

Factors That Affect Secondary School Mathematics Achievement in Indonesia

Subjects: [Education](#), [Scientific Disciplines](#)

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student stress

mathematics performance

learning interest

1. Introduction

Students' achievement is defined by the extent to which predetermined learning goals are obtained, and it is usually measured through test scores and ongoing assessments ^[1]. Several preliminary studies used the Grade Point Average (GPA) to analyze students' academic achievements ^{[2][3]}, while this research interpreted it as an indicator of the knowledge and understanding level of the mathematics material. It is a complex score influenced by learning media, environment, teaching methods, parental support, and personal factors ^{[4][5]}. The learning approach teachers use toward mathematics achievement has also been explored ^{[6][7]}, along with the relationship between parenting style and students' achievement ^{[8][9]}. Most studies only used a simple linear relationship to analyze its effect on students' achievement ^{[10][11]}. Meanwhile, this research developed a new model from a psychological perspective to analyze factors strongly related to students' mathematics achievements by adding predictors of well-being and stress levels.

Psychological factors that influence students' mathematics achievements emotionally and academically are supported from parents and teachers. These factors definitely affect their well-being ^{[12][13]}, interest in learning ^{[14][15]}, and mathematics achievement ^[16]. The way teachers and parents support the students is a psychological construct that represents their standard strategies for teaching children ^{[17][18]}. This support is a phenomenon that is recognized and analyzed professionally to determine its effect on the students' positive and negative behavior, subjective well-being, and learning achievement. Unfortunately, parents and teachers in Indonesia are unaware of the importance of providing academic assistance to students ^{[19][20]}, hence, the majority depend more on learning models ^{[21][22]}.

Mathematics mastery, inseparable from everyday activities, plays an essential role in human life ^[23]. However, its achievements in Indonesia are still far from expectations, as Indonesia is ranked 63 out of 70 countries according to the 2015 PISA ^[24]. The situation is even more worrying when students are afraid of this subject with the idea that it is difficult ^[25]. Therefore, the Indonesian government implemented numerous strategies to increase students' interest in learning mathematics and acquire more achievements ^{[22][26]}. These include increasing technology-

based learning media and teachers training to improve pedagogical and technological skills [27][28]. A few program extension plans have also been implemented to encourage teachers and parents to provide emotional and academic support [29][30].

2. Teacher-Parent Support Model

Empirical studies have examined the relationship between teacher and parent support and student well-being. According to preliminary studies, teacher and parent support have numerous benefits that significantly affect student achievement and emotions [29][31][32]. Meanwhile, limited studies have combined their support regarding student stress, interest in learning, and achievement. This research showed that regardless of where the support comes from, it will always positively affect overall student well-being. However, a model is needed to determine students' well-being, interest in learning, and achievement at the secondary school level.

3. Teachers' Academic and Emotional Support

Several existing studies show that teachers' support for students has a high relationship with psychological well-being. Ma et al. also stated that teachers' support can foster student academic achievement and enjoyment [33]. Abdullah et al. reported that during the pandemic, teachers' emotional and academic supports have a significant determination on the learning performances of undergraduate students [18]. Therefore, it can be concluded that teachers' academic support also plays an important role in student emotions. Most students in Indonesia stay at school from 7 a.m. to 5 p.m., where they are accompanied and supported by teachers. Therefore, implementing the role of teachers as mentors to assist students academically and emotionally through fair treatment and provision of rewards helps to increase their well-being and reduce stress. It is important to investigate the novel relationship between teachers' academic and emotional support of whether or not determine mathematics learning achievements.

4. Parents' Support

Studies on parents' support generally analyze the relationship between parents and students' psychological well-being [34][35]. A study by Geng et al. (2022) and Yuill and Martin (2016) found that parental support, directly and indirectly, affects students' physical health. Mata [29][36] stated that parental support for students at K-9 levels significantly affected their motivation and achievement. The interview results with low-socioeconomic-status children illustrated that support from parents is essential [8]. In detail, students' physical changes can be explained by the amount of support provided by the parents. This implies that physical complaints increase in children who lack parental support and vice versa. On the other hand, students who lack parental support from childhood experience health problems and depression as they approach adulthood [37][38]. Similarly, several studies have been conducted on parental support and its relationship to students' problems, perceived stress, well-being, achievement, and burnout [17].

In the context of this research, most Indonesian parents work hard to earn money, thereby leaving their children with their grandparents, older siblings, or teachers. These circumstances make parents unable to understand what children feel and need. Therefore, whether parent support has a direct effect on improving students' well-being, decreasing stress, and increasing interest in learning mathematics and achievement needs to be examined.

| 5. Stress and Well-Being and Mathematics Learning

There is increased stress for secondary school students in Indonesia due to demands from parents, schools, and teachers and achieving the best results. Moreover, students' difficulty in carrying out school assignments, exams, task deadlines, and others, also cause stress [39][40]. Stress is the body's response to environmental pressures or demands that can have positive or negative effects on a person (Bajaj et al., 2022; Choi Young-Jun and Hyosung, 2021) [41][42]. Some external factors of demand are friends, situations, learning environment, and people around students [18][43]. Stress is a natural feeling that helps individuals to deal with problems or challenges. Thoughts, motivations, and goals are internal factors. As a result of stress, a person responds physiologically and psychologically to various demands [44].

Most parents in Indonesia expect their children to have good mathematics achievements, while few assist. Several studies show that the higher the level of stress experienced by a person, the lower their achievement and well-being [45][46].

| 6. Interest in Learning Mathematics

Interest in learning plays a vital role in mathematics teaching activities [47][48]. When people feel pressured to do something, such as in the context of students learning and doing exercises to develop their mathematical knowledge, their interest increases. Interest is divided into two senses, namely situational and individual [14]. Situational interest is an affectionate response caused by environmental stimuli, such as technology-based learning media unfamiliar to students, and does not last long [49]. Individual interest arises from one's perception and knowledge of content, which extends the response rate. Several factors have a relationship with students' interest in learning mathematics. The first is confidence, which is the most important factor, where students should believe that the effort made is capable of improving their mathematical abilities [50][51]. The second is depression, which is a major cause of a lack of interest in learning [52][53]. The third is fear of failure, which is ineffective and causes irregularity in learning and working. The last is an unsupportive environment and a lack of facilities, which prevents students from learning efficiently. It can be concluded that many factors affect students' interest when learning mathematics. Therefore, an empirical study is needed to prove these potential factors.

According to preliminary studies, the level of interest affects students' learning motivation [15][54], self-efficacy [55], self-regulation, and overall outcomes [56][57]. Students need to learn and analyze the relationship between stress and teacher and parent support, especially in mathematics. This research also analyzes how interest in learning mathematics as a mediator affects students' mathematics achievement.

The research model was constructed based on the literature research shown in **Figure 1**. It comprises three dependent variables, namely, parents and teachers' academic and teachers' emotional support. These three variables directly influence students' well-being, interest in learning, stress, and mathematics achievement. The independent variable is students' mathematics achievement.

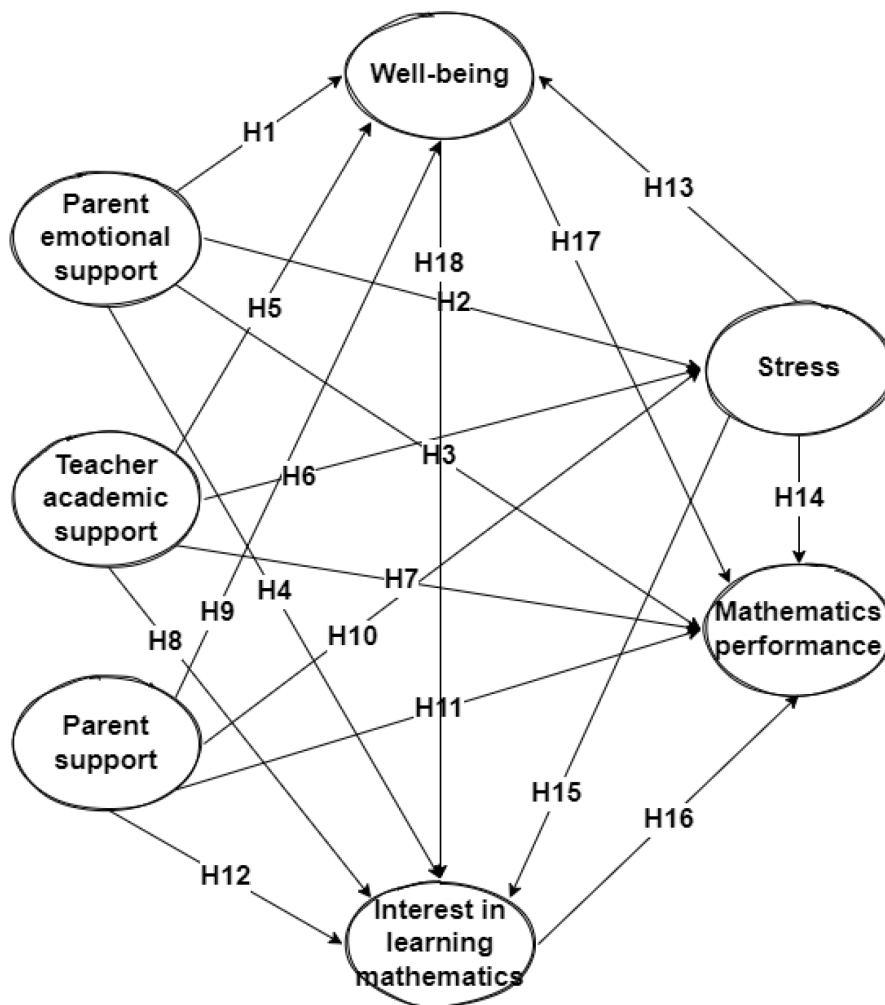


Figure 1. Initial hypotheses that are expected to affect students' mathematics achievement.

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