward with structural model assessment.

Table 04: HTMT Criteria

Construct	AE	AP	AR	LM	TAC	TAS	TES
AE	—						
AP	0.677	—					
AR	0.049	0.210	—				
LM	0.672	0.548	0.061	—			
TAC	0.286	0.276	0.066	0.415	—		
TAS	0.377	0.331	0.057	0.451	0.076	—	
TES	0.302	0.264	0.057	0.461	0.174	0.228	—

Structural Model

Assessment of Path coefficients

All hypotheses were confirmed by the structural-model results. Academic engagement also positively influenced academic persistence ($\beta = 0.620$, $t = 23.914$, $p < 0.001$), such that those who actively engaged in academic-related activities were more likely to continue with their academic pursuits. Academic engagement was also significantly predicted by learning motivation ($\beta = 0.632$, $t = 23.488$, $p < 0.001$). The most significant teacher support dimension that had the greatest influence on learning motivation was teacher autonomy support ($\beta = 0.332$), followed by teacher academic support ($\beta = 0.311$), and teacher emotional support ($\beta = 0.307$). These were all statistically significant effects.

Academic resilience significantly moderated the association between academic engagement and academic persistence ($\beta = 0.162$, $t = 5.272$, $p < 0.001$). Therefore, engagement had a stronger effect on persistence with students who had higher resilience. The sequential mediation results also proved to be significant. The effects of teacher autonomy support, teacher academic support, and teacher emotional support were sequentially transmitted to academic persistence with learning motivation as the mediator ($\beta = 0.130$, $\beta = 0.122$, and $\beta = 0.120$, respectively). The small differences between the real and bootstrap sample means of the coefficients also showed the stability of the estimation. The results overall support the proposed mechanisms linking teacher support to students' ongoing academic persistence in terms of motivation and engagement.

Table 05: Hypotheses testing

Structural Relationship	Beta (β)	Sample Mean (M)	STDEV	T Value	P Value
AE $\rightarrow$ AP	0.620	0.621	0.026	23.914	<0.001
AR $\times$ AE $\rightarrow$ AP	0.162	0.161	0.031	5.272	<0.001
LM $\rightarrow$ AE	0.632	0.633	0.027	23.488	<0.001
TAC $\rightarrow$ LM	0.311	0.312	0.033	9.394	<0.001
TAS $\rightarrow$ LM	0.332	0.333	0.034	9.772	<0.001
TES $\rightarrow$ LM	0.307	0.307	0.036	8.623	<0.001
TAS $\rightarrow$ LM $\rightarrow$ AE $\rightarrow$ AP	0.130	0.131	0.016	7.932	<0.001
TAC $\rightarrow$ LM $\rightarrow$ AE $\rightarrow$ AP	0.122	0.123	0.016	7.634	<0.001
TES $\rightarrow$ LM $\rightarrow$ AE $\rightarrow$ AP	0.120	0.121	0.016	7.434	<0.001

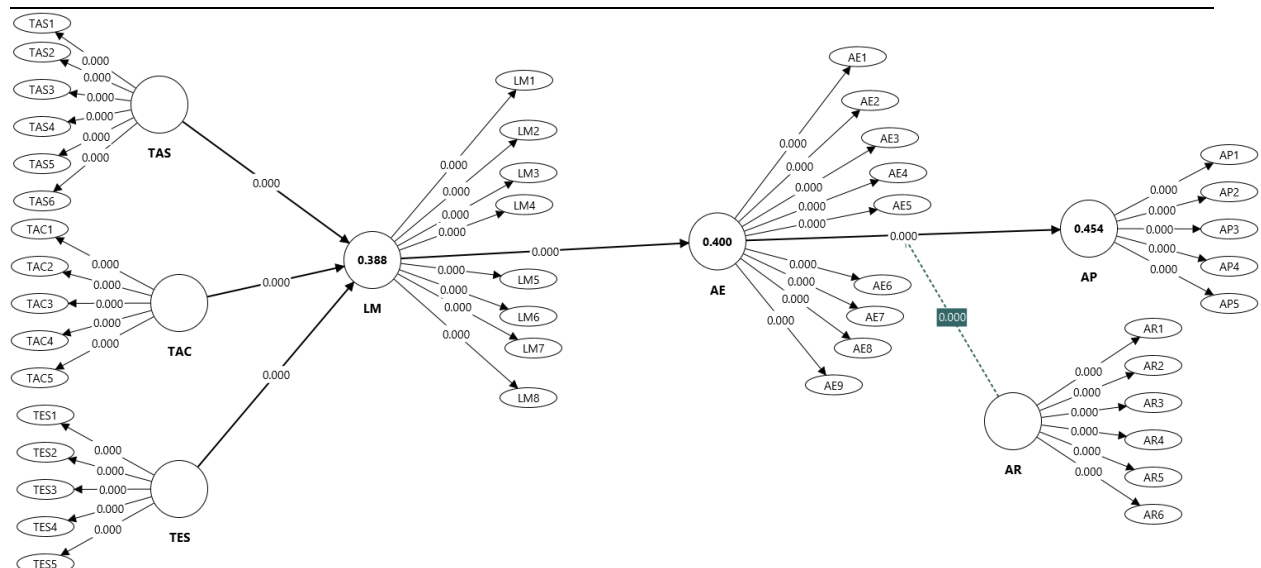


Figure 03: Structural Model

Explanatory Power, Effect Size and Collinearity

The model showed good levels of explanatory power for the endogenous constructs. The dimensions that were supported by teachers explained 38.8% of the variance in learning motivation, and learning motivation explained 40.0% of the variance in academic engagement. Academic engagement and its moderation process can account for 45.4% of the variance in academic persistence. The slight changes in original vs. adjusted R² values suggested that the

model's explanatory power did not change when its predictors were added.

The results of the effect size indicated that academic engagement had a large effect on academic persistence ($f^2 = 0.702$), and also learning motivation had a large effect on academic engagement ($f^2 = 0.666$). There were medium effects obtained from teacher autonomy support and teacher academic support on learning motivation. The effect of teacher emotional support was relatively modest but significant. Finally, the values of the variance inflation factors were in the range of 1.000 to

1.069, well below typical values. Hence, multicollinearity did not have any effect on the estimated structural relationship, which can be

concluded from the stability of the constructs used as the predictors.

Table 06: Explanatory Power, Effect Size and Collinearity

Assessment	Construct/Relationship	Value	Adjusted Value	Interpretation
R ²	Academic Engagement (AE)	0.400	0.399	Moderate explanatory power
R ²	Academic Persistence (AP)	0.454	0.450	Moderate explanatory power
R ²	Learning Motivation (LM)	0.388	0.384	Moderate explanatory power
f ²	AE → AP	0.702	—	Large effect
f ²	LM → AE	0.666	—	Large effect
f ²	TAC → LM	0.154	—	Medium effect
f ²	TAS → LM	0.172	—	Medium effect
f ²	TES → LM	0.144	—	Small-to-medium effect
VIF	AE → AP	1.002	—	No collinearity concern
VIF	LM → AE	1.000	—	No collinearity concern
VIF	TAC → LM	1.027	—	No collinearity concern
VIF	TAS → LM	1.047	—	No collinearity concern
VIF	TES → LM	1.069	—	No collinearity concern

Cross-Validated Predictive Ability Test (CVPAT)

To test the predictive ability of the proposed model, the cross-validated predictive ability test was conducted to verify the validity of the model to make predictions more accurately than the benchmark. PLS-SEM yielded smaller prediction errors with respect to the indicator averages for learning motivation, academic engagement, and academic persistence. The negative loss differences varied from -0.179 to -0.356, and all of the comparisons were significant at $p < 0.001$. The overall loss difference was also negative and significant (difference = -0.252, $t = 8.816$), which indicates that the proposed model significantly outperforms the basic indicator-average model.

The linear-model benchmark could not be outdone by PLS-SEM. Significant loss reductions were observed for learning motivation (difference = -0.051, $t = 4.896$, $p < 0.001$) and academic engagement (difference = -0.060, $t = 3.829$, $p < 0.001$). Academic persistence had a lower loss for PLS-SEM than the linear model, but the difference was not statistically significant (difference = -0.041, $t = 1.910$, $p = 0.057$). But the overall comparison was significant (difference = -0.052, $t = 4.971$, $p < 0.001$). Overall, the model outperformed both naïve and linear models, though the advantage of the model for predicting academic persistence over the linear model should be viewed with a degree of caution.

Table 07: Cross-Validated Predictive Ability Test (CVPAT)

Benchmark Comparison	Outcome	PLS-SEM Loss	Benchmark Loss	Average Loss Difference	T Value	P Value	Interpretation
PLS-SEM vs. Indicator Average (IA)	LM	1.015	1.371	-0.356	8.615	<0.001	PLS-SEM performed better
PLS-SEM vs. Indicator Average (IA)	AE	1.202	1.401	-0.199	6.301	<0.001	PLS-SEM performed better
PLS-SEM vs. Indicator Average (IA)	AP	1.193	1.372	-0.179	6.208	<0.001	PLS-SEM performed better
PLS-SEM vs. Indicator Average (IA)	Overall	1.132	1.384	-0.252	8.816	<0.001	Significant predictive superiority
PLS-SEM vs. Linear Model (LM)	LM	1.015	1.066	-0.051	4.896	<0.001	PLS-SEM performed better
PLS-SEM vs. Linear Model (LM)	AE	1.202	1.262	-0.060	3.829	<0.001	PLS-SEM performed better
PLS-SEM vs. Linear Model (LM)	AP	1.193	1.234	-0.041	1.910	0.057	Difference not significant
PLS-SEM vs. Linear Model (LM)	Overall	1.132	1.184	-0.052	4.971	<0.001	Significant predictive superiority

Discussion

This study explored the role of teacher autonomy, academic and emotional support in facilitating academic persistence by influencing students' learning motivation and academic engagement, and how academic resilience is a boundary condition. All suggested relationships were accepted. Academic support and emotional support had a significant effect on learning motivation but were less effective than teacher autonomy support. This result was found to be supportive of self-determination theory, as

meaningful choices, the consideration of students' views, instructional support, and interpersonal care help to promote motivational internalisation (Ryan & Deci, 2020; Reeve & Cheon, 2021).

Academic engagement was found to be best predicted by learning motivation, which is a sign of students' psychological energy that facilitates academic involvement in behavioral, emotional, and cognitive aspects (Howard et al., 2021; Wong & Liem, 2022). Academic engagement then had a significant influence on persistence, suggesting

that students' tendencies to withdraw would be lower if they were engaged in and continued to invest in academic work (Kahu & Nelson, 2018).

These important indirect sequential effects do provide a more detailed explanation of the role of supportive teaching in fostering persistence. Academic, emotional, and autonomy support not only made a difference on their own, but they set in an ordered process in which motivation led to engagement and engagement led to persistence. All three mechanisms were significant, but the autonomy-support pathway was the strongest indirect pathway.

Academic resilience strengthened the engagement–persistence relationship. Therefore, students with high engagement were especially likely to persist when they were able to bounce back and continue to try to reach a goal (Ayala & Manzano, 2018). The model accounted for 45.4% of the persistence and outperformed the indicators-average and linear model in terms of overall predictive value. Its predictive advantage for academic persistence alone, however, was not significant, which suggests a cautious interpretation of predictive superiority of outcome.

Theoretical Implications

This study builds on the self-determination theory framework by separating teacher support into three factors: autonomy support, academic support, and emotional support, which align roughly with the needs of students for autonomy, competence, and relatedness, respectively. The results show that these two distinct, but theoretically related resources have an independent effect on learning motivation and do not operate as a single supportive climate. This study also elucidates the motivational process linking teaching behaviour and academic persistence. The framework separates students' sentiments of learning from what they actually do in learning (Wong & Liem, 2022), by placing learning motivation prior to academic engagement. The strong indirect sequential effects are evidence that support has an impact that is meaningful when it is followed by

motivation, which in turn leads to engagement. In addition, there is a theoretically significant boundary condition, that of academic resilience. It is also moderated, meaning that engagement does not ensure persistence without the need for adaptive capacity to maintain investment when facing adversity (Cassidy, 2016). A framework is therefore developed that incorporates contextual resources, psychological motivation, enacted engagement, and personal resilience as a cohesive explanation of academic persistence.

Practical Implications

In order to support students, it is important for teachers to use a mixture of autonomy, academic, and emotional support instead of one supportive behaviour. Meaningful choices, consideration of students' perspectives and explanations of the relevance of assignments, as well as flexibility in completing learning activities, can help to strengthen autonomy. Academic support must be clear and timely, structured and targeted to supporting students who are having difficulty. Respectful communication, approachability, encouragement, and sensitivity to students' academic concerns can help develop emotional support. Instructors must relate course activities to students' goals and show students their utility for the motivation to be transferred into engagement. Engagement can be further enhanced through interactive discussion, collaborative work, formative assessment, and active problem solving. Low attendance, failure to finish assignments, less participation, and poor concentration are other early signs of withdrawal that should be monitored by teachers. Pupils exhibiting these behaviours may need a combined approach to helping them to be motivated, academically and emotionally. These practices can foster learning spaces where students feel autonomous, capable, connected, and motivated to stay on in school.

Managerial Implications

University managers have a role in academic persistence as well as in teaching and learning. Faculty-development programs should educate teachers on how to communicate in an

autonomous way, provide constructive feedback, include students in class interaction, and identify early signs of disengagement. Supportive instructional behaviours, then, should be evaluated in training evaluations along with subject knowledge and course delivery. University-level interventions to build resilience should be incorporated into the institutional approach to supporting students because this had the biggest interaction effect with persistence. Academic advising, mentoring, counselling, peer support networks, and workshops can assist students in responding to setbacks in a constructive manner. Early warning measures based on attendance, assessment submission, academic performance and engagement data should be set up by managers to identify students who are at risk of withdrawal. In addition, public and private universities need to make specific provision for those who are financially disadvantaged, working, and academically unqualified students. Lastly, administrators should periodically review indicators of motivation, engagement, and persistence instead of looking at graduation data to make their intervention decisions, allowing them to intervene earlier and more data-informed.

Limitations and Future Research Recommendations.

There are some limitations that need to be considered when interpreting and for future research. Firstly, the three-wave design provided temporal separation, but it was not an experimental condition, so causality could not be established. Longitudinal cross-lagged models, or classroom interventions, might be used in future studies to assess changes in motivation, engagement, and persistence. Second, all constructs were assessed using self-reported measures, and these measures can carry social-desirability and perceptual biases even when these are controlled for in the measurement procedures and scores. Future studies should include a combination of surveys, attendance records, learning-management-system activity, teacher evaluation, and actual retention data. Third, participants were from 8 universities in

Pakistan, so there could be institutional and cultural constraints that affect generalizability. It is recommended that the content be replicated across countries, educational systems, and degree levels. Fourth, the contextual levels were not explicitly modelled, as students were nested within classes/universities. The influences at the teacher level and institution level could be explored in a multi-level study. Finally, financial stress, digital learning conditions, peer support, psychological well-being, and institutional belonging are other potential mediators or moderators that could be explored in future studies for their effects on academic persistence.

Conclusion

The results of this study showed that teacher support led to academic persistence in an orderly motivational and behavioural process. Learning motivation was strengthened by teacher autonomy, academic support, and emotional support, which further translated into practice academic engagement. Engagement proved to be the most proximal predictor of persistence, suggesting that students persisted when their motivation was manifested in sustained behavioural, emotional, and cognitive engagement. These important sequential indirect effects were mediated by learning motivation and engagement, not via a single pathway. The engagement–persistence relationship was also reinforced by academic resilience, suggesting that the ability to overcome negative academic experiences helped sustain the benefits of academic engagement. The model was statistically acceptable for explaining the data and was also reasonably successful in predicting the data overall. The results suggest persistence as a result of inter-relational experiences of supportive teaching, internal motivation, active engagement and resilience. Institutions of higher education can thus enhance student retention by fostering supportive teaching methods and by creating institutional structures to bolster students' ability to withstand challenges in their academic work.

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