

A Study of Primary School Students in Johor: The Role of Temperament and Teacher-Student Relationships in Student Engagement

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Abstract

As students' engagement is a crucial component of their learning process, it is important to understand the factors that influence it. The COVID-19 pandemic has caused prolonged school closures and a shift to online learning, leading to learning loss. Student temperament and teacher-student relationships have been identified as two key factors that affect the quality of student engagement. This research aimed to examine the relationship between student temperament, teacher-student relationships, and student engagement in primary schools. The study employed a quantitative approach, using three questionnaires to collect data from 351 lower primary students selected through random sampling techniques. The analysis results showed that the respondents demonstrated moderate level of overall student temperament and high level of teacher-student relationship. The study results showed a weak positive correlation between student temperament and student engagement ($r = 0.243$, $p < 0.01$). Meanwhile, the study found a strong positive correlation between teacher-student relationship and student engagement ($r = 0.740$, $p < 0.01$). The findings indicate that teacher-student relationship is a much stronger predictor of student engagement in primary school, as compared to student temperament. One of the key implications of this study is that teachers can now better understand the significance of building positive teacher-student relationship in increasing the level of quality student engagement in schools.

Keywords: Student Temperament, Teacher-Student Relationship, Student Engagement, Learning Loss, Johor Primary School

Introduction

Student engagement in the classroom learning process is an important factor in determining students' academic achievement (Fredricks et al., 2019). However, school closures for up to several weeks and even months during the Covid-19 pandemic resulted in loss of learning among students as students and teachers had to resort to remote learning methods such as online learning which gave rise to the lack of face-to-face physical interaction between teachers and students (Gore et al., 2021). This situation caused students to lose focus in learning as online learning made it difficult for the students to follow the context taught by the teacher, especially for elementary school students. Furthermore, unstable internet

connections and lack of cooperation from some students who did not turn on their cameras had further exacerbated the difficulty faced by teachers who found it hard to maintain sufficient levels of student engagement. In light of such a situation, students who have just returned to school after a long period of online learning should be guided to help them address the learning challenges faced while learning remotely to enable them to attain academic success.

Student engagement in school is driven by various internal and external factors (Ursin, 2021) such as students' background Kim & Kochanska (2019), social context Gore et al (2021), and personal characteristics (Thandavaraj et al., 2021). Two important factors that can affect academic performance through school engagement are student temperament Bryce et al (2018) and teacher-student relationship (Sealy et al., 2021). Students who exhibit extroverted temperament and a higher positive level of teacher-student relationship are more likely to experience a higher level of student engagement in teaching and learning. Thus, in view of their material influences on a student's academic achievement, it is crucial that student temperament, teacher-student relationship and student classroom engagement are studied. As the Covid-19 situation is now considered an endemic, and students have now fully returned to school for learning, evaluating the academic process that is taking place during this critical transition period will particularly be valuable, especially in relation to how student temperament and teacher-student relationship can influence their classroom engagement.

Temperament can be defined as the behavioural style of a baby or a child. Temperament is used to determine how a child will respond to a situation, and how they express and regulate their emotions (Thomas & Chess, 1977). There are three constructs of temperament, namely Surgency/Extraversion, Negative Affectivity, and Effortful Control (Rothbart, 2011). Studies on student temperament are important because temperament can affect many aspects of a student's life in school (Strickhouser & Sutin, 2020). In the early 1980s, the temperament theory was proposed by Rothbart and Derryberry, which was described as a child-oriented developmental approach, the psychobiological development of a child in general, and a multidimensional approach to the overall behaviour of a child (Derryberry & Rothbart, 1984).

Although temperament has been analysed extensively in terms of global contextual variations, only specific studies have been conducted in Malaysia, especially in primary schools. Based on the research of Thandavaraj et al (2021); Gore et al (2021), student temperament and teacher-student relationship can have significant impacts on student development, in terms of their behavioural, emotional, and cognitive engagement in the classroom. These studies provide important insights into how factors such as temperament and teacher-student relationship can affect the academic achievement of primary school students in Malaysia. As for the purpose of this study, its main objective was to identify the relationships between student temperament, teacher-student relationship and student engagement among Year 3 students from primary schools located in the Johor state of Malaysia.

This study contributes significantly in terms of enriching academic literature and providing constructive guides to school administration in fine-tuning students' learning and teaching processes. It is expected that this study can help fill the research gap in the literature regarding the relationship between student temperament, teacher-student relationship, and

student engagement. Furthermore, this study would enable school administrators, especially primary school teachers, to understand the significance of the temperament factor and its impact on student engagement. In addition, developing a positive teacher-student relationship can also help improve student engagement. By having this awareness in mind, teachers can fine-tune their existing teaching methods and work towards developing positive relationships with students. This in turn will lead to increased student engagement in the classroom, which ultimately is beneficial for students.

Literature Review

Student Engagement in Primary School

Engagement has been defined as the amount of time a student actively or attentively interacts with their environment at different levels of competence (Fredricks, 2004). According to Dennie et al (2019), high-quality student engagement with their environment is an intermediary variable in their learning process. Quality engagement is described as a developmental process that helps students build healthy peer relationships and learn to manage their emotions effectively. It includes skills such as self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Student achievement in the context of engagement is not only associated with higher academic outcomes but also with increased social skills and mental health which would help students navigate their interaction with others of various age, gender, ethnicity, and ability levels (Ashdown & Bernard, 2012; Alzahrani et al., 2019).

Sparapani et al (2016) proposed a more holistic definition and exploration of active engagement that combines both student participation in classroom activities and social integration between teachers and students, which provides a comprehensive framework to support student success through engagement in teaching and learning (Fredricks et al., 2004; Oliver et al., 2019). Engagement in the classroom can also be described as a developmental process that helps students build social relationships within the school context and learn to manage their emotions effectively. According to Fredricks (2004), student engagement is measured using three distinct dimensions, which are behavioural engagement, emotional engagement, and cognitive engagement. Behavioural engagement assesses the level of a student's involvement in academic activities such as attending classes, doing homework, and studying for exams. Emotional engagement evaluates the degree of a student's sense of belonging and connection to their school and enjoyment of learning. Lastly, cognitive engagement gauges the extent to which students apply critical thinking and problem-solving skills to their learning.

Temperament

Temperament refers to the innate behavioural and emotional tendencies of an individual. Thomas and Chess (1977) suggested that temperament is used to determine how a children will react to a situation, and how they express and control their emotions. Despite numerous studies (Ato et al., 2020; Bryce et al., 2018; Bush 2018) on temperament across various contexts, recent research (Thandavaraj, 2021) has directed its attention towards the impact of temperament on student engagement, particularly among students in primary school and the same interest is observed in Malaysia. The Rothbart model (2004) defines temperament as a set of individual differences in emotion, attention, and self-regulation processes. It has been developed specifically for children, with a focus on early childhood development. It

includes three primary dimensions of temperament – negative affectivity, positive affectivity, and effortful control – that are relevant to children’s behaviour and emotional regulation.

Thandavaraj et al (2021) found that temperament is a critical factor of academic achievement among primary school students in Malaysia. Factors such as emotional levels, creative thinking, and self-control were found to have played a crucial role in how temperament affects academic achievement in the study. Similarly, Zhou et al. (2015) found that children’s temperament was related to their academic achievement in the first grade. Their findings revealed that children who were rated as high on effortful control and low on negative emotionality had higher academic achievement.

In addition to academic achievement, temperament is also important for students’ social and emotional development. A study by Denham et al (2014) found that children’s temperament was related to their emotional intelligence and social competence in the early years of elementary school. The study found that children who were rated as high on attentional focus and low on impulsivity had better social and emotional outcomes. Temperament is also important for behavioural adjustment in elementary school. In their study, Sanson et al (2016) found that children’s temperament was related to their behavioural problems in the early years of elementary school. In their study, children who were rated as high on negative emotionality and low on effortful control were found to be more likely to experience behavioural problems.

In short, temperament is a crucial factor that influences student engagement, which in turn affects their academic achievement. It is suggested in the literature that educators must take individual student’s temperament into account when designing teaching and learning strategies to promote learning engagement and academic achievement. By doing so, teachers can establish positive relationships with students and foster a more conducive learning environment. Researchers have discovered that students’ temperamental traits are associated with behavioural, emotional, and cognitive engagement. Thus, understanding the relationship between temperament and student engagement can help educators better develop educational practices and interventions aimed at improving students’ academic achievement. By identifying students’ temperamental traits, educators can customise their teaching strategies to suit each student’s needs and facilitate their academic goals.

Teacher-Student Relationship

Teacher-student relationship that is developed through the process of teaching and learning can increase students’ knowledge on a subject; for this reason, it has a direct relationship with the academic performance of students (Rooda et al., 2011). In the context of education, positive teacher-student relationship can serve as a secure base for students, allowing them to explore and learn in a safe and supportive environment (Pekrun et al., 2009). In Year 3 of primary school, students are at a crucial stage in their social and emotional development. Positive teacher-student relationship can foster a sense of security, trust, and respect in the classroom, which can enhance students’ academic engagement and achievement. Students who feel secure in their relationship with their teachers are more likely to participate in class, ask for help, and take academic risks (Hamre & Pianta, 2005). Additionally, positive teacher-student relationship can reduce disruptive behaviours and enhance students’ well-being and mental health (Koomen et al., 2007).

The findings of this study can be explicated through John Bowlby's Attachment Theory (1982), which posits that teachers serve as critical role models for children from preschool through adolescence (Ang, 2020). In this regard, teachers are perceived as attachment figures by younger students more than older children, given that children often form strong bonds with their teachers when transitioning from preschool to primary school. The type of teacher-student relationship developed is consequential for fostering a learning environment, and it could either facilitate or impede students' internal motivational sources when attending school and the classroom. A positive teacher-student relationship that is cultivated effectually may help the teacher nurture favourable temperamental traits in the students, including perseverance and self-regulation (Strati et al., 2017). In contrast, a negative teacher-student relationship may create a feeling of disconnect and affect the students' motivation and interest in learning, leading to lower grades and academic performance. For this reason, teacher-student relationship represents a pivotal factor in prognosticating student engagement in the primary school setting.

In short, the relationship between teachers and students is widely recognised as an important factor that influences student classroom engagement. Mason et al (2017) highlighted the importance of a supportive teacher-student relationship, as it has the potential to translate into higher levels of classroom engagement among students. In particular, a positive teacher-student relationship can be a source of social support for students, which is known to be a key factor in promoting engagement and academic success. Moreover, Whitten et al (2018) found that teacher-student relationship and student engagement in the classroom are interdependent, where students who feel more secure are more likely to complete their tasks and consequently, this increases their commitment and academic performance. This underscores the critical role of teacher-student relationship in predicting student involvement in the classroom. A positive teacher-student relationship is therefore a crucial factor in promoting student engagement in the classroom, and has significant implications for student motivation, social support, and academic performance.

Research Methodology

This study adopted a quantitative research approach in the form of questionnaires to identify the relationship between student temperament, teacher-student relationship and student engagement among students at local primary schools.

Participant

The study sample consisted of 351 students (n=351), who were all Year 3 students (9-year-old) studying in Chinese and national primary schools in Johor Bahru. The sample included a fair mix of races. Simple random sampling technique was used in selecting the samples. Krejcie and Morgan (1970) Sample Size Table was used to select 351 respondents from a total of 3,875 Year 3 students who made up the population in Skudai, Johor Bahru.

Research Instrument

The main research instrument used in this study was a questionnaire. The questionnaire consisted of four parts. The first part or Part A consisted of demographic questions, including gender, race, type and name of primary school.

The second part or Part B consisted of 14 questions on student temperament, which was adapted from Temperament in Middle Childhood Questionnaire (TMCQ) developed by (Simonds and Rothbart, 2004). The first 4 questions measured extraversion, the next 5 questions measured negative affection, while the last 5 questions measured effortful control.

The third part or Part C consisted of 10 questions on teacher-student relationship, which was adapted from Student Version of the Teacher–Student Relationship Inventory (S-TSRI) developed by (Ang et al., 2020). The first 3 questions measured satisfaction, followed by 4 questions which measured instrumental help and 3 final questions which measured conflict.

The last part or Part D consisted of 12 questions on student engagement which was adapted from School Engagement Measure (SEM) developed by (Fredricks et al., 2004). The first 3 questions measured behavioural engagement, the next 4 measured emotional engagement while the last 5 measured cognitive engagement.

Each component in the questionnaire, namely student temperament, teacher-student relationship and student engagement, was measured using a 5-point Likert scale where 1 represented “Highly disagree” while 5 represented “Highly agree”. The score for each component and sub-component was calculated based on the mean value of the item in the component and sub-component.

A pilot study was conducted to test the validity and reliability of the instrument. The pilot study involved a total of 30 Year 3 students studying in a primary school in Johor, who exhibited similar characteristics of the target population. Cronbach’s alpha coefficient was used to assess the reliability of each component, and results showed that student temperament, teacher-student relationship and student engagement scored 0.806, 0.865, and 0.904, respectively. All three Cronbach’s alpha scores were above 0.8, substantiating the instrument’s high overall validity and reliability.

Data Analysis

SPSS version 27.0 software was used to perform data analysis. The demographic data set from Part A was analysed descriptively, given that its level of measurement was at the nominal level. The descriptive analysis performed involved frequency, percentage, mean and standard deviation.

As for the 3 components of student temperament, teacher-student relationship and student engagement, their data sets were analysed using parametric analysis. Their individual level was assessed, with reference to the mean score interpretation table developed by (Nardi, 2018). The mean score range and its respective interpretation are presented in Table 1.

Inferential analysis involving Pearson correlation and regression was also performed on the data sets. Pearson correlation was used to identify and assess the relationship between the independent variables of student temperament and teacher-student relationship and the dependent variable of student engagement. For correlation analysis, the strength of the relationship between the variables was quantified based on the coefficient value (r). The value of r , which ranges from -1 to +1, reflects both strength and direction of the relationship between the variables. The r value of -1 indicates that there is a strong negative relationship

between the variables, while the r value of +1 indicates that there is a strong positive relationship between the variables. The interpretation of the correlation coefficient value, which was developed by Cohen (1988), is presented in Table 2.

For significant relationships identified between the variables measured, regression analysis was further performed to construct a prediction equation. This allows the value of the dependent variable to be predicted, given the value of the independent variables.

Table 1

Mean score interpretation for level of student temperament, teacher-student relationship and student engagement (Nardi, 2018).

Mean Score	Level
1.00-1.80	Very Low
1.81-2.60	Low
2.61-3.20	Medium
3.21-4.20	High
4.21-5.00	Very High

Table 2

Interpretation of Pearson's correlation coefficient value, r (Cohen, 1988).

R Value	Correlation Strength
0.50 – 1.00	Strong
0.30 – 0.49	Moderate
0.10 – 0.29	Weak

Results

Descriptive Analysis

This section presents the results of the descriptive analysis performed on the respondents' demographic data. A total of 351 respondents provided completed questionnaires, which were considered valid for data analysis after inspection. Based on the demographic data collected, the respondents' profile is tabulated and presented in Table 3.

Table 3

Respondents' demographic profile.

Demographic Information		Frequency	Percentage (%)
Gender	Male	183	52.1
	Female	168	47.9
Ethnicity	Malay	132	37.6
	Chinese	169	48.2
	Indian	18	5.1
	Others	32	9.1
School Type	SJK (C)	208	59.3
	SK	143	40.7

Level of Student Temperament, Teacher-Student Relationship and Student Engagement

This section presents the inferential analysis performed on the data sets of student temperament, teacher-student relationship, and student engagement. For the first

component of student temperament, the dimensions with the highest mean scores were effortful control (mean = 3.05, SD = 0.87) and extraversion (mean = 3.01, SD = 0.93). Both dimensions were scored at medium level. The overall mean score of student temperament was 2.92 (SD = 0.90), indicating a medium level of student temperament. The results of analysis on student temperament are presented in Table 4.

Table 4

Level of student temperament.

Student Temperament	Mean	Standard Deviation	Level
Extraversion	3.01	0.93	Moderate
Negative Affection	2.39	0.89	Low
Effortful Control	3.05	0.87	Moderate
Overall (Student Temperament)	2.92	0.90	Moderate

For the second component of teacher-student relationship, the dimensions with the highest mean scores were satisfaction (mean = 3.84, SD = 0.85) and instrumental support (mean = 3.35, SD = 0.95). Both dimensions were scored at high level. The overall mean score of teacher-student relationship was 3.54 (SD = 0.92), indicating a high level of teacher-student relationship. The results of analysis on teacher-student relationship are presented in Table 5.

Table 5

Level of teacher-student relationship.

Teacher-Student Relationship	Mean	Standard Deviation	Level
Satisfaction	3.84	0.85	High
Instrumental Support	3.35	0.95	High
Conflict	2.67	0.95	Moderate
Overall (Teacher-Student Relationship)	3.54	0.92	High

For the third component of student engagement, all 3 dimensions were scored at high level, whereby behavioural engagement achieved mean score of 4.01 (SD = 0.84), emotional engagement achieved mean score of 3.93 (SD = 0.84), and cognitive engagement achieved mean score of 3.51 (SD = 0.83). These contributed to overall student's engagement mean score of 3.77 (SD = 0.74), indicating a high level of student engagement. The results of analysis on student engagement are presented in Table 6.

Table 6

Level of student engagement.

Student Engagement	Mean	Standard Deviation	Level
Behavioural	4.01	0.84	High
Emotional	3.93	0.84	High
Cognitive	3.51	0.83	High
Overall (Student Engagement)	3.77	0.74	High

Relationship between Student Temperament, Teacher-Student Relationship and Student Engagement

Correlation analysis was performed to answer one of the research question and objective established for this study on identifying the relationship between student temperament, teacher-student relationship and student engagement. The null hypotheses established to test the relationship are as follows:

Ho1: There is no significant relationship between Student Temperament and Student Engagement.

Table 7 presents the hypothesis testing results which attempted to identify the relationship between temperament and student engagement. The results of the Pearson correlation analysis showed that the dimensions of extraversion ($r = -0.055$, $p > 0.05$) and negative affection ($r = -0.061$, $p > 0.05$) did not have significant relationships with student engagement. Only effortful control dimension demonstrated a significant relationship; however, its relationship with student engagement was a weak positive relationship ($r = 0.243$, $p < 0.01$). Overall, student temperament was also found to have a significant but weak positive relationship ($r = 0.116$, $p < 0.05$) with student engagement. Accordingly, null hypothesis 1 failed to be accepted, and it was therefore concluded that there was a significant relationship between student temperament and student engagement.

Table 7

Relationship between student temperament and student engagement.

	Student Engagement		Correlation Strength
	r	Sig. P	
Extraversion	-0.055	0.305	No significant relationship
Negative Affection	-0.061	0.257	No significant relationship
Effortful Control	0.243*	0.001	Weak
Overall (Student Temperament)	0.116**	0.030	Weak

*significant at 0.01 level.

**significant at 0.05 level.

Ho2: There is no significant relationship between Teacher-Student Relationship and Student Engagement.

Table 8 presents the results of the hypothesis testing which sought to identify the relationship between teacher-student relationship and student engagement. The Pearson correlation analysis results showed that all 3 dimensions of satisfaction ($r = 0.716$, $p < 0.01$), instrumental support ($r = 0.547$, $p < 0.01$), and conflict ($r = -0.604$, $p < 0.01$) demonstrated a significant and strong positive relationship with student engagement. Overall, teacher-student relationship displayed a significant and strong positive relationship ($r = 0.740$, $p < 0.01$) with student engagement. Therefore, null hypothesis 2 failed to be accepted and it was therefore concluded that a significant relationship existed between teacher-student relationship and student engagement.

Table 8

Relationship between teacher-student relationship and student engagement.

	Student Engagement		Correlation Strength
	r	Sig. P	
Satisfaction	0.716*	0.001	Strong
Instrumental Support	0.547*	0.001	Strong
Conflict	-0.604*	0.001	Strong
Overall (Teacher-Student Relationship)	0.740*	0.001	Strong

*significant at 0.01 level.

Regression Analysis of Student Temperament, Teacher-Student Relationship and Student Engagement

Ho3: Student temperament and teacher-student relationship do not significantly predict student engagement level.

Based on the regression analysis results presented in Table 9, the correlation between student temperament, teacher-student relationship and student engagement was found to be high ($r = 0.743$). The adjusted R^2 value of 0.553 indicated that student temperament and teacher-student relationship contributed 55.3% to the variance in student engagement.

Table 10 presents the results of ANOVA analysis, where a significant F statistic ($p < 0.001$) was obtained. The results of the simple regression tests showed that both student temperament and teacher-student relationship had significant relationships with student engagement, $F(2, 348) = 214.854$, $p < 0.001$, with adjusted R^2 value of 0.550.

Table 11 shows a linear equation constructed based on the unstandardised coefficients:

$$y = c + b^1 (x^1) + b^2 (x^2)$$

where:

y is the estimated student engagement score value;

c is the constant value (intercept);

b^1 is the regression coefficient (Student Temperament);

b^2 is the regression coefficient (Teacher-Student Relationship);

x^1 is the predictive variable score value (Student Temperament);

x^2 is the predictive variable score value (Teacher-Student Relationship).

Table 8

Model summary

Model	R	R^2	Adjusted R^2	SD
1	0.743 ^a	0.553	0.550	0.49974

Table 9
ANOVA^a

Model	Sum of Square	df	Mean Square	F	Sig.
Regression	107.316	2	53.658	214.854	<0.001 ^b
Residual	86.910	348	0.250		
Total	194.226	350			

a. Dependent Variable: Student Engagement; b. Predictors (Constant), Student Temperament, Teacher-Student Relationship.

Table 10
Coefficient table^a

	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	Beta	Std. Error	Beta		
Constant	0.884	0.224		3.950	<0.001
Student Temperament	0.129	0.066	0.071	1.963	0.050
Teacher-Student Relationship	0.710	0.035	0.736	20.477	<0.001

a. Dependent Variable: Student Engagement.

The regression analysis results in Table 10 show that there is a significant influence between student temperament, teacher-student relationship and student engagement, based on the following regression equation:

Student Engagement = 0.884 + 0.129 (Student Temperament) + 0.710 (Teacher-Student Relationship)

The prediction equation of student engagement was $0.884 + 0.129x^1 + 0.710x^2$. Based on the equation, student engagement level would increase by 0.129 and 0.710, respectively for each point increase in student temperament and teacher-student relationship. The simple regression test showed that both student temperament and teacher-student relationship had significant relationships with student engagement, $F(2, 348) = 214.854$, $p < 0.001$, with an adjustable R^2 value of 0.553. The results of the linear regression analysis showed that the model built had a significant F value ($p < 0.01$). This indicates that both student temperament and teacher-student relationship, in combination, can contribute to 55% of collective variance in student engagement. Therefore, null hypothesis 3 failed to be accepted and it was therefore concluded that both student temperament and teacher-student relationship can significantly predict student engagement.

The findings of this study suggest that the level of student temperament of Year 3 students is moderate, their teacher-student relationship is strong, and their engagement level is high. Based on the findings of the correlation analysis, a significant relationship between student temperament, teacher-student relationship and student engagement among Year 3 students was found. Meanwhile, the regression analysis also proves that both student temperament and teacher-student relationship can significantly predict student engagement level.

Altogether, three hypotheses were tested in this study and all 3 null hypotheses were rejected, as tabulated in Table 11.

Table 11

Conclusion of hypotheses testing

Hypotheses	Conclusion
Ho1 There is no significant relationship between student temperament and student engagement.	Rejected
Ho2 There is no significant relationship between teacher-student relationship and student engagement.	Rejected
Ho3 Student temperament and teacher-student relationship do not significantly predict student engagement level.	Rejected

Discussion

Temperament is a multifaceted approach focused on children's overall behaviour that considers their developmental stage, constitutional-psychobiological factors, and causality (Rothbart, 2011). Previous studies have linked temperament with various aspects of young children below six years old (Bryce et al., 2017). However, not many studies have linked temperament with students' engagement in primary school especially in the context of Asia. Based on the descriptive analysis performed, the results of this study showed that the level of effortful control in temperament was medium high among the lower level primary school students. In short, these statistical findings indicate that effortful control contributes positively to a higher level of student engagement even though the effect is weak. This is in line with the general perception that students who have a high level of effortful control are more likely to manage and focus their attention in class. In fact, in the context of this study, effortful control only had a minor impact on student engagement among the Year 3 primary students studying in schools within the Skudai zone of Johor. Overall, it was found that temperament had a significant but weak correlation with student engagement, which was largely contributed by the effortful control dimension. The findings of this study indicate that the variable of temperament is not the main factor affecting students' classroom engagement level. This finding contradicts the findings of Schmidt et al.'s (2020) study which demonstrated that student temperament played a major role in determining students' level of classroom engagement. The statistical results of their study were found to be inconsistent with the results of this present study.

For the construct of teacher-student relationship, this present study further confirms the findings of Ang et al.'s (2020) study where the study found that a high level of teacher-student relationship can predict student engagement in primary schools. Children are in a crucial stage of development and are highly dependent on the social and emotional support of their teachers to help them thrive in their academic and personal lives. Teacher-student relationship is critical for fostering a safe and supportive learning environment for students, and research has shown that a positive relationship between the teacher and the student can have a significant impact on the student's engagement and academic success (Hamre & Pianta, 2005; Roorda et al., 2011). In contrast, children's temperament, which is largely determined by genetics, can be more stable and less malleable to change through social experiences (Rothbart & Bates, 2006).

In this study, the students were able to improve their engagement in terms of behaviour, emotion, and cognition through their satisfaction level and the support provided by their teachers. However, the findings of this study are different from those of Buhs et al (2018) for the construct of student temperament, where the latter study found that student temperament can predict student engagement. Although this study failed to prove that student temperament uniquely predicts student engagement, the results of the correlation analysis showed that temperament did have a significant but weak relationship with student engagement. It is worth highlighting that the correlation strength between student temperament and student engagement was found to be much weaker, as compared to the strength of the correlation between teacher-student relationship and student engagement in primary schools.

Meanwhile, the results of the multiple regression analysis also indicate that teacher-student relationship better enhances the overall model fit, as compared to student temperament, which was found to have less predictive effect on student engagement. As such, student temperament is assessed to be a weak predictor of student engagement. This was supported by the finding that student temperament does not uniquely explain the variances in student engagement.

Conclusion

Based on the results of the analysis, the Year 3 students in this study generally exhibited moderate level of temperament, high level of teacher-student relationship and high level of student engagement. Teacher-student relationship was found to have a much stronger predictive effect on student engagement, as compared to student temperament, though both variables showed significant correlations of varying strengths with student engagement.

This study has a few key implications. First, it filled the knowledge gap identified in the literature pertaining to the topic of student temperament especially post Covid-19, which has not been widely explored in Malaysia. Second, the findings of this study provide State Education Department and the Ministry of Education Malaysia with valuable insights about the roles of student temperament and teacher-student relationship and its impact on student engagement during students' learning process in school. Third, the findings of this study can serve as a reference for stakeholders such as teachers, researchers, policy makers, and lecturers in further thinking about how these factors can be taken into consideration to generate a long-term effect, even after the students have moved into adolescence or adulthood.

To broaden the applicability of this study's findings, it is recommended that future studies could include Year 3 students from other states of Malaysia, which will generate a more comprehensive target population. Additionally, cultural factors should be further examined to assess if they have material impact on this instrument. Further studies could also focus on exploring the impact of other interpersonal relationships, such as relationship between students or relationship between students and parents, on the academic development of lower primary students.

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