

INTERSECTING PARENT AND CHILD MATH ANXIETY, PARENTAL MATH-GENDER STEREOTYPES AND CHILDREN'S MATH PERFORMANCE: A SCOPING REVIEW

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Abstract

One fundamental role of mathematics is to prepare the new generation to compete in a global economy. Although math is essential for almost all sciences, a significant percentage of primary school students report experiencing math anxiety, as well as an increased avoidance of mathematics courses and other math-related subjects. These increased levels of math anxiety and the potentially long-lasting effects led researchers to investigate the reasons behind this phenomenon. Although the antecedents of math anxiety are multiple and not fully determined, previous empirical researchers suggested that parents' math anxiety and their math-gender stereotypes play a critical role in their children's math performance and math anxiety. There is a paucity of literature that has focused on the relationship between child math anxiety and their parents' math anxiety, whereas most of the studies were directed to investigate the relationship between math anxiety and math performance. In this review, we will critically synthesize the available literature concerning the relations between children's math anxiety, parents' math anxiety, and parental gender stereotypes toward mathematics, as well as parental involvement in the child's homework as a proxy of child math anxiety and the resulting gap in math performance. This review will develop a better understanding of the relations between parental math anxiety, parental involvement in children's homework and child's math anxiety.

Cuvinte-cheie: anxietate față de matematică, stereotipuri de gen, elevi din școala primară, performanță matematică, implicarea părinților.

Keywords: math anxiety, gender stereotype threat, primary school students, math performance, parental involvement.

1. INTRODUCTION

Mathematics plays an essential role in both academic and professional success and is also seen as a gateway to employment in well-paying positions.

Mathematics is major component of numerous fields known as science, technology, engineering, and mathematics (STEM) (Yuksel-Şahin, 2008; Geist,

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2010; Smith, 2016). Students' achievement in mathematics has been widely recognized and investigated at both national and international levels (Merritt, 2011). Despite the robust presence of mathematics in our daily life, it is often viewed as a complicated and difficult topic (Maloney, Schaeffer & Beilock, 2013; Arslan, 2013).

Many studies have emphasized that math anxiety develops as early as primary school (Ma, 1999; Birgin *et al.*, 2010). For example, 21% of nine-year-old children reported that doing mathematics made them nervous (Joseph, 2009). In Jordan, Tunisia, Argentina, Mexico, Korea, Indonesia, Uruguay, Malaysia, and Romania, at least 75% of the students of these countries admitted feeling worried about doing mathematics (e.g., I often worry that it will be difficult for me, I worry that I will get poor grades) (OECD, PISA, 2012). Math anxiety is defined as a combination of unpleasant feelings such as stress, strain, fear, and apprehension in situations that demand mathematical or arithmetic skills (Rosnau, 2006; Iossi, 2013; see also Xie *et al.*, 2018). Over the past few decades, researchers, educational specialists, and psychologists have engaged in many investigations to uncover the sources of math anxiety and its impact on math outcomes. A significant segment of the reviewed literature has identified parents as a fundamental risk factor for fostering childhood math anxiety and related math-gender stereotypes (Maloney & Beilock, 2012; Batchelor, Gilmore & Inglis, 2017; Rubinsten *et al.*, 2018), besides their role as a resource in promoting children's math achievement.

Although schools are usually viewed as the primary vehicle for advancing academic competence and life aptitude, parents also play an important role in their children's success in life (Jacobs & Eccles, 2000). Parents are also their children's first and sustained teachers. However, what if parents are themselves math-anxious? Or they are stereotyped by seeing mathematics as a male domain? (Maloney *et al.*, 2015). Quite a number of studies have examined the important role parents are playing in shaping their children's identity and their perspectives, therefore, there is a substantial reason to investigate the parental influences on children's mathematics anxiety. (Soni & Kumari, 2017). There is clear evidence to propose that parents act as expectancy socializers, thus children may pick up hints from their teachers, parents, or peers when it comes to mathematics, learning that math is worrisome. Furthermore, children who begin schooling with limited fundamental mathematical skills could be more vulnerable to endorsing social cues such as math-gender stereotypes (Beilock & Willingham, 2014).

The objectives of this narrative review are to investigate the relationship between parents' math anxiety and their children's math anxiety, to analyze the role plays parents' involvement in their child's homework as a proxy for developing math anxiety and to explore the role of parent's math gender stereotype as a key that explains the gender gap in mathematics performance and math anxiety.

2. PREVIOUS STUDIES

2.1. ARE PARENTS WITH MATH ANXIETY LIKELY TO HAVE MATH ANXIOUS CHILDREN?

Undoubtedly, parents represent the primary socializing agent and the first role model for their children, who imitate what their parents prefer or dislike and how they relate to certain things. This applies to learning as well, and even to specific fields of education, such as mathematics. However, sometimes parents may give children confusing messages about math. For example, parents may emphasize the complicated and difficult nature of mathematics, but at the same time admit that mathematics skills are important for their academic success and future achievements. Hence the parents' role cannot be ignored and reveals a need for continued investigation of the role of parents in shaping their children's attitudes towards mathematics (Hill & Taylor, 2004; Batchelor *et al.*, 2017).

Many studies suggest that negative math attitudes of both parents and teachers were associated with children's poor math aptitude and the development of math anxiety. For example, children can pick up some messages from ordinary dialogues with their parents, (e.g., "math is complicated!" or "it is dreadful to calculate our monthly expenses"); these spontaneous messages may lead children to profoundly dislike mathematics and to develop negative emotions and fears toward it or to any aspects related to mathematics (Parsons, Adler & Kaczala, 1982; Maloney *et al.*, 2015).

Casad *et al.* (2015) carried out a study among students enrolled in 6th to 8th grades. The results confirmed the association between parent's math anxiety and children's math anxiety within gendered dyads. The most significant relationships were found between same-gender parent-child dyads, specifically the mother-daughter ones, while both child's math anxiety and parent's math anxiety interacted to predict mathematics outcomes. The findings revealed a significant positive correlation between child math anxiety and parent's math anxiety ($r = 0.5$). In contrast, Jameson (2013) examined the environmental factors related to math anxiety in 2nd-grade students (aged 7–9 years), and found no significant association between parents' math anxiety and their children's math anxiety (see Table no. 1) for a summary of relevant studies. The presented studies in the table were chosen based on their purposes and their investigated relationships that support our scoping review.

In addition, Batchelor *et al.* (2017) conducted a similar study with the participation of 38 child-parent dyads and the findings revealed a significant positive correlation between parents' math anxiety and their sons' math anxiety levels ($r = 0.76$), while no association was found between parents' math anxiety and daughters' math anxiety. As the researchers indicated, these findings could be accounted for by the mediating effect of parental involvement in the child's homework or possibly by the gender distribution of the participants. Indeed, math-anxious parents are more probably to pass their math anxiety to their children,

particularly when these parents frequently help their children with math homework. According to Allen (2015) when parents are themselves math-anxious, their children often learn less math throughout the school year.

Table no. 1

Descriptive information of Studies on the Relationship between Child measurements
parental measurements

Study	Year	Participants	Instrument	Main results
Casad, Hale & Wachs	2015	N= 1342 parents N=683, 11–14 years, 377 girls, 306 boys	Parents' MA, Child's MA (Marx and Stapel, 2006).	$r = 0.500^{***}$ (parent–child math anxiety)
Jameson	2013	N= 81 parents N= 91, 7–9.4 years, 48 boys, 43 girls	CAMS, MAMAS	$r = 0$ (parent–child math anxiety)
Batchelor, Gilmore & Inglis,	2017	N= 38 child-parent dyads 6–9.8 years 26 Daughters, 12 Sons	CMAQ, MAS-UK	$r = 0.76$ (parent–sons math anxiety) $r = 0$ (parent–Daughters math anxiety)
Maloney <i>et al.</i>	2015	N=133 Parents N= 438, $M_{age} = 7.21$ years, 243 girls, 195 boys	C-MAQ, sMARS, AHP	A correlation between (parent–child math anxiety) moderated by parents' helping behavior
Soni & Kumari	2017	N= 595 child-parent dyads Grade 5 th -10 th , 10–15 years	MARS-E, MARS-A, MARS-SV, ATMI	$r = 0.91^{***}$ (parent–child math anxiety) $r = -0.70^{***}$ (child math anxiety–math achievement) $r = -0.76^{***}$ (child math attitude–parents' math anxiety)
Schaeffer <i>et al.</i>	2018	N=587, 1st–3rd grades, 299 girls, 288 boys	CMAQ, sMARS	Negative association between parents' math anxiety–math achievement
Hart, Ganley & Purpura	2016	N= 339 parents of children ages 3 to 8. Gils=235, Boys=104	HES, MAS, PRCS (Parent's scale)	$r = 0.23$ (home math environment factor–parent's report of child skills)
Roberts & Vukovic	2011	N=78 child-parent dyads, 2 nd -grade, $M_{age} = 7.10$ years, Gils=43, Boys=35	MACS, PIS	$r = -.27$ (parental involvement–child math anxiety)
Vukovic, Roberts & Green Wright	2013	N= 78 child-parent dyads 2 nd -grade, $M_{age} = 7.10$ years, Gils=43, Boys=35	MAS, PIS	$r = -.27$ (child math anxiety–home support and parental expectations)

Table no. 1 (continued)

Bieg <i>et al.</i>	2015	$N = 755$, Grades 9 and 10, $M_{\text{age}} = 15.7$, Gils=416, Boys=339	GSEC, TMA, SMA	$r = .23$ (math score-explicit stereotyping) for children
Tomasetto, Alparone & Cadinu	2011	$N = 128$ fathers, 134 mothers $N = 124$ female child, 5–7 Years,	CPM, PS	No correlation (Parent stereotyping–child math performance)
Kiefer & Sekaquaptewa.	2007	$N = 63$ female college students	IAT, CGQ	$r = -.255^*$ (Implicit Gender Stereotype–Career Goals)
MAMAS=Modified Abbreviated Math Anxiety Scale, CAMS=Children's Anxiety of Math Scale, CMAQ=Child Mathematics Anxiety Questionnaire, MAS-UK=Mathematics Anxiety Scale-UK, C-MAQ=Child Math Anxiety Questionnaire, sMARS=short Mathematics Anxiety Rating Scale, AHP=Assessment of homework-helping behavior, MARS-E=Mathematics Anxiety Rating Scale for Elementary School, MARS-A Mathematics Anxiety Rating Scale for Adolescents, MARS-SV=Mathematics Anxiety Scale Short Version, ATMI =Attitude Towards Mathematics Inventory, CMAP= Children mathematics applied Problems subtest of the Woodcock-Johnson III, 2001, sMARS=short-Mathematical Anxiety Rating Scale, HES=Home Environment Survey, MAS=Math Anxiety Scale, PRCS= Parent report of child skills, PIS=Parental involvement survey, MAS=Mathematics anxiety scale, MACS=Math Anxiety in Young Children Scale, GSEC=Gender stereotype endorsement child scale, TMA=Trait mathematics anxiety, SMA=State mathematics anxiety, PS=Parent stereotyping, CPM= child's performance at the math task, IAT= Implicit Association Test(Gender Stereotyping), CGQ=Career Goals questioner				

According to Maloney *et al.* (2015), math-anxious parents are likely to transmit their anxieties to their children. More specifically, math-anxious parents may negatively affect their children's achievement in math and thus facilitate aggravating the child's math anxiety by the school year's end, but only if these anxious parents report providing frequent help to their child with math homework (see details in the section below). High-anxious parents often show a negative attitude about mathematics, because they tend to believe that math is not useful, have low motivation, and low math self-efficacy when it comes to doing math. By expressing these beliefs to their children, parents could demotivate them and impede their achievement in math. As a consequence, children would reduce the effort they invest in doing math or start avoiding math courses, which, in its turn, leads to a decline in their math achievement and facilitate the development of math anxiety

In a study involving 595 Indian students aged 10 to 15 years and one parent of each child (mother or father), Soni and Kumari (2017) confirmed that parent's mathematics anxiety was positively associated with children's mathematics anxiety and negatively affected their mathematics attitude. A potential reason for these findings is that when parents have positive feelings and attitudes toward math, it

encourages their children to have a similar outlook and lessens math anxiety, consequently improving their performance. However, parental math anxiety and math attitude serve as an antecedent for their children's math anxiety and math attitudes and can further affect the math achievement of their children.

Another study among primary school students (1st–3rd grades) investigated the relationship between parents' math anxiety and their child's performance, reporting that children's math performance was negatively associated with high parent math anxiety. Interestingly, this was not the result of the families who were given a math app (experimental group) and included in a long-term math app intervention. In this experimental group there were no differences in children's math achievement in relation to parents' math anxiety (Schaeffer *et al.*, 2018).

2.2. PARENTAL INVOLVEMENT IN MATH ACTIVITIES AND THEIR CHILDREN'S MATH ANXIETY

Nowadays, educational experts and teachers insist on the importance of parental involvement in their children's learning process (Maloney & Beilock, 2012). Many studies have confirmed parents' role in their children's educational development. On the one hand, part of it is accomplished through their school involvement, consisting of many activities such as attending school events, meetings of parent-teacher conferences, and volunteering at school. And, on the other hand, the home learning environment, which includes any activities that parents and their children engage to support learning development (Hill & Taylor, 2004; Hart *et al.*, 2016).

For many years, researchers have ignored the role of parents' anxiety on children's math anxiety and performance, which stems from different reasons. For example, from the common misunderstanding that mathematics learning is more likely to occur at school than at home, or that the role of teachers is more relevant than parents' role in math learning. An additional possible reason for this literature gap is that people do not picture parents computing math and may not think about parent's math efficiency unless it is part of their occupation e.g., banking, accounting (Tiedemann, 2000; Eccles, 2009; Casad *et al.*, 2015). However, just as teachers, parents are considered to be role models for their children. Parents represent long-term role models and their feelings and beliefs can affect their children while developing their own identities, values, and perspectives (Bhanot & Jovanovic, 2005; Maloney *et al.*, 2015). Regardless of their profession, parents are likely to perform simple calculations during their daily interaction with their child. For example, when playing card games that use numbers or counting, making a household budget and recalculating a bill, or adding a tip at a restaurant, and each can trigger math anxiety (Ashcraft, 2002). Parents' math anxiety may be conveyed to children through these everyday activities, or even more directly, while helping or not helping their children with mathematics homework (Maloney & Beilock, 2012; Maloney *et al.*, 2015).

Hart *et al.*, (2016) conducted a study on children aged 3 to 8, where the findings suggested that anxious parents who are doing more home general math activities was positively associated with parents reporting higher math skills in their child, either through direct activities (e.g., helping with math homework, count out money, add or subtract numbers with the child, etc.) or indirect (e.g., playing board games, measuring ingredients when cooking, using calendars and dates, etc.) activities. Whereas doing more spatial activities (e.g., playing with Legos or puzzles, measuring the length and width of things, using a computer or video games to do spatial tasks, etc.) was associated with parents reporting lower math skills in their child, these findings could be due to spatial activities are seen as less math-related and therefore less anxiety triggering for high math-anxious parents. In addition, children who see their parents do household math activities (e.g., home fixing by using measuring tools, balancing a checkbook) consider that their parents have more self-competence and like mathematics more than those whose parents do not get involved in any home mathematical activities. By engaging in these actions, parents influence their children's perception regarding what are the more valued spare-time activities and indirectly affect their math attitudes and learning goals (Parsons *et al.*, 1982; Jacobs & Eccles, 2000). Furthermore, various studies suggested the positive associations between children's math ability and the frequency of parents' engagement in math-related home learning activities (Braham & Libertus, 2016).

Moreover, in 2001, Fan and Chen (2001) conducted a meta-analysis, and the findings indicated that some dimensions of parental involvement might have a more remarkable effect than others on students' academic achievement. For example, the strongest association was between parental expectation for their children's outcomes and their children's academic achievement, whereas the weakest association was between parental home supervision and their children's academic achievement. The same results were reported by Braham and Libertus (2016) who found a correlation between parental expectations about children's math skills and their children's ability in mathematics.

A study conducted by Maloney *et al.* (2015) on parents and child math anxiety suggested that homework assistance provided by math-anxious parents resulted in negative results in children, such as limited math learning over the school year, compared to other children, whose parents did not help them in their homework. However, the results differed for the homework assistance given by non-math-anxious parents. Besides that, the findings of several meta-analyses reported that home parental involvement was negatively related to children's achievement and homework help was also negatively correlated to student academic performance (Hill and Taylor, 2004; Wilder, 2015). However, Vukovic, Roberts, and Green Wright (2013) examined whether children's math anxiety acts as a pathway between their mathematical achievement and parental involvement in their education, with the participants of second-grade children and their parents.

The analysis demonstrated that parental expectations and home support positively correlated with children's performance on algebraic reasoning and the word problems, while a negative correlation was found between children math anxiety and parental expectations and home support.

Many arguments were proposed about parental involvement in the child's homework; is it beneficial or not? The available results suggest it could be both an advantage and a disadvantage. For instance, Abu-Hilal and Nasser (2012) found that students with higher (IQ) scores reported they did not receive much parental help with their homework but still had a more positive math self-concept and higher math achievement. Indeed, parental help did not affect achievements, but it played a significant role in improving the motivational aspects such as the self-concept. In addition, a study including elementary school children indicated that when mothers helped with homework, it didn't develop their child's academic achievement. The reasons behind why such help is ineffective due to children's and mother's math abilities, well-performing students do not need help with regular assignments, while poor students may need help but their mothers may lack the needed skills to teach them, for such children, helping may even be unproductive and frustrated. (Levin *et al.*, 1997). On the contrary, in another study involving eighth-grade students, it has been found that parents' involvement in homework was positively associated with improving children's academic achievement (Bhanot & Jovanovic, 2005). Moreover, it has been reported that with a higher level of parental involvement in children's math learning, children had lower math-anxiety levels (Roberts & Vukovic, 2011). Lately, researchers have mentioned that further parental involvement is not necessarily for the better, requesting more inquiry of the nature of parent-child educational interactions that may negatively and positively affect both emotional and academic functioning (Mellon & Moutavelis, 2011).

There are different perspectives on parental participation in their children's learning process, whether in school or at home. A study about parental involvement, such as volunteering at school, participating in Parent-Teacher association activities, and providing help with homework, revealed that these participating activities were associated with fewer behavioral problems and higher achievement (Wilder, 2015). Moreover, another study reported that mathematics achievement was positively related to parental support and their encouragement in learning mathematics (Cruz, 2012). Another finding suggested that when parents offer uninvited help and intrusive homework monitoring, children feel incompetent about their abilities and display less self-efficiency. Nevertheless, parents tend to provide such intrusive or unsolicited support when they recognize that their child is not doing well in school or does not meet their standards (Pomerantz & Eaton, 2000).

2.3. CHILDREN'S MATH ANXIETY AND PARENT'S MATH GENDER STEREOTYPE

In the last decade, many studies have investigated important areas strongly affected by the gender role: socialization, mathematics, and math-related domains where the gender gap is noticeable (Else-Quest, Hyde & Linn, 2010; Stoet & Geary, 2012). Many theoretical approaches have assumed that stereotype threat is considered a major factor that explains the gender gap in mathematics (Picho & Schmader, 2017). Stereotype threat as a concept was first introduced by Steele and Aronson (1995) and refers to the unconscious or conscious shared belief that an individual belongs to a stigmatized group known for specific deficits (Stoet & Geary, 2012; Hakim, Kurman & Eshel, 2017; Muntoni & Retelsdorf, 2019).

In a sample of German 9th and 10th graders, Bieg *et al.* (2015) found that gender stereotype endorsement plays a significant role in explaining the gender gap in math anxiety. As stated by Bhanot and Jovanovic (2005), regardless of the child's actual abilities, parental appraisal of their children in specific domains is reflected in their stereotypes. For instance, girls are thought to better perform at social sciences, while boys at math-related subjects. These stereotype endorsements may indirectly convey to the children, and consequently, undermine children's confidence in these domains. However, these preconceptions are not confirmed by actual performance differences, nor by their neural underpinnings. Kersey, Csumitta, and Cantlon (2019) investigated the gender similarities in the brain by the use of functional magnetic resonance imaging (fMRI) during math educational activities of 3 to 10-year-old children's, found no gender differences in neural responses to mathematics content in early childhood, as they attributed the reasons for the existence of gender differences in STEM fields in adults for the environmental origin but not from the intrinsic differences in children's brains or their cognition.

Flore's and Wicherts's meta-analysis (2015) confirmed the previous results of identifying math as a 'male domain' by females. In classrooms, teachers tend to see girls as less competent in mathematics, expect mathematics to be more difficult for them than for the boys, and anticipate that girls are more likely to underperform in mathematics because of the lack of ability, whereas for boys, as a result of the lack of effort. These gender stereotypes are widespread and present in the majority of educational environments (Forgasz, Leder & Gardner, 1999; Tiedemann, 2000). Women's math performance is disrupted under threatening situations, not because of their insufficient talent but because they feel threatened by the possibility that their performance in math will emphasize the negative stereotypes associated with their social group as women and confirm the assumption about math as a male domain (Tomasetto, Alparone & Cadinu, 2011).

Researchers have also indicated that when individuals identify strongly with their social group and value domain, they are more susceptible to stereotype threat (Pennington *et al.*, 2016). At the age of 6 years, girls are likely to believe that others of their gender are not 'really really' as smart as the boys (Bian, Leslie & Cimpian, 2017), and in the 3rd or 4th grades of elementary school, gender-specific

disparities of math self-concepts were observed as well (Steffens, Jelenec & Noack, 2010). These cultural messages about cognitive ability differences and the male superiority in mathematics are influential throughout child development. Thus, it is crucial to investigate these stereotyped ideas in early childhood, as soon as young children start school and begin to set up choices that shape their future aspirations (Tomasetto & Appoloni, 2013; Ongiti, 2014; Casad *et al.*, 2017).

Moreover, parents' gender-stereotyped beliefs about their children's academic skills influence children's perceptions about their actual competence, creating negative emotions toward these subjects and other anxiety-related symptoms. Based on the empirical researches that investigated the negative stereotypes, the link between sociocultural factors and child math anxiety has been confirmed. (Chang & Beilock, 2016). Therefore, there is reason to consider that the beliefs and perceptions of both parents represent critical antecedents of children's attitudes, math anxiety, and math achievement (Tomasetto, Alparone & Cadinu, 2011; Gniewosz & Noack, 2012).

Given that both stereotype threat and math anxiety induce suboptimal performance in mathematics, it is reasonable that a large body of research has sought to understand these phenomena, which are considered separated constructs with different etiologies (Maloney *et al.*, 2013). Studies that investigated these phenomena and how cognitive processes interact with the affective factors regarding mathematics have concluded that both math anxiety and stereotype threat are sharing a similar mechanism represented by diminishing the working memory capacity and by increasing worrying thoughts which, in turn, disrupts mathematics performance (Bornholt, Goodnow & Cooney, 1994; Kiefer & Sekaquaptewa, 2007; Tempel & Neumann, 2014)

3. DISCUSSION

We aimed by assembling and elaborating the current review to explore the relationship between parents' and children's mathematics anxiety and to reach a better understanding of the parents' function as a role model that is a potential mechanism through which math anxiety and math gender-stereotypes might be transmitted (Geist, 2010; Smith, 2016; Batchelor *et al.*, 2017).

Both math anxiety and gender stereotypes threat can be explained based on the social role theory. Gender difference may occur because of math stereotype threat or the sex-role socialization, math is traditionally presented as a male domain, and women may feel they are less competent than men in mathematics leading them to underestimate their actual abilities, as a consequence, they will be more worried about their performance which exposed them to higher math anxiety (Beilock *et al.* 2010). Gender roles imposed by society and culture contribute effectively to define each gender role, for instance, girls are socialized to be tolerant, tender, dependent, cooperative, and to express their feelings, while, and boys are socialized to be assertive, aggressive, independent, competitive and

dominant (Heyder & Kessels, 2013). These models of gender socialization certainly affect children's expectations, their self-concept and their self-efficacy beliefs (Ongiti, 2014).

Based on the social learning theory, parents' academic values could be transmitted to their children depending on parent's participation in the school educational activities and direct or indirect home educational activities (Gniewosz & Noack, 2012). Parents can foster their children's math achievement by simply supporting positive math attitudes. For instance, if children have more positive math attitudes they will show higher math achievement than children with more negative math attitudes, therefore it is not surprising that math's avoiding behaviours are stem from negative attitudes of both parents and children (Pugsley & Price, 2018).

There is a common view that teachers are primarily responsible for the student's math achievement. Nevertheless, parents' engagement in their children's math education is also vital. That does not require parents to show a high skill in math. Rather, parents can elevate children's math performance by simply offering positive encouragement about math learning. Indeed, the parents' involvement in their children's education phase is critical mainly at an early age, while the way that parents interact with their children and their spontaneous reaction about doing math has a stronger prediction index of children's outcomes than the level of parental school involvement.

4. CONCLUSION

In the current scoping review, we attempted to demonstrate and analyze the relationship between parents' math anxiety and their children's math anxiety. On the one hand, we highlighted the parents' involvement in their child's homework as a proxy for developing math anxiety and, on the other hand, we emphasized the role of parent's math gender stereotype as a key that explains the gender differences in mathematics performance and math anxiety.

The environmental influences on math anxiety and achievement were widely investigated, especially the role of parents and the home math environment (Sepehrianazar & Babae, 2014; Hart *et al.*, 2016). It has been concluded that children's mathematics anxiety is related to parents' mathematics anxiety, while the parent's gender and parental involvement in homework were considered as mediators in this relationship (Batchelor *et al.*, 2017). A study conducted by Berkowitz *et al.* (2015) on math at home and child achievement found that when parents are more anxious about math, their child learned less math during first grade compared with children of less math-anxious parents.

Concerning the parental impacts on children's math attitudes and outcomes, the gender gap in the transmission of attitudes and anxiety has been investigated in many studies and was emphasized the role of gender stereotype threat among adults and children. For instance, parents reported that girls need to spend more

effort in mathematics learning than boys do while girls declared less efficiency and less confidence in their math abilities than boys, which resulted from many years of exposure to math stereotype threat (Batchelor *et al.*, 2017).

As we have noted, it is very challenging to identify the parental influences on their child's math anxiety and outcomes because this relationship is affected by several factors, such as parents' math anxiety, their involvement in child learning at home or school, and their gender stereotypes toward mathematics. Further investigations are needed in this direction to reach a deeper understanding of this multimodal relationship, for instance, a future extension of this current review may aim to analyze the impact of cultural contexts on the previously discussed relationships.

5. LIMITATIONS

The current review was not without limitations. First, cultural differences may affect the findings of each study, the age of participants and the demographic features differ from one study to another, on the other hand, different measures were applied in each study while a various data analysis was calculated, all of these aspects make it challenging to compare the results.

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REZUMAT

Un număr semnificativ dintre elevii din învățământul primar se confruntă cu anxietate față de matematică și cu tendința de a evita participarea la orele de matematică sau de a evita învățarea matematicii. Ținând cont de rolul fundamental al matematicii în creșterea economiei globale, cercetările actuale investighează motivele care stau la baza evitării matematicii la actualele generații de elevi. Deși s-a constatat că antecedentele anxietății față de matematică sunt variate, rezultatele cercetărilor empirice ne arată că anxietatea părinților față de matematică și stereotipurile lor de gen față de matematică joacă un rol decisiv în determinarea performanței și anxietății copiilor față de matematică. S-a constatat că există un număr limitat de studii care au investigat relația dintre anxietatea față de matematică a copilului și părinților. Majoritatea studiilor au investigat relația dintre anxietatea față de matematică și performanța matematică. În acest *review* teoretic al literaturii, am analizat și sintetizat în mod critic literatura disponibilă referitoare la relațiile dintre anxietatea față de matematică a copiilor și părinților, stereotipurile de gen ale părinților față de matematică, precum și modul în care implicarea părinților în realizarea temelor de casă ale copiilor influențează anxietatea față de matematică și performanța matematică a copiilor. În partea de concluzii am sumarizat constatările făcute cu scopul înțelegerii relațiilor dintre variabilele analizate.

