Correlations Between Achievements in Mathematics, Student Characteristics, Classroom Climate and Self-Efficacy

Fadia Nasser Abu al-Hija
Tel Aviv University School of Education

Rima Zagier Araidy
Achva Yarka High School

This study examines a model for evaluating the influence of student characteristics and classroom climate on achievements in mathematics among Druze high-school students. The sample consisted of 400 students who were randomly chosen from all Druze high schools in northern Israel. The participants (202 girls and 198 boys) studied four-point (mid-level) mathematics for matriculation. Student characteristics examined include background (gender, number of siblings, and parents' education), attitudes toward mathematics, and mathematical self-efficacy. Classroom climate during mathematics lessons was also examined. The extent to which the model and the variables' direct and indirect effects influence mathematical achievements were examined. Results showed that mathematical self-efficacy had a positive effect on mathematical achievements. Students' attitudes toward mathematics and the classroom climate were significantly positively associated with achievements in mathematics. Furthermore, it was observed that attitude toward mathematics significantly positively affected mathematical self-efficacy.

Keywords: achievements in mathematics, classroom climate, attitude towards mathematics, mathematical self-efficacy

INTRODUCTION

Mathematics is considered the most important core curriculum subject taught at most schools worldwide (Mohamed & Waheed, 2011). However, studies in mathematics education reveal that many students have trouble understanding mathematical concepts and keeping up with instructions in the classroom (Zulaiha et al., 2021). In recent decades, studies have emphasized students' personal variables such as attitude, mindsets, beliefs about mathematics and the study of it, motivation, emotional regulation, self-esteem, and mathematical self-efficacy. In this context, it is claimed that individuals' behavior and choice of a mathematical task are influenced by their personal beliefs and traits rather than by their knowledge of the topic (Ma & Kishor, 1997).

Furthermore, research concerning how the learning environment influences students' achievements is increasing. The learning environment and students' perceptions influence their achievements (Rif'at & Sugiatno, 2022). Among Israeli students, achievements in mathematics on international tests are low compared to the other countries belonging to the Organization for Economic Cooperation and Development (OECD) countries. On average, the achievements are 26 points lower (more than a quarter of a standard

deviation) than the OECD average (OECD, 2019). However, for Israel's Druze society, data shows a profound improvement expressed in an increase of some 23% in matriculation eligibility over the past decade (Weisblau, 2016).

This study focused on the influence of students' attitudes toward mathematics, mathematical self-efficacy, the learning environment, and the students' background variables on achievements in mathematics. The study was conducted among Druze high school students who completed the four-point (mid-level) matriculation exam in mathematics. Very few studies have examined factors that influence achievements in mathematics in high school in the Druze society.

The study aimed to examine a hypothesized structural model used to explain achievements in mathematics through students' personalities and background characteristics. Accordingly, the influence of cognitive, behavioral, and affective variables expressed through students' attitudes toward mathematics, classroom climate, and mathematical self-efficacy on Druze high school students were also examined.

The proposed research model should contribute to understanding students' achievements in mathematics among Arabic-speaking Druze high school students in Israel.

LITERATURE REVIEW

Achievements in Mathematics

According to the OECD, students' low achievements in mathematics are a global problem. In Israel, the number of struggling students is 34% which is higher than the OECD average of 24%. Furthermore, there is a 111-point gap between students in Hebrew-speaking schools and those in Arabic-speaking schools (OECD, 2019).

Studies discussing achievements in mathematics have found that many factors influence students' achievements, including their attitude toward mathematics and the classroom environment (Al-Agili et al., 2012). Other findings have found that achievements in mathematics are connected to motivating factors, beliefs, attitudes, and values (Jamaldini et al., 2015).

Attitudes Towards Mathematics

There are three dimensions of attitude: cognitive, affective, and behavioral (Maio & Haddock, 2010). The cognitive component is what one thinks or believes about the object of the attitude, the affective aspect is what one feels about the object of the attitude, and the behavioral component is the tendency to react in a certain way toward the object of the attitude.

Furthermore, other factors influencing how students form their attitude toward mathematics include how the teacher treats them, their relations with other students, and their performance in class (Mensah et al., 2013). A student's mindset, attitude, and expectations concerning mathematics are significant factors that define their achievements and school experiences (Zakaria et al., 2010).

A student's attitude toward mathematics is one of the most studied factors; however, the findings regarding the connection between attitude and achievement are ambiguous, although some data did indicate a significant connection between attitude and achievement (Mohammed & Waheed, 2011; Nicolaidou & Phillipou, 2003).

A study by Tapia and Marsh (2004) indicated that students with negative attitudes toward mathematics are more likely to achieve less in mathematics than students with a positive attitude toward the subject. Similarly, the recent study by Larsen and Jang (2022) demonstrated a statistically significant correlation between attitude and achievement in mathematics.

Mathematics Self-Efficacy

Bandura (1997) claims that people attribute causality to their functioning through mechanisms of self-efficacy, and the belief that they can control their functioning and events in their life is the primary mechanism for self-efficacy. The concept of self-efficacy is derived from Bandura's socio-cognitive theory (1986), which addresses an individual's judgments and beliefs concerning their ability to take responsibility. According to Bandura, information, skills, and previous achievements do not predict an

individual's achievements; however, their beliefs about their abilities influence their achievements (Jamaldini et al., 2015).

Specific self-efficacy is linked to a particular area, for example, mathematics, and contributes to and strengthens permanent personality traits. In addition, specific self-efficacy research stems from the fact that this type of self-efficacy can be redirected and changed with greater ease than general efficacy (Katz, 2012). Hence, students believe that mathematical self-efficacy will help them learn and succeed in mathematics, and they expect their mathematical achievements to reach the desired level.

The sense of self-efficacy plays an essential role in mathematics education. Some aspects are worth examining in light of this: the correlation between self-efficacy, mathematical achievements, and the student's attitude towards self-efficacy in mathematics (Skaalvik et al., 2015).

Studies have shown that a lack of mathematical self-efficacy among students is associated with a lack of success and few achievements in mathematics. For example, Nicolaidou and Phillipou (2003) found that the connection between self-efficacy and problem-solving is stronger than between attitudes and achievements.

The Influence of Students' Background Data on Their Achievements in Mathematics

Over the years, studies have emphasized the importance of both parents being educated. For instance, a longitudinal study conducted in Canada (Anderson & Bruce, 2004) compared the scholastic achievements of about 5000 participants aged between 30 and 39. The only significant factor in predicting participants' educational achievements was the level of their parents' education; the participants whose parents had less than a high school education had a reduced chance of pursuing higher education than children whose parents had a higher education.

A study by Tsai et al. (2017) observed a strong positive correlation between a student's achievements and the level of their mother's education and a weak correlation with their father's education. Furthermore, several studies emphasize that the level of education of both parents has a more substantial influence on their children's education than only one parent (Hahs-Vaughn, 2004).

Among the outstanding students at the four-point level for mathematics, it was observed that most of the parents of Arab, Druze, and Bedouin students had up to 12 years of schooling. This differs from the distribution of parents' education in the Jewish sector, where 43% - 44% have 13 to 15 years of study, 30% have up to and including 12 years of schooling, and 30% have 16 years of education. In contrast, within the Druze sector, the distribution of outstanding four-point math students, according to the average length of their parent's education for 2015, revealed that only 3% of the students had parents with 16 or more years of education, 23% had parents with 13 to 15 years of education, and 74% had parents with up to and including 12 years of education (CBS, 2015).

Many studies show that the number of siblings in a family is inversely correlated with their cognitive development and academic achievements (e.g., Park, 2008). According to the hypothesis of resource dilution (Blake, 1989), children growing up in small families enjoy a more significant portion of the family resources, including parental attention, which improves their cognitive development.

The matriculation mathematics exam results for 2015 showed that, in the Druze population, the distribution of excellent four-point math students by gender was 34% boys and 66% girls, and in the Jewish sector for that same year, 37% were boys and 63% were girls (CBS, 2018).

Classroom Climate

Classroom climate is a multi-dimensional concept. According to Moos (1979), this 'climate' includes the classroom, the teaching-learning processes, and the elements that influence them. Moreover, he defines the classroom climate as a byproduct of different variables and pressures that function bilaterally; environmental pressures act on the students and stem from the students and act on the environment, i.e., the school, the teachers, the environment, and the students.

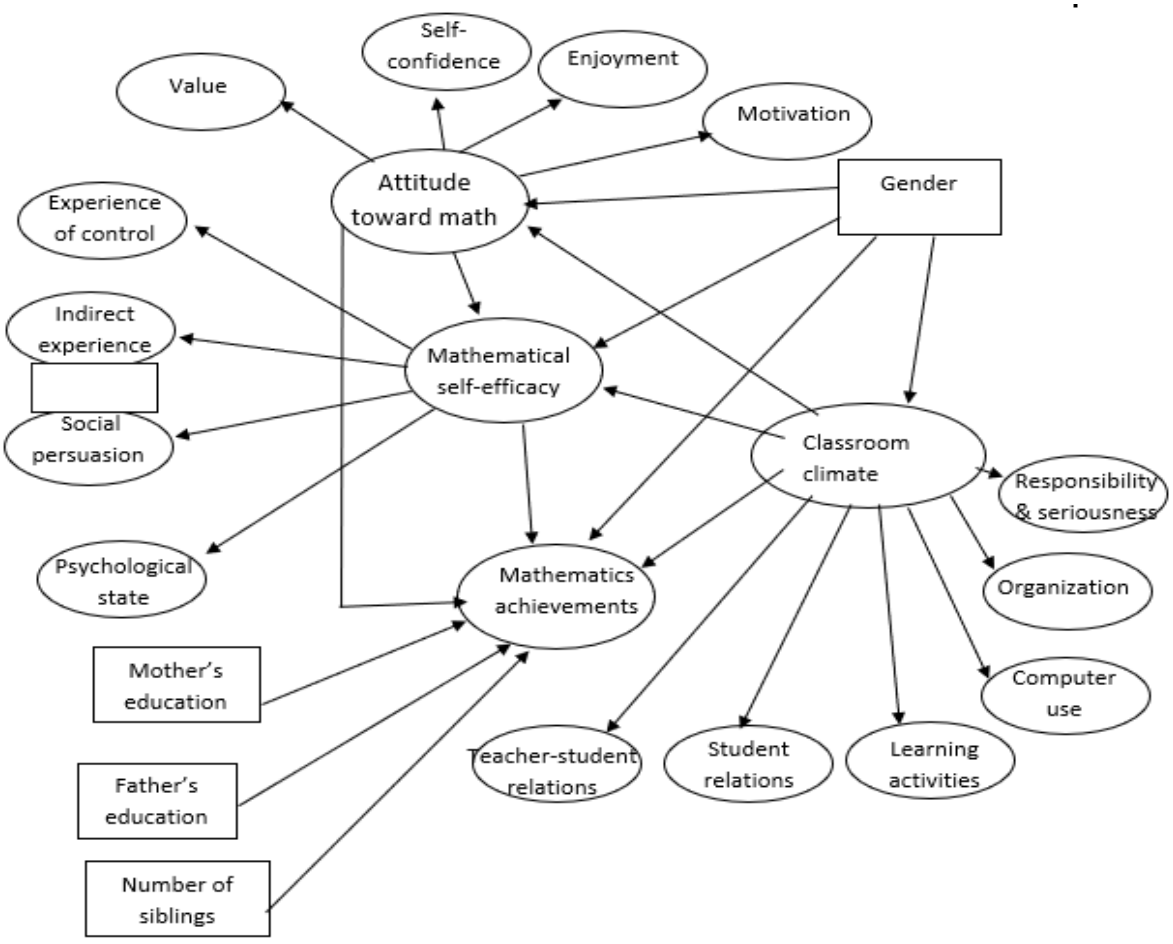
The definition of the classroom climate includes a setup composed of the culture, physical and organizational layout, social ties, and the behavior of both students and teachers. A favorable climate has clear rules and high expectations of achievement, caring, respect, cooperation, and emotional safety. In

contrast, an unfavorable climate has disciplinary and punitive rules that imply lowered expectations, limited cooperation, decreased motivation, disparaging communication, negativity, and bullying (Frazier et al., 2015).

Theoretical Research Model

A literature review demonstrates that the processes that influence a student's behavior in the classroom have several components. The model presented in this study suggests an explanation for students' behavior and achievements centered on their background and personality variables. Based on the research reviewed, the hypothesized model in this study describes the relationship between students' background variables and their mathematical achievements. In addition, the model also describes the relationship between the student's accomplishments and the classroom climate variables, mathematical self-efficacy, and the student's attitude toward mathematics. Figure 1 presents the schematic structure of the model and describes the relationship between the variables that influence the mathematical achievements of grade 10 students based on previously reviewed research literature.

FIGURE 1
A STRUCTURAL MODEL EXAMINING THE EFFECT OF STUDENT CHARACTERISTICS ON MATHEMATICS ACHIEVEMENTS



Research Hypotheses

The variable in this study is the grade from the four-point mathematics matriculation exam that reflects the level of student achievement. The explanatory factors are self-efficacy, mathematical self-efficacy,

classroom climate, and attitude toward mathematics. The connection between background factors and achievements will also be examined. Accordingly, the study's assumptions are as follows:

1. Mathematical self-efficacy will have a positive effect on mathematics achievements.
2. A positive attitude towards mathematics will have a constructive impact on mathematics achievements.
3. Classroom climate will have a positive effect on mathematics achievements.
4. A positive attitude towards mathematics will have a positive effect on mathematics self-efficacy.

METHODOLOGY

Research Population and Sample

Participants were 400 Arabic-speaking 10th-grade Druze students preparing for the four-point (mid-level) mathematics matriculation exam. The students were chosen randomly from all the Druze high schools in the north of Israel.

Research Tools and Variables

A self-report questionnaire was used to examine the students' attitude toward mathematics, mathematical self-efficacy, and classroom climate, and determine the students' background variables.

Attitudes Toward Mathematics Questionnaire

The Tapia & Marsh (1996) questionnaire on students' attitudes toward mathematics reveals the students' basic beliefs regarding mathematics and the study of it. It consists of 40 questions with a five-point Likert Scale from (1) *I don't agree at all* to (5) *I strongly agree*. The questionnaire addresses four variables examining students' attitudes toward mathematics: self-confidence, value, motivation, and enjoyment. In the study by Tapia and Marsh (2004), internal reliability was high (Cronbach's alpha ranging from $\alpha=0.87$ to $\alpha=0.96$). Furthermore, the questionnaire was validated by Austrian scholars who examined the attitudes of 699 junior high school students toward mathematics (Majeed et al., 2013). In the current study, the internal reliability values (Cronbach's alpha) for the questionnaire on attitudes toward mathematics are also high, ranging from α =0.71 to $\alpha=0.91$ (Table 2).

Mathematical Self-Efficacy Questionnaire

The mathematical self-efficacy questionnaire was taken from Usher & Pajares (2009), who developed it based on Bandura's theoretical model (2006). The questionnaire contains 24 statements. The participants were asked to state the extent to which they agree with each statement on a five-point Likert scale from (1) *I don't agree at all* to (5) *I agree to a very large extent*. The questions measured experiencing mastery, indirect experience, social persuasion, and psychological situation. In the study by Usher & Pajares (2009), internal reliability was high, with Cronbach's alpha ranging from α=0.85 to α=0.95. In the current study, the overall reliability of the questions for the four measures of the mathematical self-efficacy questionnaire ranged from α=0.82 to α=0.86 (Table 2).

Classroom Climate Questionnaire

The questionnaire regarding classroom climate was developed by Donitsa-Schmidt (1993). The questionnaire contained 21 questions divided into six measures, each examining students' perceptions of classroom climate and lesson activities. The questionnaire was initially designed to assess classroom climate in first-language composition classes; however, it was adapted for this study.

The questionnaire examined six dimensions: student-teacher relations, relations among students, learning activities, computer use, organization, responsibility, and seriousness. Students responded to all items on a four-point Likert scale, where the highest value indicated a more positive attitude toward the classroom climate. The original questionnaire was validated through factor and small space analysis. Internal reliability measures ranged from α =0.75 to α =0.89. In the current study, Cronbach's alpha was

high, with the overall reliability for the six dimensions of classroom climate for the entire sample ranging from α =0.70 to α =0.85 (Table 2).

Student Background Variables

The self-report questionnaire contained the following questions concerning student background factors:

1. Student gender - a dichotomous variable with two values: boys and girls.
2. Number of siblings - a variable reflecting the students' number of siblings. The values range from one to the highest number provided.
3. Parents' education - a variable with four values from one to four: 4 = a Master's degree or higher; 3 = a Bachelor's degree; 2 = a high school diploma with a full matriculation certificate; 1 = non-completion of all matriculation certificate exams.

Achievements in Mathematics

In the current study, the end-of-school-year grades in mathematics at the four-point level were used since it is likely that the general grade would better reflect the connection between personal factors, attitude toward mathematics, mathematical self-efficacy, and classroom climate.

Data Analysis and Research Procedure

Data analysis of multiple samples was examined through structural equation analysis. The questionnaires were distributed during mathematics lessons after receipt of the appropriate permission from the relevant authorities.

FINDINGS

Table 1 lists the direct and indirect values of the effects and the effect of each variable on mathematical achievements. The results demonstrated a significant direct association between the 'number of siblings' and 'achievements in mathematics.' Furthermore, a significant positive association between 'attitudes toward mathematics' and 'classroom climate' was observed. A negative yet significant association between 'mathematical self-efficacy' and 'achievements in mathematics' was observed.

The variables examining students' characteristics in the current study include student background, motivation, and classroom climate. The coefficients presented in table 2 indicate significantly positive correlations (r=0.235 -0.343, $p < 0.001$) between 'mother's/father's education' and 'achievements in mathematics.' Conversely, a significantly negative correlation was observed between 'achievements in mathematics' and 'number of siblings' (r=-0.202, $p < 0.001$).

We observed a significant correlation between 'attitudes towards mathematics,' 'mathematical self-efficacy,' 'classroom climate,' and 'achievements in mathematics' (r=0.458 - 0.808, $p < 0.001$).

The relationships among student background variables were significant (Table 2). For example, there was a significant positive association between the 'mother's/father's education' variable and 'achievements in mathematics' (r=0.426, $p < 0.001$). In contrast, there was a significant negative correlation between 'mother's/father's education' and 'number of siblings' ($r=0.263 < p <- 0.128$, $p <0.05$). Moreover, we observe significant positive correlations between 'mother's/father's education' and 'mathematical self-efficacy,' 'classroom climate,' and 'attitudes toward mathematics' (r=0.132 - 0.294, $p < 0.01$).

However, a significant negative correlation was observed between 'number of siblings' with 'attitudes towards mathematics,' and 'mathematical self-efficacy' (r=-.187 - -0.085, $p < 0.05$). An insignificant association was observed between 'teacher-student relations', 'computer use,' and 'organization' with 'number of siblings' (r=-0.077- 0.064, $p > 0.05$). The effect's lack of statistical significance can be attributed to the small influence that a students' family size has on some of the classroom climate components.

A significant negative association was observed between the remaining components of the classroom climate variable ('relationships among students,' 'learning activities,' and 'responsibility and seriousness'), and 'number of siblings' (r=-0.130 - 0.113, $p < 0.01$). On the other hand, significant positive associations were observed among the components of 'attitude towards mathematics' (value, enjoyment, self-

confidence, and motivation (r=0.560 - 0.841, p < 0.001). Furthermore, a significant positive correlation was observed between 'attitude towards mathematics,' 'mathematical self-efficacy,' and 'classroom climate' (r=0.351 - 0.849, p < 0.001).

There is a significant correlation among the components of the self-efficacy variable (r= 0.611 - 0.719, p < -0.001)(Table 2). Furthermore, a significant positive association was observed between 'mathematical self-efficacy' and 'classroom climate' (r=0.426 - 0.669, p < 0.001).

Finally, we observed significant positive correlations among the 'classroom climate' variables ('relationships among students,' 'learning activities,' 'organization,' 'responsibility and seriousness,' and 'computer use') (r=0.422 - 0.649, p < 0.001).

TABLE 1
EFFECTS OF STUDY VARIABLES ON MATHEMATICAL ACHIEVEMENTS FOR THE ENTIRE STUDY POPULATION

Research variable	Indirect effect	Direct effect	Overall effect
Gender	-0.064	0.016	-0.048
No. of siblings		-0.086*	-0.086*
Length (years) of father's education			0.041
Length (years) of mother's education			0.006
Attitudes toward mathematics	-0.070*	0.937*	0.867*
Mathematical self-efficacy		-0.094*	-0.094*
Classroom climate	0.359*	-0.008	0.351*

***$p < 0.001$ **$p < 0.01$ *$p < 0.05$

TABLE 2
COEFFICIENTS (R) BETWEEN RESEARCH VARIABLES FOR THE OVERALL SAMPLE (N=400)

Variables	**Achievements in mathematics**	**Gender**	**No. of siblings**	**Father's education**	**Mother's education**	**Value**	**Enjoyment**	**Self-Confidence**	**Motivation**	**Experience of mastery**
Achievements in mathematics	1.00									
Gender	-0.051	1.00								
No. of siblings	-0.202***	0.031	1.00							
Father's education	0.343***	-0.037	-0.128*	1.00						
Mother's education	0.235***	-0.031	-0.263***	0.426***	1.00					
Attitudes										
Value	0.757***	-0.068	-0.132**	0.389***	0.231***	.852				
Enjoyment	0.695***	-0.041	-0.088*	0.334***	0.189***	0.841***	.888			
Self-confidence	0.801***	-0.096*	-0.132**	0.339***	0.216***	0.737***	0.725***	.919		
Motivation	0.498***	-0.032	-0.086*	0.243***	0.160**	0.609***	0.607***	0.560***	.713	
Self-efficacy										
Experience of mastery	0.687***	-0.088*	-0.098*	0.240***	0.203***	0.705***	0.723***	0.683***	0.553***	.854
Indirect experience	0.664***	-0.007	-0.085*	0.275***	0.212***	0.728***	0.737***	0.703***	0.609***	0.719***
Social persuasion	0.694***	-0.038	-0.139**	0.309***	0.249***	0.684***	0.667***	0.682***	0.552***	0.705***
Psychological state	0.808***	-0.091*	-0.187***	0.321***	0.208***	0.716***	0.665***	0.846***	0.503***	0.613***
Classroom climate										
Student-teacher relations	0.486***	-0.064	-0.064	0.201***	0.132**	0.508***	0.520***	0.475***	0.351***	0.493***
Relations among students	0.458***	0.099*	-0.126**	0.238***	0.223***	0.529***	0.487***	0.423***	0.382***	0.504***
Learning activities	0.539***	0.020	-0.113**	0.195***	0.161**	0.595***	0.568***	0.516***	0.427***	0.561***

ה

Variables	Achievements in mathematics	Gender	No. of siblings	Father's education	Mother's education	Value	Enjoyment	Self-Confidence	Motivation	Experience of mastery
Procedures	0.465***	0.043	-0.074	0.236***	0.172***	0.573***	0.582***	0.484***	0.476***	0.578***
Responsibility and independence	0.620***	0.015	-0.130**	0.191***	0.148**	0.604***	0.631***	0.624***	0.459***	0.599***
Computer use	0.482***	-0.035	-0.077	0.294***	0.239***	0.473***	0.448***	0.528***	0.427***	0.470***

Variables	Indirect experience	Social persuasion	Psychological state	Student-teacher relations	Relations among students	Learning activities	Procedures	Responsibility and independence	Computer use
Indirect experience	0.821								
Social persuasion	0.709***	0.833							
Psychological state	0.639***	0.611***	0.863						
Classroom climate									
Student-teacher relations	0.547***	0.473***	0.473***	0.815					
Relations among students	0.566***	0.549***	0.426***	0.469***	0.777				
Learning activities	0.635***	0.564***	0.489***	0.587***	0.621***	0.771			
Procedures	0.622***	0.574***	0.432***	0.485***	0.622***	0.610***	0.704		
Responsibility and independence	0.669***	0.595***	0.575***	0.553***	0.589***	0.649***	0.649***	0.817	
Computer use	0.489***	0.524***	0.521***	0.456***	0.423***	0.422***	0.488***	0.476***	0.817

***$p < 0.001$ **$p < 0.01$ *$p < 0.05$ The diagonal values are measures of internal consistency and reliability

DISCUSSION AND CONCLUSIONS

The findings indicate that the number of siblings directly impacts mathematics achievements. For the current study population, where the average number of children in the family is close to five, the attention and emotional support dedicated to any given child decreases; emphasis is placed on conformity and obeying parental authority and less on achievements.

Furthermore, the findings indicate that the level of parental education does not influence mathematics achievements. These findings compare to data from a previous study conducted on high school students in the United States (Rozek et al., 2015).

Another variable included in the background variables in the current study was gender, which had no significant impact on mathematical achievements. This finding supports the conclusion Preckel et al. (2008) reported regarding students' achievements on two different levels of ability in mathematics. Although there were no differences in the grades between boys and girls, there were notable differences in self-perception, interest, and motivation, which were higher in girls.

The assumption that attitudes toward mathematics directly influence achievements in mathematics was confirmed in this study. These results support the study's theoretical rationale and the findings mentioned in the literature concerning the influence of positive attitudes toward mathematics on achievements (Hemings et al., 2011; Mensah et al., 2013; Mohamed & Waheed, 2011). A possible explanation is that a positive attitude toward mathematics strengthens self-image, which may encourage students to be more involved in their studies and to display perseverance, effort, and alertness. This will result in more achievements and a positive attitude toward mathematics. As a result, many countries aim to develop positive attitudes toward mathematics to increase mathematical self-efficacy (IEA, 2009a).

Our findings show that mathematical self-efficacy directly influences achievements in mathematics. A statistically significant negative association was observed between self-efficacy and the achievements of the current study's participants. However, the assumption that mathematical self-efficacy positively influences achievements in mathematics was not confirmed. Our finding contradicts the data reported in the literature (Skaalvik et al., 2015). The ambiguity may be due to the student's inaccurate estimation of mathematical self-efficacy, distorting how the influence of this variable on the other variables is determined.

Classroom climate has a positive effect overall; a very weak, insignificant direct effect and a statistically significant positive indirect effect mediated through mathematical self-efficacy and positive attitudes towards mathematics. These results concur with the study's theoretical rationale and match the findings reported in the professional literature on the positive influence of an optimal classroom climate on achievements in mathematics (Frazier et al., 2015).

A favorable classroom climate benefits students and helps them achieve good grades, succeed and integrate into school life. Many studies have indicated the importance of classroom climate to mathematics achievements and have shown that a positive classroom climate increases students' self-esteem and promotes their scholastic performance (Admiral et al., 2022).

In conclusion, the model matched the data and identified variables that significantly influence mathematics achievements among Druze students. Furthermore, the findings provide empirical confirmation for most of the assumptions based on the hypothesized model. The model was designed to explain achievements in mathematics and was built based on a literature review.

Research Implications

The current study provides a better understanding of the variables that influence achievements in mathematics among Druze high school students who studied for the 4-point (mid-level) matriculation exam. Regarding students' personal factors, the influence of background variables, such as the level of their parents' education, was negligible and unimportant for achievements in mathematics. On the other hand, the number of siblings had a weak influence on mathematics achievements, raising the question of which other factors related to students' background variables influence mathematics achievements. It also suggests examining other aspects not explored in this study.

This study's implications regarding the motivational variables are important. First, the positive correlation observed between achievements in mathematics and attitudes toward mathematics suggests the need to preserve students' positive attitudes toward mathematics and seek new methods for developing and strengthening positive attitudes toward mathematics among students who have a less-positive attitudes.

The negative correlation between self-efficacy and achievements highlights that students have difficulty perceiving themselves as having high mathematical self-efficacy. This questions the effectiveness and nature of the support and the means provided to students, whether at school or at home, to improve their mathematical self-efficacy. Other variables that could increase the students' sense of self-efficacy need to be identified.

The current study has practical and implementable consequences for all the factors examined and discussed above. Regarding classroom climate and its influence on achievements in mathematics, since one can positively influence and improve classroom climate, it is necessary to explore which variables influence classroom climate and are related to increasing students' achievements in mathematics. Exploring the school climate is also worthwhile since it may influence the classroom climate. The study's implications are significant for improving the classroom climate, promoting and maintaining equality in achievements in mathematics among girls and boys, increasing mathematical self-efficacy for both genders, and for developing a positive attitude toward mathematics.

Research Limitations

The current study only addresses the characteristics of the learning environment at the class level. Furthermore, it only addresses the father's education, the mother's education, and the number of siblings in the family as students' background variables. It would be beneficial to include the family's socioeconomic situation. Finally, the study is only based on quantitative studies. Combining qualitative and quantitative methods could strengthen the findings, especially regarding attitudes toward mathematics, mathematical self-efficacy, and classroom climate.

REFERENCES

Admiraal, W., Post, L., Kester, L., Louws, M., & Lockhorst, D. (2022). Learning labs in a secondary school in the Netherlands: Effects of teachers' autonomy support on student learning motivation and achievement. *Educational Studies*, pp. 1–18.

Al-Agili, M., Mamat, M., Abdullah, L., & Maad, H. (2012). The factors influencing students' achievement in mathematics: A case for Libyan students. *World Applied Sciences Journal, 17*(9), 1224–1230.

Anderson, C.A., & Bruce, C.J. (2004). Using family background to predict educational attainment in Canada**.** *Economica LTD., The Expert Witness Newsletter, 9*(3). Retrieved from http://economica.ca/using-family-background-to-predict-educational-attainment-in-canada/

Bandura, A. (1997). *Self-efficacy: The exercise of control*. Freeman.

Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares, & T. Urdan (Eds.), *Self-efficacy beliefs of adolescents*. Information Age Publishing.

Blake, J. (1989). Number of siblings and educational attainment. *Science, 245,* 32–36.

Central Bureau of Statistics (CBS). (2018). *Israeli Society. Report No. 10*. (Hebrew).

Frazier, S., Mehta, T., Atkins, M., Glisson, C., Green, P., Gibbons, R., . . . Ogle, R. (2015). The social context of urban classrooms: Measuring student psychological climate. *Journal of Early Adolescence*, *35*(5–6), 759–789.

Hahs-Vaughn, D. (2004). The impact of parents' education level on college students: An analysis using the beginning postsecondary students, longitudinal study 1990-92/94. *Journal of College Student Development*, *45*(5), 483–500.

IEA. (2009a). *TIMSS 2007 International Database and User Guide*. USA.

Jamaldini, M., Baranzehi, H., Farajpour, N., & Samavi, A. (2015). The causal relationship of self-efficacy, self-concept and attitude towards mathematics with academic achievement in mathematics by mediation of approaches to learning. *International Journal of Review in Life Sciences, 5*(2), 41–45**.**

Katz, S. (2012). *Self-efficacy – Diagnosis and intervention: Use of qualitative methodology to reveal efficacy beliefs in education* (pp. 19–28). Sha'anan College. (Hebrew).

Kuranchie, A. (2013). Children and wards of low-income class and access to university education. *Academic Journal of Interdisciplinary Studies, 2*(3), 19.

Larsen, N.E., & Jang, E.E. (2022). Instructional practices, students' self-efficacy and math achievement: A multi-level factor score path analysis. *Canadian Journal of Science, Mathematics and Technology Education*, pp. 1–21.

Ma, X., & Kishor, N. (1997). Assessing the relationship between attitude toward mathematics and achievement in mathematics: A meta-analysis. *Journal for Research in Mathematics Education, 28*(1), 26-47.

Maio, G., & Haddock G. (2010). *The psychology of attitude and attitude change*. Sage Publications.

Mensah, J., Okyere, M., & Kuranchie, A. (2013). Student attitude towards mathematics and performance: Does the teacher attitude matter? *Journal of Education and Practice, 4*(3), 132–139.

Mohamed, L., & Waheed, H. (2011). Secondary students' attitude towards mathematics in a selected school of Maldives. *International Journal of Humanities and Social Science, 1*(15), 277–281.

Moos, R.H. (1979). Educational climates. In H.J. Walberg (Ed.), *Educational environments and effects: Evaluation, policy and productivity* (pp. 79−100). McCutchan.

Nicolaidou, M., & Philippou, G. (2003, February 28–March 3). Attitudes towards mathematics, self-efficacy and achievement in problem-solving. In M.A. Mariotti (Ed.), *Proceedings of the third conference of the European society for research in mathematics education*. Bellaria, Italia. Retrieved May 6, 2016, from http://www.dm.unipi.it/~didattica/CERME3/proceedings/tableofcontents_cerme3.html

OECD. (2019). *PISA 2018 assessment and analytical framework*. OECD publishing. Retrieved January 20, 2022, from https://www.oecd-ilibrary.org/docserver/b25efab8-en.pdf?expires=1643549239&id=id&accname=guest&checksum=36DAABC8E813DD20C1CF94A88ECB632C

Park, H. (2008). Public policy and the effect of sibship size on educational achievement: A comparative study of 20 countries. *Social Science Research, 37*(3), 874–887.

Preckel, F., Goetz, T., Pekrun, R., & Kleine, M. (2008). Gender differences in gifted and average-ability students: Comparing girls' and boys' achievement, self-concept, interest, and motivation in mathematics. *Gifted Child Quarterly, 52*(2), 146–159.

Reardon, S. (2011). The widening achievement gap between the rich and the poor: New evidence and possible explanations. In G.J. Duncan, & R.J. Murnane (Eds.), *Whither opportunity? Rising inequality, schools and children's life chances* (pp. 91–116). Russell Sage.

Rif'at, M., & Sugiatno, S. (2022, January). Unfolding the practical of numerical literacy for specialist in teaching mathematics. In *Eighth Southeast Asia Design Research (SEA-DR) & the Second Science, Technology, Education, Arts, Culture, and Humanity (STEACH) International Conference (SEADR-STEACH 2021)* (pp. 1–7). Atlantis Press.

Rozek, C.S., Hyde, J.S., Svoboda, R.C., Hulleman, C.S., & Harackiewicz, J.M. (2015). Gender differences in the effects of a utility-value intervention to help parents motivate adolescents in mathematics and science. *Journal of Educational Psychology, 107*(1), 195.

Skaalvik, E.M., Federici, R.A., & Klassen, R.M. (2015). Mathematics achievement and self-efficacy: Relations with motivation for mathematics. *International Journal of Educational Research, 72*, 129–136.

Tapia, M., & Marsh, G.E. (2004). An instrument to measure mathematics attitudes. *Academic Exchange Quarterly, 8*(2), 16–22.

Tsai, S.L., Smith, M.L., & Hauser, R.M. (2017). Families, schools, and student achievement inequality: A multilevel MIMIC model approach. *Sociology of Education*, *90*(1), 64–88.

Usher, E., & Pajares, F. (2009). Sources of self-efficacy in mathematics: A validation study. *Contemporary Educational Psychology*, *34*(1), 189–101.

Weissblau, E. (2016). *The Druze education system and Druze integration in higher education – Main data*. Knesset Research and Information Center. (Hebrew).

Zakaria, E., Chin, L.C., & Daud, M.Y. (2010). The effects of cooperative learning on students' mathematics achievement and attitude towards mathematics. *Journal of Social Sciences*, *6*(2), 272–275.

Zulaiha, R., Rahdiani, D., Rahman, A., & Al Anfal, M.F. (2021, April). Analysis of difficulty level and discriminating power between multiple choices and essay items on math test. In *International Conference on Educational Assessment and Policy (ICEAP 2020)* (pp. 62–68). Atlantis Press.