Students' Locus of Control, Self-Efficacy and Perceived Teacher Efficacy on Mathematics Achievement in Guyana.

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ABSTRACT

Although researchers have reported the predictive impacts of locus of control, student self-efficacy, and perceived teacher efficacy, it was unclear how these variables predict the Mathematic performance of high school students in Guyana. The problem addressed in this study was that although Guyana's Ministry of Education has provided the requisite textbooks to every student, work sheets, past examination papers with solutions and televised mathematics lessons, secondary school students in Guyana are still performing poorly in the mathematics examination at the Caribbean Secondary Education Certificate (CSEC) examination. The purpose of this quantitative study was to determine if students' self-efficacy, locus of control, and perceived teacher self-efficacy predict students' achievement in mathematics. Correlational research design was adopted for this study. Data was collected using surveys from a sample of 154 girls and 145 boys. The instrument was face validated by three experts. The internal consistency of the questionnaire was determined using Cronbach Alpha method and coefficient of 0.82 was obtained. The findings on hypotheses revealed that The findings of the independent samples t-test indicated that there was no statistically significant difference in mathematics scores between genders ($M = 13.98$, $SD = 15.35$; $M = 14.45$, $SD = 12.39$), $t(297) = -0.30$, $p = .768$. These findings resulted in the rejection of Hypothesis 1 and suggest that gender was not a distinguishing factor in mathematics achievement within this sample of secondary school students in Guyana. The performance outcomes of male and female students appeared statistically comparable, indicating relative parity in mathematics achievement across genders.

Keywords: achievement gaps, gender, Guyana, performance

INTRODUCTION

Determining the effectiveness of a school is becoming increasingly prevalent. For this study school effectiveness is interpreted to mean those school that can ensure children leave the school with a least five CSEC subjects inclusive of Math and English. The fundamental objective of stakeholders is for students to receive acceptable grades on the Caribbean Secondary Education Certificate (CSEC) and evaluating the efficacy of secondary schools' aids in achieving this aim. Summative evaluation of candidates' performance is the primary function of CSEC, which is highly significant for teenagers since it opens doors to scholarship prizes, advanced education, and employment. While the Caribbean Examinations Council (CXC) permits each nation to determine its own acceptable grade range, most CXC member countries traditionally consider Grades I through III to be suitable for both work and admission to postsecondary education. Mathematics is one of the subjects taught at CSEC.

The Ministry of Education, Guyana has urged teachers and other stakeholders to strive for an increase in the percentage of Grades I-III. While 2020 garnered the best results in mathematics for the eight -year period (2016-2023), this improved performance in 2020, according to the Ministry of Education, may be because of teachers spending more time on working past examination papers since everyone was home due to the Covid 19 pandemic.

The academic success of students at different levels of learning may be influenced by different factors. For instance, Ozcan (2021) found that teachers' professional competence, guidance, and the learning environment significantly influence the student's academic success. Mappadang et al. (2022) found besides the quality of

learning and attitude towards learning, the students' academic achievement was also influenced by their interest in learning. In a blended learning institution, Castillo et al (2023) found a relationship between the student's academic performance and their study habits especially time management, taking notes, and setting goals. While research has focused on teacher support to enhance students' performance (Wang et. al 2022), and the influence of self-efficacy and optimism on student's overall academic performance (Usán et al. 2022), there is no documented research on these variables influence of students' academic achievement within the context of Guyana.

Statement of the Problem

The problem is that although Guyana's Ministry of Education has provided the requisite textbooks to every student, work sheets, past examination papers with solutions and televised mathematics lessons, secondary school students in Guyana are still performing poorly in the mathematics examination at the Caribbean Secondary Education Certificate (CSEC) examination. The Ministry of Education in Guyana revealed that even though the Math and English scores of high school students increased from 31.6% and 67.72% in 2021 to 34.26% and 70.84% in 2022, the Math score for children was still below the required pass rate. Supporting the report released by the Ministry of Education, Jagnandan and Jagnandan (2019) reported that the poor Math performance of students in Guyana was a result of poor mathematical preparation in institutions of learning. In addition, Roach (2023) reported that 52% of Caribbean students were enrolling in high school with low proficiency in Math.

Although researchers (Hajovsky, et al., 2020, Villa and Sebastian, 2021) have reported the predictive impacts of locus of control, student self-efficacy, and perceived teacher efficacy, it was unclear how these variables predict the Mathematic performance of high school students in Guyana. While Hettinger et al. (2023) found that teacher efficacy offers students emotional support which helped to increase their engagement and overall academic performance, more research is needed to investigate how perceived teacher efficacy predict secondary student's math performance. Usan et al. (2022) also found that self-efficacy and optimism might improve student's overall academic performance. However, they recommended further research on how self-efficacy and other psychological variables might influence the students' personal and academic achievement.

Purpose of the Study

The purpose of this quantitative study was to determine if students' self-efficacy, locus of control, and perceived teacher self-efficacy predict students' achievement in mathematics. The following were the objectives:

1. To help schools develop policies and strategies that might work to improve the student's math performance.
2. To examine whether the high school student's achievement in mathematics could be predicted by locus of control, perceived teacher self-efficacy, and student self-efficacy.
3. To improve the high school student's self-efficacy, locus of control, and perceived teacher self-efficacy for improved math performance.
4. To explore how the student's perception of their teacher's self-efficacy informs their math performance.

Research Questions and Research Hypotheses

The following research questions were formulated to guide the study:

RQ1. How much does students' self-efficacy at two secondary schools in Guyana influence their maths achievement?

RQ2. In two secondary schools in Guyana, how much do pupils believe their teachers' self-efficacy to predict their maths achievement?

RQ3. How much does the locus of control of students in the two secondary schools in Guyana predict their maths achievement?

Hypotheses

The following hypotheses were tested:

H10. The student's self-efficacy does not predict their achievement in mathematics in the two secondary schools in Guyana.

H1a. The student's self-efficacy predicts their achievement in mathematics in the two secondary schools in Guyana.

H20. Students perceive teacher self-efficacy not to predict their achievement in mathematics in two Secondary Schools in Guyana.

H2a. In two secondary schools in Guyana, students believe that their maths achievement is predicted by the self-efficacy of their teachers.

H30. In Guyana's two secondary schools, students' locus of control does not predict their maths proficiency.

H3a. In the two secondary schools in Guyana, the locus of control of the students indicates how well they will perform in mathematics.

METHODOLOGY

The researcher employed a correlational research design, which was appropriate for examining the strength and direction of relationships among variables without manipulating them (Bloomfield & Fisher, 2019). This design was used to investigate whether students' self-efficacy, locus of control, and perceived teacher efficacy predict students' achievement in mathematics across two secondary schools. A quantitative methodology was used to allow for the collection and analysis of numerical data to test hypotheses and evaluate theoretical relationships through statistical methods (Djamba & Neuman, 2002). It emphasizes objective measurement, numerical analysis, and statistical inference derived from data collected through structured instruments such as questionnaires and academic performance records (Peterson, 2000).

The researcher collected the data through a survey. Survey is widely utilized in educational, social, and behavioural research for gathering information from a defined population about attitudes, perceptions, behaviours, or characteristics (Lindell & Whitney, 2001). Survey was appropriate for this study since it is not only unpretentious, but a successful in collecting data anonymously from the participants which can be generalized to the wider population. It was particularly appropriate when the goal is to describe patterns, examine relationships among variables, or test theoretical models across a relatively large sample (Creswell & Plano Clark, 2018). For instance, in a study to determine students' attitudes regarding the tracking of teenagers engagement on social platforms, researchers Burke et al. (2024) employed surveys using a mixed method approach to assess the teenagers perceptions across multiple stakeholder groups, demonstrating the effectiveness of survey design in capturing diverse perspectives within educational settings. Additionally, a survey allowed the researcher to collect standardized data efficiently from a broad group of respondents. This approach offers several key advantages: it permits measurement of different variables and facilitates comparisons across subgroups, and gives quantitative data to determine tendencies, associations, or group differences. It also supports anonymity, which is especially important when investigating sensitive topics, such as determining whether students perceive their teacher to be competent or not. In addition, using the survey helped to avoid bias as it is the participants who are rating the degree of their agreement with the statements posed.

Next, the researcher applied correlation analyses which was used to investigate the relationship and direction among the independent and dependent variables in two secondary schools. The correlational research selected

for this study aligns with the objectives which is to investigate the direction and strength of the relationship between the independent and dependent variables in two secondary schools. Bloomfield and Fisher (2019) asserted correlation is a type of research used to study the association among variables without trying to change or control them. Through this methodology, the researcher did not manipulate any variable but focused on how they associate with each other to help the researcher to understand whether variables are related and if that relationship is strong or weak, and whether it moves in a positive or negative direction. For example, the correlation analysis determined if there is any association among the independent variables and the dependent variables- perceived teacher efficacy with their academic achievement in Mathematics at CSEC examination. Once the association is established between/ among variables, the researcher attempted to simulate the link between two variables. Correlational research was also appropriate for this study as the researcher did not randomly assign participants into control and intervention groups as in experimental and quasi-experimental designs. Since correlation does not equal causation, the researcher used multiple linear regression which is appropriate since the relationship between the dependent and independent variables is linear. Regression analysis was particularly useful since the dependent variable might be influenced by several factors. To explain the student academic achievement in Mathematics at the CSEC, or the dependent variable, the researcher employed one of the independent variables to determine the predictability of each of the dependent variable. It is important to note that a strong association between one or more of the independent variables and the dependent variable for the predictive relationship to be statistically significant.

To collect data, a questionnaire was developed to capture data on the core constructs of interests in the study. The questionnaires contain both closed items (such as Likert scale statements) including demographic questions such as gender, age group, class grouping, to collect background information on the participants. Likert-type scales are typically used to assess agreement or frequency on various statements, as they are well-suited for capturing attitudes, beliefs, and self-reported behaviors. The researcher has chosen to use the Likert scale-type questions in a questionnaire because it offers several advantages, making them a valuable tool in survey research. These scales are not simple and easy to understand, increasing the likelihood of accurate responses. Additionally, the Likert scale offers flexibility in its design, which allows the researcher to tailor it according to the study's need which provides reliable and dependable results especially when more than one item is used to test each of the construct. The researcher intends to utilize the data produced from the Likert scales to conduct studies, including factor analysis, regression, and correlation, which may reveal more profound insights and linkages within the data. Finally, the researcher has chosen the Likert scale because it is an efficient data collection tool which follows a simplified format and allows the participants to respond immediately. which can be easily digitized and processed using tools such as Statistical Package for Social Sciences (SPSS).

To ensure the instrument's internal consistency, statistical analysis was conducted, with particular emphasis on the Cronbach's alpha coefficient. The researcher aimed for a Cronbach's alpha of 0.80 or higher, a threshold generally regarded as indicative of excellent reliability. The researcher is pleased to report that each of the variables yielded a reliability score of .80 or higher: Locus of Control 0.80, Students Self Efficacy .083, Teacher Efficacy 0.87, Perceived Achievement 0.87. Since the reliability did not fall below the established standard, there was no need for iterative revisions and retesting. In addition to reliability testing, the researcher established face and content validity through expert review. Subject matter experts were invited to critically evaluate the questionnaire to ensure that it appears, on the surface, to measure the intended constructs (face validity) and that the items comprehensively encompassed all relevant dimensions of the research domain (content validity). Feedback from these experts were used to further inform the refinement of the questionnaire to maximize its validity and overall methodological rigor.

In addition, the researcher used longitudinal data from the Mathematics Annual Examination (2024) scores as a measure of students' achievement (Ministry of Education- Guyana, CXC Reports and Statistics 2016 - 2024). The data was then quantified and analyzed through a computerized statistical programme (SPSS).

Construct validity of the psychological instruments measuring locus of control, self-efficacy, and teacher efficacy was established through Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). EFA was conducted to identify the underlying factor structure, while CFA was used to confirm the measurement

model and assess model fit using established fit indices (e.g., CFI, TLI, RMSEA, and SRMR). Reliability and validity were further evaluated through factor loadings, composite reliability, and average variance extracted measures. Following instrument validation, independent samples *t*-tests, Pearson correlation analyses, and multiple regression analyses were conducted to test the study hypotheses regarding gender differences, relationships among psychological constructs, and predictors of actual and perceived academic achievement. Items with factor loadings below .40 or substantial cross-loadings were removed. CFA was subsequently performed to confirm the factor structure and evaluate the measurement model using standard fit indices, including the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

This study targeted the full population of Grade 10 students (N = 1,299) enrolled in the 11 public secondary schools across Guyana, with one school representing each of the country's eleven educational districts. The cohort consists of 670 girls and 629 boys, all of whom are registered to write the Caribbean Secondary Education Certificate (CSEC) Mathematics examination in 2026. By focusing on this specific academic group, the study ensures alignment between participants' imminent high-stakes assessment and the study's goal of predicting mathematics achievement. Uniform exposure to the national mathematics curriculum and similar developmental stages also served to reduce extraneous variability and bolster the study's internal validity (Abbas et al., 2025). The inclusion criteria for participants in this study are: enrollment in Grade 10 during the 2024–2025 academic year, registration for the 2026 CSEC Mathematics exam, and provision of informed assent and parental consent. Students with mild or emerging needs was also included with accommodations, whereas those with more severe, medically diagnosed disabilities requiring substantially different educational environments were excluded, as their educational contexts would not reflect the mainstream cohort's experience.

Power analysis was conducted to ensure the sample size of 299 provides sufficient statistical power (1 - β) to detect expected effect sizes in multiple regression analyses. Assuming a moderate effect size ($f2 = 0.15$) and a significance level of $\alpha = 0.05$, a sample size of approximately 138 would be sufficient to detect effects with power = 0.80 for three predictors. With 299 participants, the study exceeds this requirement, thereby allowing for subgroup analysis (e.g., by gender or region) without compromising statistical power (Wang et al., 2024). Stratification was chosen because of the recognized differences in gender-related academic performance and psychological constructs such as self-efficacy and locus of control. Literature in Caribbean and international education has consistently reported gender-based achievement gaps, particularly in mathematics (UNESCO Institute for Statistics, 2022). Stratified sampling ensures each gender is adequately represented in the sample, enabling valid comparative analyses and contributing to the study's generalizability.

Following stratification, students were selected using a random number table. A unique identifier was assigned to each student in both strata. Random number sequences were generated to identify the 154 girls and 145 boys who were included in the study. This procedure ensures that all participants within each stratum have an equal probability of being selected, thereby reducing selection bias and maintaining fairness (Sarah Lee, 2025). The sample was demographically representative of the broader population in terms of gender and geographic distribution. Each of the 11 educational districts was included, ensuring that regional variations are captured. The gender distribution of the sample mirrors that of the population (51.6% girls and 48.4% boys). Such representativeness strengthens the external validity of the study, enabling generalization of findings to the national. The study received ethical approval from the Unicaf University Research Ethics Committee (UREC) prior to the commencement of any data collection activities. Ethical approval ensured that the research complied with internationally accepted standards for research involving human participants and that all procedures protected the rights, dignity, welfare, and privacy of participants. No data were collected until approval had been granted and all necessary permissions had been secured from the relevant educational authorities.

RESULTS

This section analyses the data collected from a sample of 299 students (N=299 and is structured to follow a logical progression of analysis. It begins with a profile of the participants' demographic characteristics and an assessment of the composite scales. This is followed by a verification of parametric assumptions, including

normality and homogeneity of variance. The remainder of the section is dedicated to the inferential statistical tests including linear regressions required to evaluate each hypothesis. The presentation of results is organized systematically to address the following five hypotheses established in the research design:

1. **H1:** There will be a significant difference between boys' and girls' actual achievement.

2. **H2:** There will be a significant difference between boys' and girls' perceived achievement.

3. **H3** (Exploratory): The psychological constructs: locus of control, self-efficacy, and teacher efficacy) will be significantly inter-correlated.

4. **H4:** Psychological constructs: locus of control, self-efficacy, and teacher efficacy and gender will significantly predict actual academic achievement.

5. **H5:** Psychological constructs: locus of control, self-efficacy, and teacher efficacy and gender will significantly predict student perceived achievement.

A total of 299 secondary school students from 11 educational districts in Guyana were sampled (N = 299). As shown in Table 1, the gender distribution of the sample was relatively balanced, with slightly more female participants (n = 154, 51.5%) than male participants (n = 145, 48.5%). The age distribution reveals that the sample is primarily composed of older secondary students. The largest group consisted of students aged 15-to-under-16 years (n = 205, 68.6%).

This was followed by students in the 14-to-under-15 years category (n = 71, 23.7%), while the 13-to-under-14 years group represented the smallest portion of the sample (n = 23, 7.7%). Regarding geographical distribution, approximately 69.9% (n = 209) of the participants were in urban, capital, or coastal regions. The remaining 30.1% (n = 90) represented students from hinterland regions (regions 1, 7, 8, and 9). The largest single district representation came from region 4 (14.0%), while regions 1, 8, 9, and 10 each contributed exactly 7.0% (n = 21) to the total sample.

Characteristic	n	%
Gender		
Male	145	48.5
Female	154	51.5
Age Group		
13 – under 14 years	23	7.7
14 – under 15 years	71	23.7
15 – under 16 years	205	68.6
Geographical Region Type		
Hinterland	90	30.1
Urban/Capital/Coastal	209	69.9
Educational District		
1	21	7
2	28	9.4
3	34	11.4
4	42	14
5	22	7.4
6	26	8.7
7	27	9
8	21	7

9	21	7
10	21	7
11 Georgetown (Capital)	36	12

Hypothesis 1: There will be a significant difference between boys' and girls' actual academic achievement.

The findings of the *t*-test indicated that there was no statistically significant difference in math scores between male students (M = 13.98, SD = 15.35) and female students (M = 14.45, SD = 12.39), $t(297) = -0.30$, $p = .768$) in actual achievement in mathematics. These findings contributed to the rejection of hypothesis number 1 and suggested that gender does not play a significant role in determining mathematics achievement within this specific cohort of sampled secondary school Guyanese students. This finding contributes to the continuous discussion in the literature regarding the gender gap in academic achievement, especially in mathematics scores among female and male students in Guyana. While some prior research suggests male having an advantage over female students in mathematics achievement, current studies have demonstrated a reduction in the gender gap in terms of mathematics performance within the majority of educational settings (Gottfredson et al., 2020; Maamin et al., 2021).

The results disconfirm previous studies, which indicated that mathematics is perceived as a masculine domain by society. For instance, Maamin et al. (2021) established a corresponding positive and negative relationship between students' cognitive, affective, and behavioral engagement and mathematics achievement and discovered that female students are subjected to educational stereotypes. Parents, teachers, and peers develop negative attitudes towards girls in mathematics because of social and cultural barriers that prevent girls from engaging in what is traditionally a male preserve (León-Mantero et al., 2020), as girls are particularly excluded from educational activities with science and mathematics. However, the current study findings revealed that gender does not play a significant role in determining mathematics achievement within this specific cohort of sampled secondary school Guyanese students.

Moliner and Alegre (2020) established that cultural stereotypes play a role in excluding female students and eroding their attitudes toward the math subject. As a result, it is essential to promote the principles of effective teaching and learning that should involve all students without discriminating against them by their gender or cultural background and develop a positive attitude towards mathematics for all students. This aligns with current study findings that gender does not play a significant role in academic performance among female and male students. The result is also consistent with those of Hay et al. (2022), who did not find any statistical significance between gender and math performance. Similarly, Alam et al. (2022) reported that higher levels of self-efficacy improved the math performance of students in general, even though male students have higher levels of self-efficacy when compared to female students.

The lack of gender gap in the current study findings is consistent with the growing perceptions and reflects the need for effective reforms in the education sector to enhance access to study resources and policies that change expectations of society about the place of female students in science subjects such as mathematics. This may affect the relationship between gender and academic performance among students in Guyana.Yet, it is vital to consider that the lack of significance in the gender differences and academic performance in mathematics may not suggest that equity in every aspect of learning among students. Although some minor differences may be noticed in classroom engagement, career aspirations, and attitude towards the subject, may exist but were not involved within this research's scope. Generally, H1 gender did not determine mathematics achievements among students, suggesting the need to focus on different predictors, including instructional and psychological variables.

Hypothesis 2: There will be a significant difference between boys' and girls' perceived achievement.

Research data revealed that male students (M = 3.23, SD = 0.78) and female students (M = 3.24, SD = 0.80) reported nearly identical levels of perceived achievement. The resulting *t*-statistic was non-significant, t (297) = -0.17, p = .862. These results indicate that gender does not significantly influence students' subjective evaluations

of their academic performance in mathematics. This result is of significant note as previous empirical literature indicates that gender differences may be a key factor in the perception of performance rather than the actual achievement (Díez-Palomar et al., 2020). Some research findings indicated that male students tend to perceive high achievement in mathematics despite having the same performance levels (Díez-Palomar et al., 2020). Still, the findings of the current study have challenged this assumption, indicating that female and male students may have had the same perceptions about their academic achievement. However, Musengimana et al. (2021) found that gender, instructional methods, grade level, and parental attitudes are the main determinants, where parental perception of education has a unique role in enhancing a positive attitude. The parents' educational expectations are also positively associated with students' educational attitudes and students' achievements in mathematics and sciences that the parents care about (Díez-Palomar et al., 2020).

The current study may imply a shared education context that promotes the same approaches to feedback on academic achievement expectations and experiences in the classroom for both genders. Comparable resource and academic reinforcement from educators implies that students' self-evaluation is more likely to be consistent regardless of their gender. In addition, the non-significance in gender differences for perceived achievement reflects a change in cultural perceptions about gender equity in the educational context. The traditional stereotypes about gender may not be internalized by student concerning their ability in various subjects, such as mathematics, as it has been done by prior generations. Therefore, rejecting H2 supports the conclusion from H1 that gender does not play a significant role in determining mathematics achievement within this specific cohort of sampled secondary school Guyanese students. Therefore, schools should enforce interventions that target factors that may affect all students as opposed to basing them on gender-specific interventions.

Hypothesis 3: The psychological constructs: locus of control, students self-efficacy and perceived teacher efficacy will be significantly inter-correlated.

The findings indicated that there was a moderate negative correlation between Locus of Control and Students' Self-Efficacy (r = -.493, p < .001), suggesting that as scores on the locus of control scale increased, students' belief in their own capability tended to decrease. However, Perceived Teacher Efficacy demonstrated significant positive correlations with both Locus of Control (r = .287, p < .001) and Students' Self-Efficacy (r = .529, p < .001). The strongest relationship was observed between Teacher Efficacy and Self-Efficacy, indicating that students who perceived their teachers as highly effective also tended to report higher levels of personal academic self-efficacy. These findings are consistent with previous research, which indicated that perceived teacher efficacy was found to influence the students' academic performance (Alibakhshi et al., 2020). Alibakhshi et al. (2020) reported that teachers with higher levels of self-efficacy positively impacted student performance compared to teachers with low self-efficacy. In emergency online learning, Huang and Wang (2023), while investigating academic self-efficacy, teacher support, and academic achievement, found that teacher efficacy positively influences and enhances the students' academic performance.

The findings demonstrate how interconnected psychological experiences of students are within education setting. The positive correlation between students' self-efficacy and perceived teacher efficacy implies that students who see their educators as effective tend to develop confidence in their learning abilities. The negative link between locus of control and students' self-efficacy fosters the significance of students' internal psychological structure. The results suggest that students with increased locus of control tend to show reduced self-efficacy levels, suggesting that the lack of perceived individual urgency may limit confidence levels in academic achievement among students. This shows that psychological variables are interconnected in affecting students' academic outcomes and thus suggests the prominence of addressing several psychological factors at the same time when developing effective interventions in the educational context.

Hypothesis 4*:* Psychological constructs of locus of control, students' self-efficacy and perceived teacher efficacy and gender will significantly predict students' actual academic achievement.

The multiple linear regression model was not statistically significant, F (4, 294) = 0.282, p = .889. None of the individual predictors were significant contributors to the model, suggesting that gender (p = .719), locus of control (p = .482), self-efficacy (p = .319), and teacher efficacy (p = .388) failed to significantly predict math

scores. These findings suggest that psychological perceptions and gender are not strong indicators of actual objective performance in mathematics among students, implying that the combined impact of self-efficacy, perceived teacher efficacy, locus of control, and gender failed to explain the difference in actual scores in mathematics among students.

Given that 0.815 is much greater than .05, there is no significant difference in variance between males and females for locus of control indicating similar variability. Therefore, the assumption of equal variances was satisfied. For students' self-efficacy, since .480 > .05, the variances are considered equal across gender groups, and the spread of self-efficacy scores was similar for males and females. With regards to Perceived Teacher Efficacy, (F = 0.930; p = .336), again, .336 > .05. Therefore, equal variances are assumed, indicating consistent variability between groups. 4. For Students' Perceived Achievement, F = 0.001; p = .970, this p-value is extremely high, suggesting the variances between males and females were almost identical. Finally for total math score, F = 3.388; p = .067. Although this p-value is closer to .05, it is still greater than .05.

Therefore, the assumption of equal variances is still considered met, and the difference in score variability between males and females is not statistically significant. Therefore, the variability of scores was statistically similar across male and female students for all study variables, and the assumption of homogeneity of variance was satisfied. Because all p-values exceeded the standard alpha level of .05, the null hypothesis of equal variances was retained, indicating that the assumption of homogeneity of variance was met. The multiple regression analysis revealed that the predictor variables collectively explained only a negligible proportion of variance in mathematics achievement (R^2 = .004). The overall model was not statistically significant, F(4, 294) = 0.282, p = .889, indicating that gender, locus of control, students' self-efficacy, and perceived teacher efficacy did not significantly predict mathematics achievement among the sampled secondary school students. Furthermore, none of the individual predictors made a statistically significant contribution to the model. These findings suggest that the variables examined were weak predictors of objective mathematics performance within this cohort.

There was statistical significance, F (4, 294) = 362.58, $p < .001$, explaining 83.1% of the variance in students' perceived achievement. Three of the four predictors were significant individual contributors to the model: Locus of Control (B= .72, $p < .001$), Students' Self-Efficacy (B= .44, $p < .001$), and Perceived Teacher Efficacy (B = .55, $p < .001$).

This result is unforeseen because it contradicts previous literature indicating that psychological factors predict academic achievement among students. Contrary to this finding, Hayat et al. (2020) noted that a sense of self-efficacy was associated with positive learning emotions and meta-cognitive learning strategies, which improved the students' academic performance. Similarly, Usán et al. (2022) indicated that students who were optimistic with high levels of self-efficacy reported improved academic performance through personal development and adaptive behaviors in the classroom. Further, Luo et al. (2023) reiterated that how students perceived their abilities to perform academic tasks influenced their overall academic success. The lack of a significant predictive association indicates that, in this sample of data, other factors that were not included may be predictors of actual academic achievement among students in Guyana.

The unexpected finding may have various interpretations. Contextual factors and structural factors, including difficulty of the curriculum, designs of assessment and evaluation, quality of instruction, and resource accessibility to students may influence actual academic achievement or performance among students. While psychological constructs may influence engagement, their impact may not be immediate to influence academic performance among students. This shows a limitation in assuming a direct association between academic achievement and psychological factors.

Hypothesis 5*:*Psychological constructs of locus of control, students' self- efficacy and perceived teacher efficacy and gender will significantly predict students' perceived achievement.

The results of the multiple regression indicated that the model was highly significant, F (4, 294) = 362.58, $p <$ .001, and that Locus of Control (B= .72, $p < .001$), Students' Self-Efficacy (B= .44, $p < .001$), and Perceived

Teacher Efficacy (B = .55, p < .001) were significant predictors of perceived achievement. However, student gender was not a significant predictor (p = .536). These results indicate that when students feel in control of their learning, believe in their own abilities, and perceive their teachers to be competent, their subjective sense of academic achievement increases. This finding suggests that self-efficacy, locus of control, teacher efficacy, or effectiveness influence student performance within the educational context.

The findings contribute to empirical literature, which indicates that mathematics self-efficacy is related to the students' ability to appraise themselves, set performance targets, and engage in activities that would improve their engagement and performance in mathematics (Zakariya, 2022). Moreover, Pendon (2022) established that self-efficacy was associated with high mathematics performance among the student population. Additionally, the findings also align with those of Hopkins et al. (2020), who reported that self-efficacy and locus of control positively influenced the students' academic and cognitive development. Self-efficacy. Hajovsky et al. (2020) also reported that teacher-student relationships, as a result of self-efficacy, improved the students' performance in mathematics. Consistent with the current study's findings, Oppermann and Lazarides (2021) indicated that teachers' self-efficacy beliefs predicted the support they offered to students and consequently improved their performance. Hettinger et al. (2023) contended that teacher self-efficacy positively predicted student engagement and emotional support. The current study findings provide insight into how student who feel confident, view their educators as effective, and believe in their control over outcomes tend to have a positive perception about their performance regardless of the score. This study has addressed the gap in the literature that for the secondary schools in Guyana, it was not known how perceived teacher self-efficacy predicts the students' mathematics performance in the CSEC examination. Therefore, by demonstrating how perceived teacher self-efficacy predicts mathematical achievement among students, school administrators may also develop strategies that could help teachers improve their self-efficacy for the benefit of their students.

DISCUSSION OF FINDINGS

Hypothesis 1: There will be a significant difference between boys' and girls' actual academic achievement.

The findings of the independent samples t-test indicated that there was no statistically significant difference in mathematics scores between genders (M = 13.98, SD = 15.35; M = 14.45, SD = 12.39), t(297) = -0.30, p = .768. These findings resulted in the rejection of Hypothesis 1 and suggest that gender was not a distinguishing factor in mathematics achievement within this sample of secondary school students in Guyana. The performance outcomes of male and female students appeared statistically comparable, indicating relative parity in mathematics achievement across genders.

The findings contribute to the ongoing discourse surrounding gender differences in mathematics achievement. While earlier studies frequently reported that mathematics was viewed as a male-dominated subject area, more recent literature has suggested that gender gaps in mathematics achievement have gradually narrowed across many educational contexts (Gottfredson et al., 2020; Maamin et al., 2021). The current findings are in keeping with the trend and may reflect gradual improvements in educational access, classroom participation, and societal expectations concerning the role of females in science and mathematics education. Previous literature suggested that female students were often disadvantaged by cultural stereotypes that portrayed mathematics as a masculine domain. For example, Maamin et al. (2021) reported that female students were more vulnerable to educational stereotypes that influenced their engagement and confidence in mathematics. Similarly, León-Mantero et al. (2020) noted that social and cultural barriers often contributed to negative attitudes toward girls' participation in mathematics and science-related subjects. In contrast, the findings of the present study indicate that such gender-based disparities were not evident within this sample of Guyanese secondary school students.

The findings are also consistent with Moliner and Alegre (2020), who argued that educational reforms and inclusive teaching practices can reduce the influence of gender stereotypes in mathematics classrooms. Similarly, Hay et al. (2022) found no statistically significant relationship between gender and mathematics performance. Alam et al. (2022) also reported that although male students may demonstrate slightly higher levels of self-efficacy, both genders were capable of achieving comparable mathematics outcomes when provided with

appropriate educational support. The absence of significant gender differences may reflect gradual shifts within the Guyanese educational system toward more equitable learning opportunities for male and female students. These findings suggest that students may now be experiencing more comparable instructional support, classroom expectations, and access to educational resources regardless of gender. From an educational perspective, the findings imply that the Guyanese school system may be fostering a relatively balanced learning environment in which both genders have similar opportunities to excel academically in mathematics.

Nevertheless, the absence of statistically significant gender differences does not necessarily imply complete equity across all dimensions of learning. Differences may still exist in areas such as classroom participation, confidence levels, subject preferences, career aspirations, or attitudes toward mathematics, but these variables were beyond the scope of the current study. Overall, the rejection of Hypothesis 1 suggests that mathematics achievement among this cohort of Guyanese students may be influenced more strongly by other instructional, contextual, or psychological factors than by gender alone. The findings have important implications for educational practice and policy. Since achievement differences were not associated with gender, interventions aimed at improving mathematics performance may be more effective when focused on instructional quality, student engagement, motivation, and psychological support rather than gender-specific remediation programmes. The findings also reinforce the importance of maintaining equitable educational opportunities for both male and female students within the Guyanese education system.

Hypothesis 2: There will be a significant difference between boys' and girls perceived achievement.

The findings revealed that both genders ($M = 3.23$, $SD = 0.78$; $M = 3.24$, $SD = 0.80$) reported nearly identical levels of perceived achievement $t(297) = -0.17$, $p = .862$. Consequently, Hypothesis 2 was rejected, suggesting that gender did not significantly influence students' subjective perceptions of their mathematics achievement. This finding is noteworthy because previous research often suggested that gender differences may be more evident in students' perceptions of achievement than in actual academic performance (Díez-Palomar et al., 2020). Some studies reported that male students tended to perceive themselves as more academically competent in mathematics even when actual achievement levels were similar to those of female students. However, this study challenge this assumption by indicating that both male and female students possessed comparable perceptions of their academic performance.

The findings may reflect a relatively balanced educational environment in which students receive similar academic expectations, feedback, encouragement, and reinforcement regardless of gender. As a result, both male and female students may develop comparable perceptions regarding their mathematics competence and academic success. From a social cognitive perspective, students' self-perceptions are shaped by environmental feedback, classroom experiences, and social reinforcement. Therefore, the absence of gender differences in perceived achievement suggests that students within this educational setting may be receiving relatively similar efficacy-related messages and support systems. Although Musengimana et al. (2021) identified gender, instructional methods, grade level, and parental attitudes as influential factors in student achievement, the present findings suggest that gender may not be a dominant determinant of students' academic self-perceptions within this context. Similarly, Díez-Palomar et al. (2020) reported that parental educational expectations positively influence students' attitudes and performance in mathematics and science. It is therefore possible that changing societal expectations regarding gender and education in Guyana may be contributing to more balanced student self-perceptions across genders.

The rejection of Hypothesis 2 further reinforces the conclusion from Hypothesis 1 that gender-based disparities were not evident in either actual or perceived mathematics achievement among this sample of Guyanese secondary school students. These findings imply that interventions designed to improve students' perceptions of academic competence should focus more broadly on enhancing classroom support, instructional quality, academic motivation, and psychological empowerment for all students rather than targeting one gender specifically.

Hypothesis 3: The psychological constructs pf locus of control, self-efficacy and perceived teacher efficacy will be significantly inter-correlated.

The findings indicated significant relationships among the psychological constructs examined in the study. A moderate negative correlation was found between locus of control and students' self-efficacy ($r = -.493$, $p < .001$), suggesting that as scores on the locus of control scale increased, students' confidence in their academic abilities tended to decrease. Because higher scores on the locus of control scale reflected greater externality, the findings suggest that students who attributed academic outcomes to external forces were more likely to report lower levels of academic self-efficacy. Perceived teacher efficacy demonstrated significant positive relationships with both locus of control ($r = .287$, $p < .001$) and students' self-efficacy ($r = .529$, $p < .001$). The strongest relationship was observed between perceived teacher efficacy and self-efficacy, indicating that students who viewed their teachers as effective and supportive also tended to demonstrate stronger confidence in their own academic capabilities.

The results of this study reinforce existing evidence highlighting the contribution of teacher support and student self-beliefs to academic development. Students who perceive their teachers as effective may be more inclined to develop stronger academic confidence, which can positively influence their learning experiences. Similarly, Alibakhshi et al. (2020) observed that higher levels of teacher self-efficacy were linked to more favorable student achievement outcomes, underscoring the importance of teacher-related factors in promoting academic success., while Huang and Wang (2023) reported that teacher support and efficacy enhanced students' academic self-efficacy and performance during emergency online learning. The findings highlight the interconnected nature of psychological variables within the educational environment. The relationship between students' self-efficacy and perceived teacher efficacy suggests that supportive and effective teaching practices may contribute significantly to students' confidence and motivation. Likewise, the negative relationship between external locus of control and self-efficacy underscores the importance of fostering students' sense of personal responsibility and agency in learning.

These findings imply that psychological variables should not be viewed in isolation within educational settings. Rather, interventions designed to improve mathematics engagement and achievement may be more effective when they simultaneously address students' confidence, motivational beliefs, perceptions of instructional support, and sense of personal control over learning outcomes. Consequently, educators and school leaders should consider implementing holistic support systems that strengthen both students' psychological resilience and classroom learning experiences.

Hypothesis 4: Psychological constructs of locus of control, self-efficacy and perceived teacher efficacy and gender will significantly predict actual academic achievement.

The results of the multiple linear regression analysis revealed that the overall model was not statistically significant $F(4, 294) = 0.282$, $p = .889$. Furthermore, none of the independent variables significantly contributed to predicting mathematics achievement, as gender ($p = .719$), locus of control ($p = .482$), self-efficacy ($p = .319$), and perceived teacher efficacy ($p = .388$) all failed to emerge as significant predictors of mathematics scores. These findings imply that neither gender nor the psychological variables examined served as strong predictors of students' actual mathematics performance. Overall, the combined influence of self-efficacy, perceived teacher efficacy, locus of control, and gender did not significantly explain differences in students' mathematics achievement scores.

This result is unforeseen because it contradicts previous literature indicating that psychological factors predict academic achievement among students. Contrary to this finding, Hayat et al. (2020) observed that the efficacious students were correlated with positive learning emotions and meta-cognitive learning strategies, which improved the academic performance of students. Similarly, Usan et al. (2022) indicated that students who were optimistic reported improved academic performance through personal development and adaptive behaviors in the classroom. Further, Luo et al. (2023) reiterated that how students perceived their abilities to perform academic tasks influenced their overall academic success. The lack of a significant predictive association indicates that, in

this sample of data, other factors that were not included may be predictors of actual academic achievement among students in Guyana.

The unexpected finding may have various interpretations. Contextual factors and structural factors, such as curriculum, designs of assessment, evaluation, quality of instruction, and resource accessibility to students may influence actual academic achievement or performance among students. While psychological constructs may influence engagement, their impact may not be immediate to influence academic performance among students. This shows a limitation in assuming a direct association between academic achievement and psychological factors.

None of the predictor variables, including gender ($p = .719$), locus of control ($p = .482$), students' self-efficacy ($p = .319$), and perceived teacher efficacy ($p = .388$), significantly predicted actual mathematics achievement. These findings indicate that the combined influence of the psychological variables and gender failed to explain variations in students' mathematics scores within this sample. The finding was unexpected given the substantial body of literature linking psychological constructs to academic achievement. Previous studies suggested that self-efficacy, locus of control, and teacher support were important predictors of academic success. Evidence from previous studies also supports the role of self-efficacy in fostering positive academic outcomes. Students who possess greater confidence in their ability to succeed are often more willing to engage in effective learning strategies, persevere when faced with challenges, and take an active role in their learning. Consistent with this perspective, Hayat et al. (2020) found that self-efficacy was positively associated with the use of productive learning strategies and higher academic achievement. Likewise, Usán et al. (2022) reported that students with stronger self-efficacy beliefs tended to exhibit more constructive classroom behaviors, which were associated with better academic performance. Luo et al. (2023) also noted that students' beliefs about their academic capabilities significantly influenced educational outcomes.

The absence of a statistically significant regression model indicates that the influence of psychological factors on mathematics performance may not be direct or universal, but rather shaped by contextual and interacting variables. This finding suggests that students' academic outcomes in mathematics are likely influenced by a broader range of factors beyond the psychological constructs examined in this study. A particularly noteworthy outcome was the contrast observed between actual mathematics achievement and students' perceptions of their achievement, highlighting the possibility that the factors associated with how students evaluate their academic success may differ from those that influence their measured performance While psychological constructs strongly predicted students' perceptions of their academic competence, they did not significantly predict objective mathematics examination scores. This suggests that psychological experiences may shape students' confidence, motivation, and self-perceptions more readily than measurable academic outcomes.

Several contextual and structural factors may help explain these findings. In the Guyanese educational context, external influences such as curriculum difficulty, examination pressure, instructional quality, school resources, socioeconomic disparities, and unequal access to academic support may exert stronger effects on mathematics performance than psychological perceptions alone. Additionally, because mathematics achievement was measured using objective examination scores, performance may have been influenced by factors extending beyond individual confidence or perceptions of teacher effectiveness. The findings highlight the complexity of academic achievement and suggest that educational performance cannot be explained solely through psychological variables. Instead, mathematics achievement may reflect the interaction of multiple personal, instructional, environmental, and systemic influences. Consequently, the findings imply that efforts to improve mathematics performance in Guyana should adopt a broader approach that addresses not only students' psychological experiences but also curriculum delivery, instructional practices, educational resources, and systemic barriers to achievement.

Hypothesis 5: Psychological constructs of locus of control, self-efficacy, perceived teacher efficacy and gender will significantly predict student perceived achievement.

The multiple regression analysis demonstrated that the combined set of predictor variables significantly explained variation in the dependent variable, as evidenced by the statistically significant overall model, $F(4,$

294) = 362.58, p < .001. This result suggests that the predictors, taken together, contributed meaningfully to understanding differences in the outcome measure. Locus of control (B = .72, p < .001), students' self-efficacy (B = .44, p < .001), and perceived teacher efficacy (B = .55, p < .001) emerged as significant predictors of perceived achievement, while gender was not a significant predictor (p = .536). These results indicate that students who felt more confident in their academic abilities, perceived greater control over learning outcomes, and viewed their teachers as effective were more likely to report positive perceptions of their academic achievement. Zakariya (2022) reported that mathematics self-efficacy was associated with students' ability to set academic goals and engage meaningfully in mathematics learning activities. Pendon (2022) similarly found that self-efficacy positively influenced mathematics performance among students.

The regression analysis showed that the overall model was statistically significant., F(4, 294) = 362.58, p < .001. Further analysis showed that locus of control (B = .72, p < .001), students' self-efficacy (*B* = .44, p < .001), and perceived teacher efficacy (B = .55, p < .001) significantly predicted students perceived academic achievement. However, gender did not emerge as a significant predictor (p = .536). These findings indicate that students are more rate themselves as academically successful when they believe that they are responsible for their learning, demonstrate confidence in their academic capabilities, and view their teachers as competent and effective. Overall, the results suggest that psychological variables examined in this study significantly influence students' how students perceive their success within the educational environment.

The findings contribute to empirical literature, which indicates that mathematics self-efficacy is related to the students' ability to appraise themselves, set performance targets, and engage in activities that would improve their engagement and performance in mathematics (Zakariya, 2022). Furthermore, Pendon (2022) found a correlation between good math performance among students and self-efficacy. Furthermore, these results are consistent with research by Hopkins et al. (2020) that demonstrated the beneficial effects of locus of control and self-efficacy on students' academic and cognitive growth. Strong self-efficacy beleifs and supportive teacher-student connections were linked to greater levels of math achievement among learners (Hajovsky et al. 2020).

Oppermann and Lazarides (2021) indicated that teachers' self-efficacy beliefs predicted the support they offered to students and consequently improved their performance. Hettinger et al. (2023) contended that efficacious teachers positively predicted the commitment of students and emotional support. The current study findings provide insight into how student who feel confident, view their educators as effective, and believe in their control over outcomes tend to have a positive perception about their performance regardless of the score. Limited research existed on perceived teacher self-efficacy predicts students' mathematics performance at the CSEC level. By highlighting this relationship, school administrators in developing strategies and support systems aimed at strengthening teachers' self-efficacy, ultimately benefiting student learning outcomes.

The findings also align with studies emphasizing the importance of teacher support and efficacy in students' academic experiences. Hajovsky et al. (2020) reported that positive teacher–student relationships enhanced students' mathematics achievement and motivation. Likewise, Oppermann and Lazarides (2021) found that teacher self-efficacy influenced the level of support teachers provided to students, while Hettinger et al. (2023) noted that teacher efficacy positively predicted student engagement and emotional support.

The present findings provide important insight into the psychological dimensions of perceived achievement among secondary school students in Guyana. Students who felt academically capable, perceived their teachers as supportive and competent, and believed they had some control over their learning outcomes tended to report stronger perceptions of academic success regardless of their actual mathematics scores. This distinction between perceived and actual achievement is particularly important because students' academic self-perceptions may influence classroom participation, motivation, persistence, and long-term educational engagement.

The findings contribute to the limited body of Caribbean and Guyanese research examining the psychological dimensions of mathematics achievement. The findings suggest that schools should prioritize initiatives that strengthen students' academic confidence, foster supportive teacher–student relationships, and encourage students to develop a greater sense of personal responsibility for learning outcomes. Professional development programmes aimed at improving teacher effectiveness and classroom support may also positively influence

students' academic self-perceptions and engagement in mathematics. Collectively, the psychological variables contributed substantially in shaping students' perceptions of academic competence than in predicting objective mathematics performance. While gender differences were not evident in either actual or perceived achievement, self-efficacy, locus of control, and perceived teacher efficacy demonstrated strong relationships with students perceived academic success.

The distinction between actual and perceived achievement highlights the complexity of academic performance and suggests that objective mathematics outcomes may be influenced by broader systemic, instructional, and contextual factors beyond individual psychological beliefs alone. These findings reinforce the importance of addressing both psychological and environmental dimensions of learning within mathematics education in Guyana.

RECOMMENDATIONS

1. One recommendation is the integration of social-emotional learning (SEL) competencies into the secondary school curriculum. Social-emotional learning programmes have been shown to strengthen self-awareness, self-management, responsible decision-making, resilience, and academic motivation (Mahoney et al., 2021). Such competencies can help students develop confidence in their ability to learn mathematics and cope with academic challenges. The Ministry may therefore consider incorporating structured social-emotional learning activities into mathematics and other subject areas.
2. School leaders should therefore prioritize instructional leadership. Effective instructional leadership involves supporting teachers' professional growth, monitoring classroom practices, promoting collaborative learning among staff, and ensuring the consistent implementation of high-quality instructional strategies. Hallinger (2020) noted that instructional leadership remains one of the strongest school-level influences on student learning outcomes.School leaders should also promote positive school climates characterized by trust, respect, inclusivity, and academic support. Students who feel safe, valued, and supported are more likely to engage positively with learning activities and develop stronger perceptions of academic competence. Positive school climates have been linked to improved student engagement, motivation, and academic outcomes (Thapa & Cohen, 2023).
3. Teachers should intentionally create classroom environments that foster confidence, participation, and academic engagement. Students are more likely to develop positive beliefs about their abilities when they experience supportive interactions with teachers and are provided with opportunities for success. Teachers should use formative assessment practices to provide continuous feedback regarding student learning. Effective feedback helps students understand their strengths, identify areas for improvement, and recognize the connection between effort and achievement. Hattie (2023) identified feedback as one of the most powerful influences on student learning.
4. Counsellors should implement programmes designed to strengthen students' self-efficacy and internal locus of control. Such programmes may include workshops on goal setting, self-regulation, academic resilience, growth mindset development, and study skills. Students who develop confidence in their abilities are more likely to persist through academic challenges and engage positively with learning opportunities.
5. Parents should be encouraged to promote persistence, effort, and responsibility rather than focusing solely on examination outcomes. Research indicates that parental expectations and involvement positively influence students' academic motivation and achievement (Pinquart, 2024). Students who receive encouragement and support from their families are more likely to develop confidence and positive attitudes toward learning.
6. Professional development programmes should focus on effective instructional strategies, assessment literacy, classroom management, differentiation, and student engagement. Training should also help teachers develop skills for fostering student confidence and resilience while maintaining high academic expectations.

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