

Reasons Behind Female Students' Math Anxiety in Azerbaijan

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In Azerbaijan, high school students choose their future profession according to their knowledge on specific subjects. Undergraduates who are good at math, and science choose medicine, or engineering, while the others prefer to choose language or law faculties. The gender imbalance in some faculties is quite large, especially education and engineering-related ones. Not surprisingly the former consists mostly of women, while the latter is dominated by men. When we look at the reason behind this imbalance, there are several factors to understand: growing up in a society with popular stereotypes such as *girls are good at reading; boys are good at numbers* or *being smart in specific area is related to genetics*, not having enough women role models in math, negative experiences with sexist teachers in math classes and so on. All these factors in society are the beginnings of challenging and anxious situations for female students to prove themselves as a smart pupil in mathematics. That is the reason why sometimes despite their skills and knowledge, girls do not choose math-related specialties. Therefore, the described problem reveals a need to make essential changes in the education system in order to encourage more girls and women to pursue math-related careers.

In this paper, I first discuss how the notion of math anxiety has been used to describe certain situations that are observed during math classes regularly. I explain social factors contributing to math anxiety from the literature, and my own experiences as a female student. Later, I discuss the importance of teachers' role in the creation of math anxiety to understand how teachers' well-being in this process is a

significant factor in female students' education and well-being.

Studies on math anxiety

Beginning in the 1950s, researchers began to track people's fears of numbers and negative attitudes. Having a great deal of fear, avoiding situations, and *number anxiety* were addressed by Dreger and Aiken (1957). In research, the phrase *math anxiety* was described in 1972 by Richardson and Suinn to describe pupils who struggled with problem-solving while also experiencing unpleasant physical reactions. In general, all definitions refer to having a great deal of fear, dread, and nervousness that results in poor performance in math classes (Ashcraft 2002).

The main reasons for math anxiety are divided into three groups, which are social, cognitive and academic factors. Social factors are mostly about race and gender stigmas and a lack of support from parents, especially in lower socioeconomic classes. The cognitive reasons consist of dyscalculia and deficits related to memory and its functions: students with an inability to remember formulas, who demonstrate learning disabilities in basic arithmetic around the age of ten, such as adding or multiplying numbers, or other poor linguistic and memory skills are referred to by this group. Academic factors include the implementation of old-fashioned teaching methods, unsuccessful techniques used in the teaching process, and most importantly, anxious math teachers. These academic insufficiencies manifest themselves in students in that they may not understand *why mathematics?*; in that they later forget learned mathematical concepts; and in a lack of practice, while all of these create regular feeling of frustration too.

Families' role in math anxiety

In the case of Azerbaijan, I want to draw attention toward how social factors create math anxiety for students. Because as a

society we cannot now fully prevent kids from cognitive and academic factors, we can still break stereotypes, change our views, be more supportive and make a positive impact on female students' math education.

From my own experience at school, being a female student created obligations such as being more disciplined and getting only the highest grade. Girls had to prove that they were the best to get attention from teachers. In Azerbaijan the highest grade is five at schools and it is the only grade that is accepted as a *good* grade by teachers, and parents. Even if a student gets a four, especially a girl, it is considered poor performance. When I was at primary school, my mother once explained to me that getting a five means that I have knowledge only at the level of four, because if I knew everything, I would get *five star* or *five plus*, which would mean that I am really smart. However, according to the assessment system, we do not have these "star, and plus" category.

Unfortunately, in Azerbaijan, families have turned these requirements into generational expectations, even obligations (Hunner-Kreisel et al. 2016). Since primary school years, children have the responsibility to achieve good grades, and this expectation constructs how they are treated, and loved at home by parents, grandparents, and even other relatives. The creation of math anxiety starts here, when these adults start to show love and care to their children primarily according to their grades in specific subjects. The reason behind specific subjects is an important factor because, being talented is not enough, children need to be smart. For instance, if a child is talented in music or art but bad at math, this child is considered *not good at school*. Ultimately, *the child is good at school* means the child is good at math.

Starting general education with this familial responsibility for female students is more challenging because they need to behave well and study hard from the very first day. During my

school years I never witnessed crying among my classmates over making grammar mistakes in language lessons, but during math classes intense competition driven by familial expectations manifested itself: each lesson had winners and losers. Students cried, especially girls. This obligation is applied to the females more strictly rather than males at schools and households. The stereotype of girls being more obedient, silent, and smart at school is accepted as a good sign for their families' name in society. For example, my mother is a lecturer at the college, she is good at math, and my father is an engineer, so that meant I had to be good at math as well. If I was not good at math, I would break the intergenerational continuity because my grandparents were good at math too. I remember my grandmother telling me that I should be smart, more specifically in math because all my family members had higher education, in engineering or teaching. However, in Azerbaijani society these legacies create math anxiety when you start to feel obliged to know math well out of a need to *continue this legacy*.

On teachers' role

Teachers are role models in the classroom, mentors who motivate students not to feel left behind in the classroom. So, their attitudes and their pedagogy play an important role for female students. Considering that pupils' overall mental health predicts their subsequent academic achievement (Collie et al. 2018; Gregory et al. 2021; Guhn et al. 2016; Yu et al. 2018), kids need to feel good, not worried, alone, or scared during the class. Provision of stability in a classroom environment is teachers' responsibility. Support by subject teachers has a positive influence on students' general ideas, well-being, and motivation for mathematics at school.

When we talk about families' role on math anxiety, most of the reasons are related to traditional gender stigmas and views on general education. Regarding teachers, there are other details to be mentioned. Firstly, teachers who also have math anxiety

can cause the same problem for female students. Secondly, teachers are also part of the society, so they carry traditional ideas and pressures to the classroom.

To explain the first case, stressful and poor working conditions are considered negative factors for teachers and their mental well-being. In order to decrease teachers' stress and the negative atmosphere of instruction specialization, innovative changes in the teaching process, curriculum and methods should be considered. As Beilock et. al (2010) has noted, the control of anxiety should start from the creation of a stress-free atmosphere in the classroom. In most of the literature, only the analysis of linear relationships between teachers and their students are described and given as a main reason for anxiety while psychological aspects play a more important role in the process of students becoming more anxious and thus stressed in math classes.

Students' math learning can be negatively influenced when teachers react angrily to requests for more explanation or help requests in math lessons (Cornell 1999; Fiore 1999; Jackson and Leffingwell 1999). As a math teacher, I have observed that the students who had this kind of teachers before are scared during class and barely speak or ask question. Experiencing regular aggression by teachers made them think that they are not able to understand anything and all questions they ask are *dumb questions*. Once, one of my female students confessed that in her previous school she felt she was acting during math classes, pretending that she understands everything so as not to make her teacher mad.

In teachers' scenario there may be many reasons to be stressed during the workday; for example, bad relations with administrative staff or parents, low salaries, poor working conditions and so on. According to the study by Diganayeva (2021), 54% of teachers in Azerbaijan feel exhausted at the end of day. Having continuous exhaustion damages teachers' nerve systems such that they become angry easily in class. In

this situation, students in a classroom with a math-anxious or generally angry instructor get unpleasant impressions of what their teacher thinks about math, their math knowledge and these impressions affect how well they learn this subject at school (Bush 1989).

Considering that the intellectual and emotional motivation for students comes not only from their parents (Pomerantz, Moorman, and Litwack 2007; Warner 2010), but also from teachers, teachers need to be more certain, less anxious, and less stressed in their classes. For this reason, in Azerbaijan teachers' well-being should be protected in order to prevent them from math anxiety and its possible negative consequences not only for female students, but also for teachers' future professional career.

Conclusion

Traditional patriarchy strongly influences Azerbaijani families' attitudes towards their daughters: they believe that girls need to study more than boys to be successful in education. This significant gender discrimination creates pressure on girls in the family, and that is often accompanied by pressure from teachers at school. Even if girls are good at math, they are asked to prove it by studying harder than male peers. Teachers, mostly women in Azerbaijan, have also had this same experience with their families before, and they often take this attitude into the classroom where they compound difficulties for a new generation of girls, bringing down the weight not only of societal biases but also academic anxiety on their students. To address these factors and increase the proportion of girls and women that choose math as a career, we need to pay attention and reform our societal biases. Additionally, administrators in Azerbaijani schools and the legislature needs make Azerbaijani teachers' well-being a higher priority because this leads to better outcomes for students.

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