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Enhancing Learners' Academic Mindedness through Supportive School Climate: Evidence from TIMSS 2023

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Abstract: Academic mindedness is essential for students' engagement and success at all educational levels. While many educational administrators aim to promote academic mindedness to improve learning outcomes, the connection between a supportive school climate—encompassing factors like school safety, teacher-student interactions, class size, and the overall learning environment—and academic mindedness is underrepresented in the literature. This gap is a key motivation for the present study. The research utilised the 2023 data from the Trends in International Mathematics and Science Study (TIMSS) and developed a five-construct Structural Equation Model to analyse the causal relationships between supportive school climate factors and academic mindedness. The model's quality criteria showed that the Standard Root Mean Square Residual (SRMR) was 0.041, and the Norm Fit Index (NFI) was 0.93, both meeting acceptable benchmarks. The findings indicate that the learning environment (β=0.117, t=11.255, $p<0.05$), class size (β=-0.026, t=2.767, $p<0.05$), school safety (β=0.504, t=29.067, $p<0.05$), and teacher-student interactions (β=0.041, t=4.205, $p<0.05$) significantly predict students' academic mindedness. These results highlight the significance of a supportive school climate in fostering students' academic motivation. Therefore, school stakeholders must take proactive steps to support students in achieving their academic goals. These findings contribute to the existing literature on the role of supportive school climate in fostering students' academic mindedness. This study implies that school authorities and management should provide a supportive school climate characterised by trust, respect, safety, inclusivity, and strong relationships for both students and school staff.

Keywords: Academic support, academic mindedness, TIMSS, school safety, learning environment.

1. Introduction

A supportive school climate is foundational to students' academic outcomes, long-term health, safety, and development within the school community. Such a supportive community promotes resilience, empowers students and teachers, and creates the conditions necessary for meaningful learning and positive life outcomes. When students feel supported in the learning environment, their mental, emotional and social well-being are enhanced (Konstantinidis, 2024; Joubert & Jacobs, 2024). A supportive school climate results from intentional efforts to create a safe, inclusive, engaging, and nurturing environment for all members of the school community. It encompasses safety (both physical and emotional), positive and respectful relationships, a sense of belonging and inclusion, engagement and participation, high expectations and positive academic support, a supportive learning environment, clear communication and consistent policies, staff well-being and professional support, community and family engagement, and continuous reflection and improvement (Martinsone et al., 2023). A supportive school climate can foster students' academic mindedness.

Academic mindedness, characterised by students' intrinsic motivation, resilience, and commitment to learning, is increasingly recognised as a vital determinant of educational success. It pertains to the individual values, perspectives, and convictions that students form regarding their own aptitudes,

intelligence, and capacity to thrive in a learning environment (Rožman et al., 2025; Wolff et al., 2024). A learner's approach to learning and involvement in academic contexts is influenced by their self-perceptions of academic aptitude and potential for success, which are integral to academic mindedness. Academic mindedness can also be referred to as attitudes towards intelligence, drive, and problem-solving skills, all of which significantly impact a learner's well-being and academic achievement (Acosta-Gonzaga, 2023). Success and self-actualisation depend on these psycho-social attitudes about oneself in relation to academic work (Hinduja et al., 2024). Academic mindedness encompasses several fundamental ideas, including students' sense of value, growth, belonging, and academic success. According to Rožman et al. (2025), these mindsets are important motivators that affect a student's perseverance and academic achievement.

The Trends in International Mathematics and Science Study (TIMSS) 2023 is the eighth cycle of an extensive international evaluation, conducted every four years since 1995. It measures fourth- and eighth-grade students' proficiency in mathematics and science across 64 nations and six benchmarking systems. TIMSS 2023 continues to be a crucial instrument for guiding educational policy worldwide by advancing global knowledge of student success in science and mathematics through technology-enhanced assessment and extensive contextual data. Recent analyses of TIMSS 2023 data underscore the significance of school climate factors such as safety, teacher-student interactions, learning environments, and class sizes in shaping students' academic orientations. Studies have identified the role of students' academic behaviours and psychological needs, as well as school attachment, in fostering academic engagement and outcomes (Hikmet et al., 2023; Ukpabio et al., 2023).

In the literature, academic mindedness is often used interchangeably with academic resilience, and perceived teachers' emotional support is important in fostering academic mindedness among students (Amoadu et al., 2025). Romano et al. (2021) investigated the interventional role of teachers' emotional support and reported a significant relationship between school engagement and learners' academic resilience. This suggests that fostering emotionally supportive teacher-student relationships can enhance students' commitment to learning and their ability to navigate academic challenges. Furthermore, a favourable school climate, characterised by safety, belonging, and supportive relationships, is instrumental in promoting academic mindedness. Students who perceive their schools as inclusive and safe environments tend to develop a strong sense of belonging, which fosters engagement and motivation. A study conducted by Winnaar (2021) using data from TIMSS 2019 indicates that feelings of safety and belonging within the school context are associated with higher academic achievement. This highlights the importance of fostering a supportive school climate to promote students' academic engagement.

A supportive school climate encompasses various elements that contribute to students' academic development. According to Dimitropoulou et al. (2025), a supportive school climate can help students become more motivated and emotionally engaged. Ikegbusi et al. (2023) identify family support, community involvement, and school climate as reliable predictors of learning outcomes among middle-grade learners. As stated by Saputra et al. (2020) and Richard (2021), a conducive school climate is essential for students to achieve positive academic performance. The authors suggest that negative perceptions of a lack of support within the school context lead to overall poor performance. Additionally, a positive school climate has been shown to reduce delinquency in schools (Sabia & Bass, 2017).

Moreover, safety within the school environment is paramount for academic success. Literature indicates that a secure learning environment enhances learners' engagement in classroom interactions. Wendelborg et al. (2020) reported that declines in students' sense of safety correlated with reduced academic performance. Ensuring safe and orderly schools in developing countries is crucial for fostering academic focus. Research indicates that secure learners are more likely to

participate in learning activities; Ojukwu (2016) observed that insecurity within schools, such as the presence of cult activities and substance abuse, significantly affects students' academic outcomes. Furthermore, Okpanachi (2023) emphasised that suitable school locations, perimeter fencing, teachers, parents, and community support are vital for maintaining security and enhancing academic performance.

According to Ogunode et al. (2024), the term "Safe School Initiative Programme" generally refers to a range of initiatives designed to make schools and the surrounding community safer for teachers and students. Through this intervention, every child, especially those in emergency and conflict situations, will have a safe space to study, play, and reach their full potential. For instance, in Nigeria, the main goal of the intervention is to protect students in schools from insurgent attacks, which may include rape, hostage-taking, kidnapping, and outright murder by thugs. Safe schools provide education, services, and supervision to help children grow over time and to save lives in the short term. To institutionalise safe schools and learning environments during emergencies and times of conflict, there have been collaborations on several research projects, campaigns, and programmatic initiatives that led to the creation of the Safe School Initiative (Manjo, 2024). The Safe School Initiative Programme has had a positive impact on students' behaviour and academic achievement (Chinwuba et al., 2024).

Teacher-student interactions significantly influence students' academic orientations. Huang and Wang (2023) demonstrate that supportive teacher behaviours enhance students' academic self-efficacy and engagement, resulting in improved learners' achievement. Furthermore, effective communication and positive relationships between teachers and students are crucial for fostering a conducive academic environment. Friendly and result-oriented interactions between teachers and learners are a fundamental aspect of effective educational activities, significantly impacting students' drive and learning outcomes. Akhtar et al. (2019) found that the quality of the teacher-student relationship significantly correlates with the student level of motivation. Their study emphasises that positive interactions characterised by respect, responsiveness, and encouragement can lead to higher student engagement and improved academic performance. Beyond traditional classrooms, teacher-student interaction is crucial in digital and online learning environments. Ong and Quek (2023) highlighted that consistent and meaningful teacher engagement can enhance students' sense of connection and online participation, even in virtual settings. Similarly, Aldrup et al. (2022) emphasise that teacher empathy and emotional support are key components of productive interactions, contributing to students' psychological well-being and learning outcomes.

Beyond the teacher-student relationship in the learning environment, physical and psychological aspects of the learning environment also play a critical role. Adequate resources, comfortable classroom settings, and a positive school culture contribute to students' willingness to participate in academic activities. Research by Akinnubi et al. (2024) supports the notion that well-structured learning environments correlate positively with higher learning outcomes. Class size is another factor influencing academic mindedness. Smaller class sizes often allow for more individualised attention and better student-teacher interactions (Hanushek, 2020). The Trends in International Mathematics and Science Study (TIMSS) provides significant insights into how school dynamics affect learners' academic mindfulness. TIMSS 2019 data, for instance, revealed that school climate and academic mindedness, including student well-being, are correlated with academic achievement (TIMSS 2019 International Reports). These studies were mainly analytically descriptive and relied on primary data that measured perceptions about the TIMSS programme. This study fills this gap in the literature by analysing TIMSS secondary data using the Structural Equation Modelling approach.

1.1 Problem statement

Several studies have focused on the modality of curriculum implementation, teacher quality, and student background as contributing factors to learners' academic mindedness (Cole et al., 2023;

Darling-Hammond et al., 2019; Haque & David, 2022; Nevenglosky et al., 2019). However, less attention has been given to the impact of school climate variables (Delgado-Galindo et al., 2025; Escalante Mateos et al., 2021; Podiya et al., 2025). Persistent classroom overcrowding, particularly in low- and middle-income countries, poor student-teacher rapport, and a lack of emotional and physical safety in many schools may silently undermine students' academic orientation (Darling-Hammond et al., 2019; Jameel & Aslam, 2025). The present study explores the link between a supportive school climate and learners' academic mindedness to assess the contributions of a supportive school climate to academic mindedness among Grade 8 learners**.** Based on this, the study answered the following question: *Are there significant contributions of supportive school climate to academic mindedness among Grade-8 learners as evident from the 2023 version of TIMSS data?*

2. Literature Review

The characteristics of a learning environment that affect how educational practices evolve within a school setting are referred to as the school climate (Delgado-Galindo et al., 2025). According to Delgado-Galindo et al. (2025), fostering a healthy school atmosphere is essential for enhancing learning opportunities, students' academic performance, and the overall calibre of everyday schoolwork, all of which contribute to educational sustainability. A positive school climate influences teacher commitment and student achievement, creates a learning environment that motivates both instructors and students, and supports effective teaching and learning activities (Al-Zu'bi et al., 2024; Escalante Mateos et al., 2021). Research indicates that schools can enhance academic achievement and improve grades by mitigating the adverse impact of socioeconomic disadvantage through the promotion of a healthy school climate (Berkowitz & Ben-Artzi, 2024).

2.1 Impact of selected school factors on academic mindedness

Academic mindedness, often characterised by a student's commitment to learning, critical thinking, and intellectual curiosity, is significantly influenced by various school-related factors. One crucial determinant is school safety, which provides a secure environment conducive to learning. For instance, Boye and Agyei (2025) highlight that a healthy and safe academic environment is necessary for students' academic achievement, as it minimises threats that could affect their well-being and academic focus. Teacher-student interaction is another pivotal factor impacting academic mindedness. Imran et al. (2023) emphasise that an outcome-oriented positive relationship between teachers and students, coupled with mutual respect and understanding, significantly enhances students' academic performance by fostering a supportive learning atmosphere. The learning environment, encompassing physical and psychological aspects, plays a vital role in shaping students' academic attitudes. Kamoet (2024) asserts that well-structured classrooms with adequate resources and a positive climate contribute to improved academic achievement among secondary school students.

Class size also affects academic mindedness, with smaller classes fostering personalised teaching and better engagement with learners. Chummongkol and Tupsai (2025) found that smaller class sizes in elementary schools positively influence constructivist teaching approaches, thereby enhancing students' learning experiences. School culture and climate, including the overall ethos and values promoted within the school, influence students' academic orientation. Heinla and Kuurme (2024) observed that a positive school climate and supportive teacher-student relationships contribute to higher levels of student satisfaction and academic motivation. The quality of education, often differing between public and private institutions, impacts students' academic engagement. Hafeez et al. (2023) noted that profit-oriented schools perform better in effective teaching practices, student safety, and engagement, which are crucial for fostering academic mindedness.

Podiya et al. (2025) used a systematic review to investigate the effects of a supportive school climate on teenagers' academic performance and emotional well-being. According to the findings, high

school students' academic performance, self-esteem, and reduced symptoms of stress and depression were all significantly correlated with positive aspects of the school climate, including peer support, student-teacher relationships, a sense of belonging, a sense of connectedness, and favourable teaching and learning strategies. Inclusivity and a culturally diverse academic environment promote academic engagement among students from various backgrounds. Muhammad and Liu (2025) discuss how constructivist teacher education addressing cultural diversity enhances inclusivity to provide a conducive environment that fosters academic achievement. Roeser et al. (2024) highlight that aspects such as resource availability and classroom conditions significantly affect learners' development and academic achievement. Many studies have been conducted on the supportive school climate, but few have linked its effects with learners' academic mindedness. Additionally, there is a dearth of studies that explore international data, such as TIMSS, for a reliable prediction of the causal influence of supportive school climate on learners' academic mindedness using structural equation modelling, as presented in this study.

2.2 Theoretical background

Bronfenbrenner's 1979 ecological systems theory categorises child development and its interaction with the immediate environment into nested structures: microsystem (immediate environments such as home and school), mesosystem (interactions between microsystems), exosystem (indirect environments), and macrosystem, which represents broader cultural and societal influences (Renn & Smith, 2024; Garbacz et al., 2017). School ecological theory provides a framework for understanding how various environmental systems within and around schools influence student development, well-being, and educational outcomes. Drawing from ecological systems theory, particularly Bronfenbrenner's model, this approach emphasises the complex, dynamic interactions between individuals and their multiple contexts, including the school environment. The theory highlights how the layers of learners' environments interact over time to shape student experiences and outcomes (El Zaatari & Maalouf, 2022; Garbacz et al., 2017). The present study also hypothesises that learners' interactions within the school system, shaped by teacher-student relationships, school safety, class size, and the learning environment, could influence their academic mindfulness.

3. Methodology

The study explores secondary data provided by the International Education Assessment. This data is released periodically every four years. Although many versions of data are published by the International Education Assessment, this study focuses on the Trends in International Mathematics and Science Study, which has been released every four years since 1995. Secondary data from governments, organisations, or other institutions often includes vast populations, longer time spans (longitudinal data), or diverse regions. It would be expensive or impossible for a single researcher to gather this secondary data on their own (Kelly et al., 2025). Secondary datasets, sourced from reliable sources with stringent quality assurance procedures, offer higher reliability and validity compared to datasets that might be gathered by an individual researcher (Cheng & Phillips, 2014).

The study is a cross-sectional investigation of school environmental factors that influence learners' focus on academic tasks. A cross-sectional study collects and examines data from a target group at a single moment in time (Hunziker & Blankenagel, 2024). The typical purpose of such a study is to explain the relationship between a specific outcome and one or more other variables of interest, or to characterise the characteristics of the population (Wang & Cheng, 2020). Although this design is useful for developing ideas, characterising a population, and guiding policy decisions, it cannot ascertain cause-and-effect correlations. The 2023 version of Trends in International Mathematics and Science Studies captured teachers of different genders, ages, and learning environments.

3.1 Data and teachers' demographic characteristics

The TIMSS data from the 2023 edition were utilised for this study. The data were collected from teachers in 64 countries across various continents regarding the school factors that enhanced students' academic mindedness. The information obtained from the International Education Assessment (IEA) website on TIMSS 2023 for sciences indicated that 25,078 teachers participated; this number was reduced to 22,490 after all incomplete cases were removed. The demographic characteristics of the participants revealed that 60.5% of the sampled teachers were female, most teachers were aged between 30 and 39 years, the mean years of teaching experience were 17, and 20.6% of the teachers were English language speakers, while others spoke various languages.

3.2 Studied constructs

The study developed a five-construct model to explain the interaction among the factors that constitute school climate and students' academic mindedness. It was hypothesised that the learning environment, school safety, teacher-student interaction, and class size could create either a favourable or unfavourable learning climate for students. These constructs were extracted from the TIMSS 2023 data version and were validated using various approaches, as presented in Table 1.

Table 1: *Constructs and their code in TIMSS 2023 data*

Construct	Code used by TIMSS 2023	Symbol	Number of Items
School Safety	BTBGSOS-BTDGSOS	SSF	3
Teacher-Student Interaction	BTBS17A- BTBS17C	TCI	4
Learning Environment	TBG13A- TBG13I	LEI	9
Academic Mindedness	TBG06I- TBG06K	ACM	3
Number of Students in the Class	ATBG010A-B	NSC	1

Table 1 presents the symbols used to represent the constructs in the present study, along with the number of items used to measure them. All constructs, except the number of students in the class, are categorical, and their psychometric properties were estimated. The constructs' composite reliability coefficients and Average Variance Extracted (AVE) were assessed, along with discriminant validity, as subsequently presented.

3.3 Reliability of the constructs

Two reliability statistics were estimated, and their coefficients were presented alongside the AVE in Table 2. The exclusion of the number of learners in the class as a construct was due to it being a metric (continuous) variable.

Table 2: *Reliability of the constructs*

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Academic mindedness	0.895	0.895	0.935	0.826
Learning Environment	0.958	0.963	0.964	0.750
School Safety	0.625	0.926	0.793	0.615
Teacher-Student Interaction	0.942	0.942	0.958	0.851

The result revealed that Cronbach's Alpha reliability coefficient of the construct ranges from 0.625 to 0.958, as against the benchmark of 0.7. The result shows that the reliability coefficient for school safety is a little below the acceptable value. The result further revealed that the composite reliability coefficients for the constructs range from 0.793 to 0.963, as against the cut-off mark of 0.7, which implies acceptable values. The AVE of the construct revealed values that range from 0.615 to 0.85, as against the benchmark of 0.5, which implies that the construct could explain reasonable variance in

the trait measured. The result of the discriminant validity for the construct in the study is presented in Table 3. The coefficient of Discriminant Validity (DV) reveals how constructs are distinct and unique from each other. The essence of discriminant validity is to prevent duplication and ensure that constructs are not measuring the same trait. Although three approaches (Cross loading, Fornell-Larcker, and Heterotrait Monotrait Method (HMM)) were used to estimate DV in the study, and all yielded a reliable value, the HMM result was adopted and presented in Table 3 due to its ease of interpretation.

***Table 3**: Discriminant Validity of the Constructs*

	Academic mindedness	Learning Environment	N of Students in Class	School Safety	Teacher-Student Interaction
Academic mindedness					
Learning Environment	0.316				
Number of Students in Class	0.156	0.345			
School Safety	0.656	0.473	0.334		
Teacher-Student Interaction	0.236	0.400	0.251	0.396	

The principle behind HMM is that for a construct to have discriminant validity, its coefficient of correlation with other constructs must be less than 1.0. Furthermore, Cheung et al. (2024) reported that the intercorrelation coefficient between two constructs should be less than 0.8. The results in Table 3 show a range of intercorrelations from 0.1 to 0.6, which implies that the constructs of the study exhibit discriminant validity.

3.4. Analytical procedures

The study adopted Variance-based Structural Equation Modelling (VB-SEM), specifically Partial Least Squares Structural Equation Modelling (PLS-SEM). This approach was chosen because estimating both the measurement and the structured model of the constructs allows for accurate predictions as well as validation of the constructs (Hair et al., 2021; Lim, 2024). The path algorithm and the bootstrapping procedures in Smart PLS-SEM enhanced the potential for model building and estimation (Hair et al., 2024; Henseler et al., 2016). Additionally, the estimation procedure revealed the quality criteria of the model, alongside testing the significance of each construct.

3.5. Ethical consideration

The utilised secondary data, particularly the 2023 edition of the Trends in International Mathematics and Science Study (TIMSS), was extracted from the International Education Assessment website. The ethical clearance and other documents were provided by IEA.

4. Presentation of Results

The model quality criteria are presented in Table 3 and reveal the coefficient of each model quality indicator.

***Table 4:** Model Quality Criteria*

Criteria	**Saturated model**	**Estimated model**
SRMR	0.041	0.041
d_G	0.171	0.171
d_ULS	0.355	0.355
NFI	0.934	0.934
Chi-square	26885.355	26885.355

The results revealed a Standard Root Mean Square Residual (SRMR) of 0.041, compared to the benchmark of <0.1, indicating a well-fitting model. The Norm Fit Index (NFI) of 0.93, exceeding the

cut-off mark of ≥0.9, suggests a valid model fit and indicates that the constructs accounted for more than 90% of the variance observed in the model. The d_G of 0.171, the d_ULS of 0.355, and the Chi-Square of 26,885.36 all indicate that the model demonstrates an acceptable fit. The model and the path coefficients are presented in Figure 1.

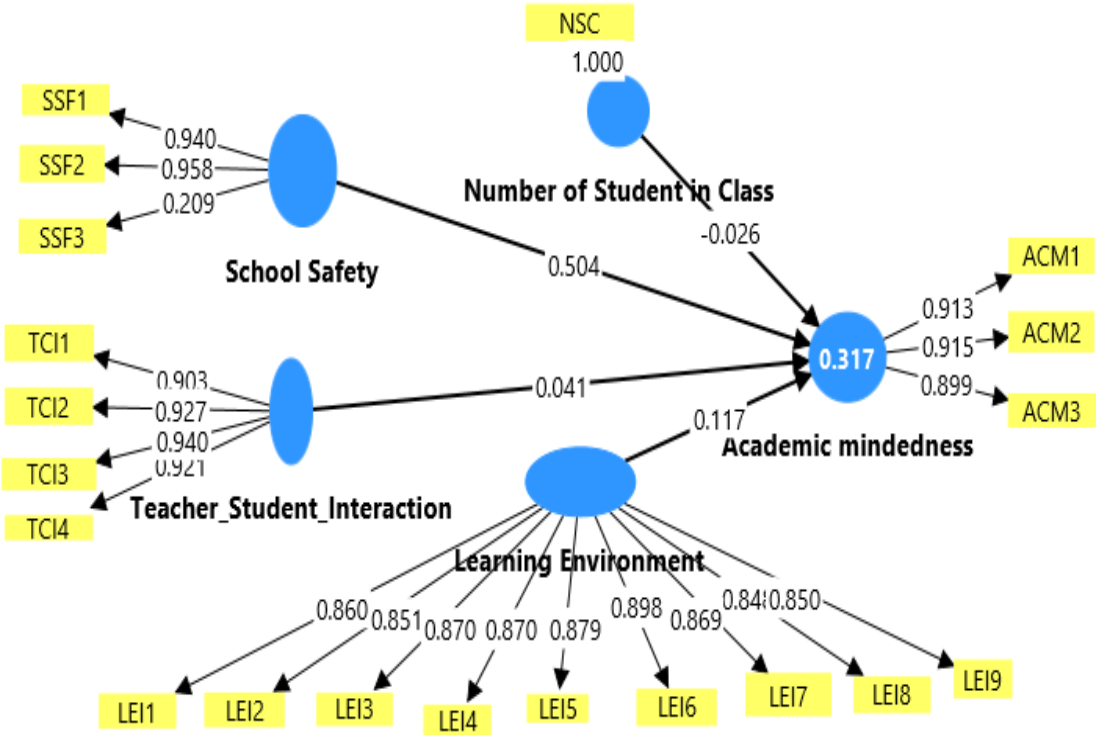

Figure 1: *Model diagram and the estimated coefficients*

From the model diagram, it can be observed that school safety, the number of students in the class, teacher-student interaction, and the learning environment were modelled to predict learners' academic mindedness. The model revealed that these constructs could explain 31.7% of the total variance in learners' academic mindedness (R^2 = 0.317), which is considerable compared to a coefficient of around 0.25 (25%) reported in some popular models, such as the Technological Acceptance Model (Ajzen, 1985). The estimated path coefficients were used to test the significance of each construct in the model and to address the research question raised in the study.

***Research Question*:** Are there significant contributions of Supportive School Climate to academic mindedness among Grade-8 learners?

The results that provide an answer to the research question were presented in Table 4. The Table revealed the path coefficients in the form of sample mean (M), the t-statistics, and the probability levels.

Table 5: *Significance of pathways and their coefficients*

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
Learning Environment -> Academic mindedness	0.117	0.117	0.010	11.255	0.000
Number of Students in Class -> Academic Mindedness	-0.026	-0.026	0.009	2.767	0.006

School Safety -> Academic mindedness	0.504	0.504	0.017	29.067	0.000
Teacher Student Interaction -> Academic mindedness	0.041	0.041	0.010	4.205	0.000

The results shows the learning environment (β=0.117, t=11.255, p<0.05), number of student in class (β=-0.026, t=2.767, p<0.05), school safety (β=0.504, t=29.067, p<0.05), and teacher student interaction (β=0.041, t=4.205, p<0.05) all made significant influence on learners' academic mindedness and are reliable predictors of it. The magnitude of influence represented by t-statistics shows that school safety (t=29.067) is the most influential construct of school climate, followed by learning environment (t=11.26) and others (teacher-student interaction (t=4.21) and the number of students in the class (t=2.77)). It can be inferred that learning environment, school safety, teacher-student interaction, and the number of students in the class are reliable determinants of learners' academic mindedness.

5. Discussion of Findings

The findings emphasise the pivotal role of a supportive learning environment in fostering learners' academic mindedness, particularly among Grade 8 students. A secure and nurturing environment is essential to students' sense of safety and positively influences learners' academic engagement and motivation. The learning environment, encompassing physical infrastructure and classroom resources, significantly impacts students' academic attitudes. Studies have shown that well-organised and adequately resourced classrooms promote greater student attention and willingness to engage (Maringe & Sing, 2022). Factors such as proper seating, lighting, and teaching aids directly influence learner motivation (Olaniyi et al., 2020). These findings highlight the significance of investing in the physical aspects of the learning environment to enhance learning outcomes.

Teacher-student interactions are another critical component influencing academic mindedness. Positive relationships characterised by warmth, responsiveness, and academic guidance significantly enhance learners' engagement and persistence (Wentzel & Muenks, 2020). Research has linked personalised teacher attention to increased learners' confidence and academic aspirations (Adeyemi & Ajiboye, 2022). These connections are pivotal in improving learners' academic identities and influencing their learning trajectories.

Class size presents a structural factor with psychological and pedagogical implications for academic mindedness. As class sizes increase, the ability of teachers to provide personalised instruction and feedback diminishes, often leading to disengagement among students (Blatchford et al., 2021). This issue is particularly problematic in resource-constrained settings where physical and instructional resources are already stretched thin (Ekundayo, 2020). A report also shows a relationship between the number of students in the class, students' academic mindedness, and school participation, indicating that overpopulated classrooms reduce opportunities for meaningful student participation (Adebayo & Ogundele, 2023; Emeke et al., 2021). Therefore, addressing class size concerns is a structural necessity for boosting educational quality. Collectively, the school climate variables examined in this study function as interdependent elements that either reinforce or hinder academic mindedness. When students are exposed to safe environments, effective teaching relationships, manageable class sizes, and well-designed learning spaces, their academic orientation is likely to be stronger (Hair et al., 2020; Olawale & Bello, 2022). These factors interact synergistically to support learners' cognitive, emotional, and behavioural engagement with academic content. Viewing school climate as a holistic construct provides a more comprehensive understanding of what motivates learners to invest in school.

The study's findings affirm the utility of focusing on school climate to enhance learners' academic outcomes. In doing so, it contributes to global and local efforts advocating for student-centred school reforms (Kim & Lee, 2024; Ajayi et al., 2023). By integrating both structural and relational components

of the school environment, educational stakeholders can develop targeted interventions to support academic engagement. Improving school safety, enhancing classroom environments, training teachers on relational engagement, and reducing class sizes are actionable pathways toward this goal. This approach holds promise for cultivating academically minded learners in diverse educational settings. Finally, the interplay between school safety, learning environment, teacher-student interaction, and class size significantly influences learners' academic mindedness. Addressing these factors holistically is crucial for enhancing an educational arena that fosters academic engagement and success.

6. Conclusions and Recoemmendations

This study has examined the association between supportive school climate and learners' academic mindedness among Grade 8 learners, drawing data from the TIMSS 2023. The findings affirm that school safety is the most influential predictor of academic mindedness among Grade 8 learners. By utilising recent TIMSS data and contextualising findings within the educational landscape of participating countries, this research fills a critical knowledge gap and offers evidence-based insights to educators, policymakers, and stakeholders. It advocates for systemic reforms in school climate that transcend academic performance metrics, aiming instead to develop intrinsically motivated, emotionally resilient, and academically minded students. The findings thus lay a robust foundation for policy formulation, teacher training, and school leadership development aimed at transforming grade-level educational practices.

The results emanating from the study indicate that schools must prioritise both the physical and psychological safety of learners. This includes perimeter fencing, trained security personnel, anti-bullying policies, and emergency preparedness protocols. Achieving this may require collaboration with other stakeholders, such as security agencies and community organisations, to ensure schools are safe learning environments. Governments and school administrators should allocate budgetary resources towards providing conducive school buildings, adequate furniture, and ensuring classrooms are well-lit and ventilated. Equipping classrooms with digital learning tools and visual aids can further stimulate student interest and enhance cognitive engagement. Policymakers and educators must prioritise these elements to foster academic excellence and equity in schools.

It is also recommended that teachers undergo continuous professional development on relational teaching methods, emotional intelligence, and inclusive practices. This would empower educators to build meaningful relationships with students, fostering environments that promote academic persistence and motivation. Additionally, to address overcrowding, the education sector must recruit more qualified teachers and construct additional classroom blocks. Smaller class sizes allow for differentiated instruction, timely feedback, and better classroom management—critical factors in nurturing academic engagement. Lastly, policymakers should adopt an integrated school climate framework that recognises the interconnectedness of safety, infrastructure, pedagogy, and classroom dynamics. Such a framework should guide school evaluation metrics and serve as a blueprint for national education quality assurance.

6.1 Limitations and suggestions

There are several limitations regarding the data used in the study. Because the data was extracted from the TIMSS 2023 version, the researchers had no opportunity to control for the variances that occurred in the studied variables. Therefore, the causal relationship between the independent and dependent variables cannot be established. Future researchers should consider using an experimental approach. Although TIMSS data is a combination of information obtained from Science and Mathematics teachers, only the science version of the 2023 data was used for the analysis, which could pose a threat to the external validity of the findings. Studies that consider the holistic dataset should be encouraged in the future.

7. Declarations

Author Contributions: Conceptualisation (S.O.O. & J.P.); Literature review (S.O.O.); Methodology (S.O.O. & J.P.); Software (N/A), Validation (J.P.); Formal Analysis (S.O.O. & J.P.), drafting and preparation (S.O.O. & J.P.), review and editing (S.O.O. & J.P.); supervision (J.P.), Project Administration (S.O.O.), funding acquisition (N/A). All authors have read and approved the published version of the article.

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Conflicts of Interest: The author(s) declare no conflict of interest

Data Availability: The data used in this study were obtained from the Trends in International Mathematics and Science Study (TIMSS) 2023 database, which is publicly available in the IEA Data Repository at https://www.iea.nl/data-tools/repository. The data are openly available; no new data were created or collected specifically for this study.

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