UNIVERSITY OF TWENTE.

The impact of achievement, gender and parental involvement on students' self-concept and intrinsic motivation for mathematics and science

MASTER THESIS

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Abstract

Students', especially girls', lack of participation in science, technology, engineering, and mathematics (STEM) is a matter of worldwide concern, and research suggests this is related to students' attitudes towards mathematics and science. Using data from the Trends in International Mathematics and Science Study (TIMSS) 2015 assessment of fourth-grade students in 32 countries, a series of mean comparisons and regression analyses were conducted to determine (1) the gender gap students' intrinsic motivation and self-concept for mathematics and science; (2) to what extent student achievement, student gender, and various types of parental involvement (i.e. expectations, attitudes, education, and early numeracy activities) influence students intrinsic motivation and self-concept; and (3) to what extent there are significant interaction effects between student gender and parental involvement.

Results from this study indicated that there is a significant gender gap in students' attitudes towards mathematics and science in several countries. Mean comparisons results revealed that girls have significantly lower mathematics intrinsic motivation and mathematics self-concept but, in contrast, they have significantly higher science intrinsic motivation and science self-concept. Regression analyses revealed that, for all attitudes, student achievement and student gender have a greater impact than the different types of parental involvement. Achievement has the largest effect in all countries while gender has a significant effect in more than half of the countries, depending on the attitude. Out of the types of parental involvement, parents' expectations and parents' attitudes were the most significant variables, with parents' expectations having a significant positive effect on students' self-concept and parents' attitudes having a significant positive effect on students' intrinsic motivation. Few interactions effects between gender and parental involvement were significant.

This study provides insight into the influence parents, student gender, and student achievement have on the attitudes towards mathematics and science of boys and girls. There is evidence of a significant gender gap in students' attitudes – either on favour of boys or girls – as early as in fourth-grade, a matter of concern as this might influence student achievement and future educational choices.

Keywords: gender differences, attitudes towards mathematics and science, parental involvement, TIMSS, primary education.

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INTRODUCTION

Participation in science, technology, engineering and mathematics (STEM) fields of study and employment is a matter of international concern, as STEM plays a key role in scientific discoveries, technological innovations and economic development (Roeser, 2006). Through STEM, countries are able to meet current and future demands related to healthcare, global warming, energy, and many other topics. Yet, despite the importance of STEM, not enough students are interested in pursuing a STEM career. Moreover, among the few students who do show an interest – and who do pursue a STEM career – the proportion of women is small (Dasgupta & Stout, 2014). This can be seen in countries belonging to the OECD area, where only 23% of tertiary education graduates belong to the field of science and engineering and only 31% of these students are women (OECD, 2017). This underrepresentation is also seen in the workforce: where only 22% of scientific authors are women, and the number of patents made by women ranges from 4% to 15% (OECD, 2017).

The STEM gender gap not only puts women in an economic disadvantage, as STEM occupations are among the fastest growing and most lucrative careers (Carnevale, Smith & Melton, 2011; Dasgupta & Stout, 2014), but it could compromise the quality of innovations and scientific output (Kanny, Sax, Riggers-Piehl, 2014) by not taking women's needs and input into account. Increasing women representation in STEM, and thus increasing diversity, can lead to greater innovation, creativity and productivity (Corbett & Hill, 2015). Furthermore, it can lead to better designed solutions, more likely to represent all users, by not overlooking needs unique to women (Corbett & Hill, 2015; Margolis & Fisher, 2002). Margolis and Fisher give some examples of the consequences of the underrepresentation of women:

> some early voice-recognition systems were calibrated to typical male voices. As a result, women's voices were literally unheard. Similarly, some early video conferencing systems, in which the camera automatically focused on the speaker, ignored the participation of women. If women could not be heard, they could not be seen. Similar cases are found in many other industries. For instance, a predominantly male group of engineers tailored the first generation of automotive airbags to adult male bodies, resulting in avoidable deaths for women and children. A mostly male group of engineers designed artificial heart valves sized to the male heart (2002, p. 2-3).

To increase participation in STEM, a critical solution is to increase the representation of girls, and to reach the solution, insight into the causes of girls' nonparticipation in STEM is needed. According to Spearman and Watt (2013), there are three explanations for the STEM gender gap: (1) differences in ability between boys and girls, (2) differences in attitudes towards STEM, and (3) differences in socialization. Regarding the first explanation, results from the latest versions of international studies such as the Trends in International Mathematics and Science Study (TIMSS) and the Programme for International Student Assessment (PISA) show no large overall differences between the mathematics and science achievements of boys and girls, although this varies from country to country (Mullis, Martin, Foy, & Hooper, 2016; OECD, 2016). However, in the case of PISA 2015, the differences were "statistically significant but numerically small" in favour of boys (OECD, 2016, p. 78). Nonetheless, even if students have the required achievement levels or capabilities to pursue a STEM study, they still decide not to (Carnevale et al., 2011; Hossain & Robinson, 2012). For instance, in the United States, more than 75% of high school students who have a high math competency – as shown in their SATs results – choose not to pursue a STEM major in college (Carnevale et al., 2011). The desire to pursue a STEM career seems more closely related to the second explanation by Spearman and Watt (2013), especially to attitudes such as self-concept (Goldman & Penner, 2016) and students' motivation. In turn, these attitudes are closely related to socialization, which includes the role of parents, who deeply influence children's values and behaviours (Dasgupta & Stout, 2014).

Most of the research on the STEM gender gap in education has been conducted in transition points in education, such as secondary and tertiary education, and thus is focused on adolescents. Nevertheless, there is evidence that the gap between boys and girls in terms of attitudes in mathematics develops as early

as in elementary grades (Herbert & Stipek, 2005). Understanding gender differences in attitudes towards STEM could give insights into girls' participation in STEM and, consequently, help to meet the challenge of increasing their participation in this field. The aim of this project is to study – in the context of mathematics and science – the relationship between socialization, particularly the role of parents; and attitudes, in terms of intrinsic motivation and self-concept, among fourth grade students from different countries.

THEORETICAL CONCEPTUAL FRAMEWORK

In the last decades, attitudes towards mathematics and science have been a constant topic of interest in educational research. In general, an attitude is "a disposition to respond favourably or unfavourably to an object, person, institution, or event" (Ajzen, 1988, p. 3).

Ma and Kishor (1997) defined attitudes towards mathematics as a global measure of liking or disliking mathematics, believing one is good or bad at the subject, perceiving mathematics as easy or difficult, believing whether mathematics is useful or useless, and believing whether mathematics is important or unimportant. Similarly, Tapia and Marsh (2005) identified self-concept, value, enjoyment, and motivation as main elements of attitude towards mathematics. In a more recent study, Di Martino and Zan (2010) aimed to clarify the concept of attitude towards mathematics by analysing essays written by students from primary school, middle school, and high school. Based on the analysis, Di Martino and Zan proposed a three-dimensional model of attitude towards mathematics integrated by emotional disposition, perceived competence, and vision of mathematics. The emotional disposition reflects feelings towards mathematics, such as like, love, hate, fear or anger. Statements about perceived competence indicate whether students understand/do not understand, succeed/fail, or get good/bad marks in mathematics. Vision of mathematics is about the type of activities students relate to mathematics, which can be either instrumental (e.g. "there are too many rules") or relational (e.g. "it needs reasoning"). Di Martino and Zan also found that all dimensions are interconnected and that, particularly, emotional disposition and perceived competence were strongly connected in some essays.

Attitudes towards science is also considered a multidimensional concept. According to Osborne, Simon, and Collins (2003), attitudes towards science involve feelings, beliefs, and values held about science or school science. Osborne et al. additionally mentioned different components of attitudes towards science, such as the perception of the science teacher, self-esteem at science, enjoyment of science, attitudes of parents towards science, and achievement in science.

In the present study, attitude towards mathematics and science will be measured using the student questionnaire of TIMSS 2015 assessment of fourth grade students. Among other constructs, the TIMSS 2015 student questionnaire measures two elements of attitude towards mathematics and science: self-concept and intrinsic motivation (Hooper, Mullis, Martin, 2013). A brief review of the research on these two dimensions is given in the following paragraphs.

Self-concept

Self-concept refers, in general, to an individual's perception of his or her competence in a given activity (Wigfield & Eccles, 2000). In an academic setting, self-concept reflects an individual's perceptions about his or her academic ability (Bong & Skaalvik, 2003, Mullis & Martin, 2013) and it is established in early childhood (Bleeker & Jacobs, 2004). According to Marsh and Craven (2006), academic self-concept is different across domains; one's self-concept for mathematics is different from the self-concept for science. With that in mind, mathematics self-concept is defined as a student's perceptions about his or her own

mathematics abilities (OECD, 2016; Vandecandelaere, Speybroeck, Vanlaar, De Fraine, & Van Damme, 2012) while science self-concept is defined as a student's perception on his or her ability to do well in science (Wilkins, 2004). Both mathematics and science self-concepts have been a popular topic of research in the last decades, albeit science self-concept to a lesser extent, and most of the research has focused on the relationship between self-concept and achievement.

Intrinsic motivation

The second dimension of students' attitudes refers to the enjoyment of mathematics or science, also known as intrinsic motivation (Deci & Ryan, 1985). Deci and Ryan stated that students who are intrinsically motivated to learn science or mathematics find the subjects to be interesting and enjoyable. As with self-concept, intrinsic motivation across subjects is different (Green, Martin, & Marsh, 2006).

Variables related to students' attitudes

There are several factors related to lower or higher levels of self-concept and intrinsic motivation, such as students' achievement and gender, as well as parents' and teachers' influences or behaviours (Stake, 2006).

Achievement. Self-concept and intrinsic motivation have a positive relationship with achievement, and this happens for both mathematics and science. Research consistently shows a positive correlation between mathematics self-concept and mathematics achievement, as well as between science self-concept and science achievement (e.g. OECD, 2016; Wilkins, 2004; Chang & Cheng, 2008; Kadijevic, 2015). Although the correlation is consistently found, there is no clear consensus about the type of relationship between these variables. Calsyn and Kenny (1977) proposed two models for the relationship between self-concept and achievement: the self-enhancement model, in which self-concept has a positive effect on achievement; and the skills development model, in which achievement has a positive effect on self-concept. Additionally, there is a third model, known as the reciprocal effects model, which proposes a reciprocal relationship between self-concept and achievement (Marsh, Trautwein, Lüdtke, Köller, & Baumert, 2005). While there is no one definite model, there is evidence that the relationship between mathematics self-concept and achievement varies depending on the grade under study (Pesu, 2017), which could explain the difficulty of determining a direction in the relationship between self-concept and achievement. Regarding early school years, such as 4th grade which is the target group of the present study, there seems to be support for the skills development model (Aunola, Leskinen, Onatsu-Arvilommi, & Nurmi, 2002).

Regarding intrinsic motivation, students who enjoy a particular subject tend to do well in that subject (Williams, Williams, Kastberg & Jocelyn, 2005). In the case of mathematics, research shows that either enjoyment can be improved by achievement (Vandecandelaere et al., 2012) or that the relationship can be reciprocal; children who enjoy mathematics are more likely to have higher achievement, and children who have high achievement are more likely to enjoy mathematics (Pinxton, Marsh, De Fraine, Van Den Noortgate, & Van Damme, 2014). In science, enjoyment and achievement also correlate; high achieving students report higher enjoyment and value of science (DeBacker & Nelson, 2000). Using TIMSS 2011 data from Serbia and Slovenia, Kadijevic (2015) found a correlation between enjoyment and achievement, although it was smaller than the correlation between self-concept and achievement.

It is also important to mention the close relationship between mathematics and science, as mathematics is an important component of science subjects. Oliver and Simpson (1988) provided evidence for this relationship and found that mathematics achievement related strongly to science self-concept. Furthermore, although each subject has a specific self-concept, it might be possible that mathematics self-concept and science self-concept are related to each other.

Gender. Although gender differences in mathematics achievement have proven to be small or even non-significant in some countries (e.g. Meelissen & Luyten, 2008; Skaalvik & Skaalvik, 2004), there is still a significant gap between the self-concept of boys and girls. Research consistently shows that boys have a higher math self-concept than girls (King, & McInerney, 2014; Vandecandelaere et al., 2012; Fan & Williams, 2011; Meelissen, & Luyten, 2008; Herbert, & Stipek, 2005; Crombie et al., 2005; Skaalvik, & Skaalvik, 2004; Wilkins, 2004; Hyde, Fennema, Ryan, Frost, & Hopp, 1990). Furthermore, Herbert and Stipek (2005) concluded that these differences can be found as early as the first grade of elementary school. There is also a gender gap in science self-concept in favour of boys (DeWitt et al., 2013; DeBacker & Nelson, 2000; Jansen, Schroeders, & Lüdtke, 2014; Stake, 2006, Wilkins, 2004). However, this gap is mostly related to students in 8th grade or above. With young children, from kindergarten to third grade, there seems to be no gender differences in science self-concept (Andre, Whigham, Hendrickson, & Chambers, 1999; Patrick, Mantzicopoulos & Samarapungavan, 2008). However, Andre et al. (1999) found significant self-concept differences in the domain of physical science in grades 4-6.

Gender differences in self-concept could be explained by gender stereotypes that identify mathematics and science, mainly physics, as typically male domains (Smyth & Nosek, 2015; Cvencek, Meltzoff, & Greenwald, 2011; Nosek et al., 2009). According to Herbert and Stipek (2005) gender-stereotyped views can be conveyed by significant adults – such as parents and teachers – and result in low self-concepts in girls.

Gender differences in intrinsic motivation for mathematics and science are less clear. Meelissen and Doornekamp (as cited in Vandecandelaere et al., 2012) found no significant differences between boys and girls concerning the enjoyment of mathematics. However, other studies have found significant differences either in favor of boys (e.g. Skaalvik & Skaalvik, 2004) or in favor of girls (e.g. Vandecandelaere et al., 2012). In terms of intrinsic motivation for science, there is also a lack of consensus about gender differences. There are studies that report no differences (e.g. DeBacker & Nelson, 2000; DeWitt et al., 2013) while other studies report that boys have a higher science intrinsic motivation (e.g. Patrick et al., 2008, Simpson & Oliver, 1985).

Parental involvement. Students' parents and home environments play an important role shaping student's attitudes towards mathematics and science. For example, Maltese and Tai (2010) found that, among scientists and graduate students in scientific fields, family was an initial source of their interest in science, especially among females. Involvement comprises different parental behavioural patterns and parental practices (Fan & Chen, 2001), and it can be divided into direct or indirect, and involvement at home or at school (Farr, 2015). The present framework focuses on parental involvement at home.

Farr (2015) describes, in the context of mathematics, direct involvement at home as tasks and activities that parents perform with their children to improve their mathematics skills, such as assistance with mathematics homework and mathematics-related games. On the other hand, indirect involvement at home is about support given by parents that does not directly relate to helping their children with mathematics and it includes, among others, parents' aspirations or expectations about their children's' future education, and parents' attitudes towards mathematics.

Children who frequently played mathematics- or science-related games, or who frequently did mathematics- or science-related activities, might grow to enjoy more these subjects. Additionally, they might develop familiarity and skills in these subjects and, consequently, feel more confident of their abilities. However, the type and frequency of activities seems to depend on the children's gender, as parents tend to engage their sons in more numeracy-oriented activities while engaging their daughters in more literacy-oriented activities (Gustaffson, Hansen, & Rosén, 2013). According to Skaalvik and Skaalvik (2004), stereotyped activities (i.e. mathematics as a male domain and language as a feminine domain) may fail to reinforce a positive self-concept in mathematics among girls, as they are less likely than boys to develop familiarity and skill in mathematics related activities (Tenenbaum & Leaper, 2003).

Parents' beliefs and expectations about their child's future education have proven to be significant predictors of children's perception of their own skills, and when parents have higher educational expectations for their children, children have higher mathematics and English self-concepts (Fan & Williams, 2011). Furthermore, parental expectations for children's future education is also a predictor of mathematics enjoyment (Fan & Williams, 2011). Regarding parents' attitudes towards mathematics and science, little research has been conducted about their relationship with students' self-concept. Most of the research focuses on general attitudes and their link with achievement (e.g. Perera, 2014; Fan & Chen, 2001). Nevertheless, there is evidence that students share the same attitudes towards mathematics as their parents (Farr, 2015). The same occurs with science, as parents' beliefs about science significantly influence children's interest in science (Tenenbaum & Leaper, 2013). According to Jacobs and Eccles (2000), children construct their interests based on their parents' messages; if parents value mathematics and science, and refer to them in a positive way, it could lead to a higher enjoyment of these subjects (Farr, 2015). A possible explanation for the influence of parents' indirect involvement on children's attitudes is that parents communicate their aspirations – and their opinions – to students and, as consequence, students feel confident in their academic endeavours (Fan & Williams, 2011).

Parental involvement can be shaped by parents' characteristics, such as the parents' educational background (Farr, 2015). Results by Vandecandelaere et al. (2012) show that students whose parents had a higher educational level reported a higher mathematics self-concept, although no significant relationship was found between parents' education and mathematics intrinsic motivation. Science self-concept was also not significantly related to parent education (Stakes, 2006).

RESEARCH QUESTIONS

Based on the literature previously mentioned, attitudes towards mathematics and science have an essential role in STEM education and these attitudes can be shaped and influenced by parents. This study aims to understand how parents influence their children attitudes and, particularly, identify whether there are significant gender differences in the way parents influence their children that might explain the gender gap in STEM related attitudes. The following research questions were formulated:

1. To what extent there is a gender gap in terms of mathematics and science attitudes among fourth grade students?
2. Which student characteristics (i.e. gender, achievement) and which parental influences (i.e. education, attitudes, expectations, and early learning activities) are significantly related to the attitudes of fourth grade students towards mathematics and science?
3. What is the relationship between parental influences and student gender on the attitudes of fourth grade students towards mathematics and science?

METHOD

Research design

The present study aims to examine the gender differences in students' attitudes, the factors that influence students' attitude – especially various types of parental involvement – and the interaction between parental involvement and students' gender. Thus, it is denoted as a correlational study, that uses quantitative data from a large-scale survey. Additionally, this study can be classified as cross-sectional because data collection took place at only one point in time, when TIMSS 2015 was conducted in each country. The dependent variables are the student's attitudes towards mathematics and science: mathematics self-concept, mathematics intrinsic motivation, science self-concept, and science intrinsic motivation. The independent variables come from both the students and their parents, and include student gender, student achievement, father education, mother education, parent attitudes towards mathematics and science, parent expectations, and early learning activities.

Data source

The data used for this project comes from the latest application of the Trends in International Mathematics and Science Study (TIMSS) to fourth-grade students. TIMSS is an international assessment of mathematics and science at the fourth- and eight- grades, conducted by the International Association for the Evaluation of Educational Achievement (IEA) every four years since 1995 (Mullis & Martin, 2013). In TIMSS 2015, the latest and sixth assessment in the TIMSS series, a total of 50 countries participated in the assessment of fourth-grade students.

TIMSS has the goal of helping countries to make informed decisions on how to improve teaching and learning of mathematics and science (TIMSS & PIRLS, n.d.). For this, TIMSS not only measures educational achievement in the subjects of mathematics and science, but also students' context for learning both subjects. There are several sources of context information in TIMSS which include, in the fourth-grade assessment, questionnaires for students, parents, teachers, school principals, and national research coordinators (Hooper, Mullis, & Martin, 2013). The present project focuses on data from the student and parent questionnaires, as well as achievement data.

The mathematics and science assessments used in TIMSS are based on comprehensive frameworks developed in collaboration with the participating countries. For each subject and grade, the frameworks are organized around two dimensions: a content dimension, specifying the content domains to be assessed; and a cognitive dimension, specifying the thinking processes to be evaluated (Mullis & Martin, 2013).

TIMSS results, as well as its reports, assessment frameworks, and methods and procedures, are available on the TIMSS official website.

Respondents and sampling

The respondents for this study were fourth-grade students from different countries. To select the participants, TIMSS performs a two-stage random sample design. The first stage consists of a random sample of schools within each country, and the second stage involves a random sample of an intact fourth grade class in each sampled school. For the second stage, it is required that the mean age of the sampled class at the time of testing is at least 9.5 years (Martin, Mullis, Foy, & Hooper, 2016). More information on the methods used in sampling can be found in the TIMSS Methods and Procedures Report (Martin, Mullis, & Hooper, 2016).

For the present study, a purposeful sample of countries was analysed. To ensure a high response rate from students' parents, only those countries who had at least an 85% response rate on the home questionnaire were considered during the purposive sampling. Out of the 50 participating countries, only 32 countries fulfilled this requirement. The countries in the sample are: Bahrain, Belgium (Flemish), Bulgaria, Chinese Taipei, Croatia, Cyprus, Czech Republic, Denmark, Finland, France, Georgia, Hong Kong SAR, Hungary, Indonesia, Islamic Republic of Iran, Ireland, Italy, Japan, Kazakhstan, Republic of Korea, Lithuania, Morocco, Oman, Poland, Portugal, Russian Federation, Saudi Arabia, Serbia, Singapore, Slovak Republic, Turkey, and United Arab Emirates.

Instruments

There were three instruments used in this study: an achievement test, a student questionnaire, and a home questionnaire. All the instruments were developed by the IEA.

Achievement test. TIMSS 2015 measured achievement in the subjects of mathematics and science. Each student received a booklet with that consisted of four blocks – two per subject – of items. Each booklet was designed to have a total test duration of 72 minutes. There were two types of items in the test: multiple choice items, with four possible answers; and constructed response items, which required students to write down their answers. The cognitive dimension of both subjects consisted of three domains: knowing, applying, and reasoning. The mathematics part of the test assessed the content domains of Number; Geometric Shapes and Measures; and Data Display. The science part measured the content domains of Life Science, Physical Science, and Earth Science.

Student questionnaire. After completing the achievement test, students completed a 30-minute questionnaire about different aspects of their home and school lives. The present study will focus on the following variables:

- *Gender*
- *Mathematics self-concept*: Students were asked to indicate their level of agreement on a 4-point Likert scale, ranging from 4 (agree a lot) to 1 (disagree a lot) to nine statements (e.g. "I usually do well in mathematics").
- *Mathematics intrinsic motivation:* Students were asked to indicate their level of agreement to nine statements (e.g. "I enjoy learning mathematics").
- *Science self-concept:* Students were asked to indicate their level of agreement to seven statements (e.g. "I am just not good at science").
- *Science intrinsic motivation*: Students were asked to indicate their level of agreement to nine statements (e.g. "I like science").

Home questionnaire. TIMSS included a home questionnaire for students' parents and caregivers to collect information about students' home backgrounds and early learning experiences. The items of interest for the present study are:

- *Early numeracy activities*: Respondents were asked to indicate how frequently they did certain numeracy activities with their children (e.g. "Play with number toys"), ranging from 1 (often) to 3 (never or almost never).
- *Parental attitude toward Mathematics and Science*. These items assessed parents' feelings towards STEM fields (Hooper, 2016). Parents were asked to indicate their level of agreement on a 4-point Likert scale, ranging from 4 (agree a lot) to 1 (disagree a lot), with eight statements about mathematics and science (e.g. "Learning science is for everyone", "Most occupations need skills in math, science, or technology").
- *Parent education***.** Respondents were asked to indicate the highest level of education completed by the child's mother and father.

- *Expectations about child's education.* Respondents were asked to indicate how far in education they expect their child to go. They could select whether they expected their child to finish: lower secondary education, upper secondary education, post-secondary education, non-tertiary education, short-cycle tertiary education, a Bachelor's or equivalent level, or a postgraduate degree.

Data analysis and procedures

Data analysis was conducted using SPSS (IBM Statistics Version 23), Microsoft Excel 2016, and IEA IDB Analyzer (Version 4.0.14), an application developed by the IEA for analysing data from large-scale assessment surveys, such as TIMSS (IEA, 2017).

Data files for the 32 selected countries were downloaded from the TIMSS official website. There were two files for each country: one for the student background questionnaire –including achievement data – and one for the home background questionnaire. The next step was to use the 'merge module' of the IDB Analyzer to combine files from both sources (i.e. student and home questionnaires) and from all countries, which resulted in one definitive database. Next, invalid or missing cases were deleted, as well as cases for which the home questionnaire was answered by someone other than the mother or the father of the student, or for which there was no information on who answered the home questionnaire. The final database contained 169212 cases. Additionally, to meet the requirements of the regression analyses, the categorical variable gender was dummy coded to 0 (male) and 1 (female). New variables were also computed to include the interaction effects between gender and the remaining dependent variables in the regression analyses.

Next, the 'analysis module' of IDB Analyzer was used to run different types of analysis. First, to get an overview of the gender gap in achievement and to answer the first research question, mean comparisons were conducted for achievement, attitudes, early numeracy activities, and parents' expectations. The correlation between these variables and gender was also computed to be able to make comparisons across variables. Next, to answer the second research question, four linear regression analyses were run with each attitude (i.e. mathematics intrinsic motivation, science intrinsic motivation, mathematics self-concept, science self-concept) as dependent variables, and student characteristics (i.e. gender, achievement) and parental influences (i.e. early numeracy activities, expectations, attitudes, education) as independent variables. For the third research question, other four regression analyses were conducted with the interaction between gender and each parental influence variable, as well as the interaction between gender and achievement. For all analyses, plausible values were used as well as the sampling weight variable 'HOUWGT' (house weight), which sumps up to the national student sample size (Foy, 2017).

The product of every analysis run in IDB Analyzer was an SPSS syntax file, which was then run with SPSS. After running the syntax, the results were shown in an SPSS output file. Along with the output file, the syntax gives additional outputs, out which the Excel files were used to compute significance values.

RESULTS

Gender Differences

To answer to what extent there is a gender gap in students' attitudes towards mathematics and science, a mean comparison conducted, with boys as the reference group and girls as the comparison group. Additionally, and to get an overview of the TIMSS 2015 data, the mean comparison was also conducted for student achievement and parental influence. To be able to compare results across variables, the assessment also included the correlation between gender and each variable (i.e. mathematics achievement, science achievement, mathematics intrinsic motivation, science intrinsic motivation, mathematics self-concept, science self-concept, early numeracy activities, and parents' expectations). Positive correlations indicate advantages for girls and negative correlations indicate advantages for boys.

Achievement

Overall, girls and boys had a similar mathematics and science achievement. However, when looking at individual countries, the gender gap in achievement varied from country to country, either in favor of girls or boys. The average mathematics achievement was 516.18 (*SD* = 75.81) for girls; and 517.21 (*SD* = 80.47) for boys. The correlation between gender and mathematics achievement ranged from -.16 to .17. The correlation was negative in half of the countries, and significantly so in 13 countries (see Figure 1). The correlation was positive only in Saudi Arabia, Oman, Bahrain, and Finland.

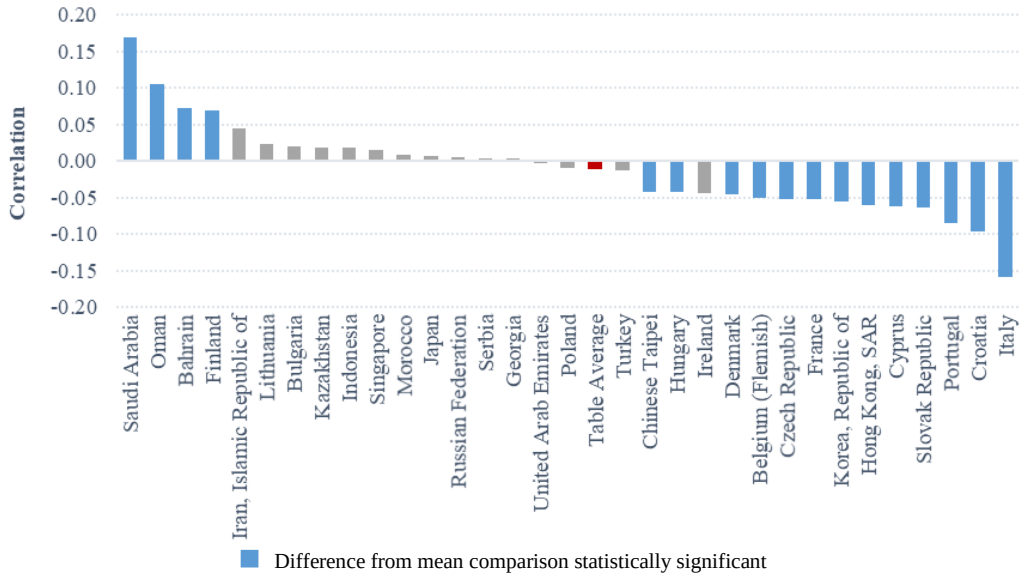


Figure 1 Correlation between gender and mathematics achievement by country.

For science, the average achievement for girls was 512.78 (*SD* = 77.29) and the one for boys was 509.67 (*SD* = 82.34). The correlation between gender and science achievement ranged from -.09 to .30, and it was statistically significant in only 13 countries (see Figure 2). There was a similar amount of countries with positive (6) and negative correlations (7). The complete results, by country, are shown in Appendix A.

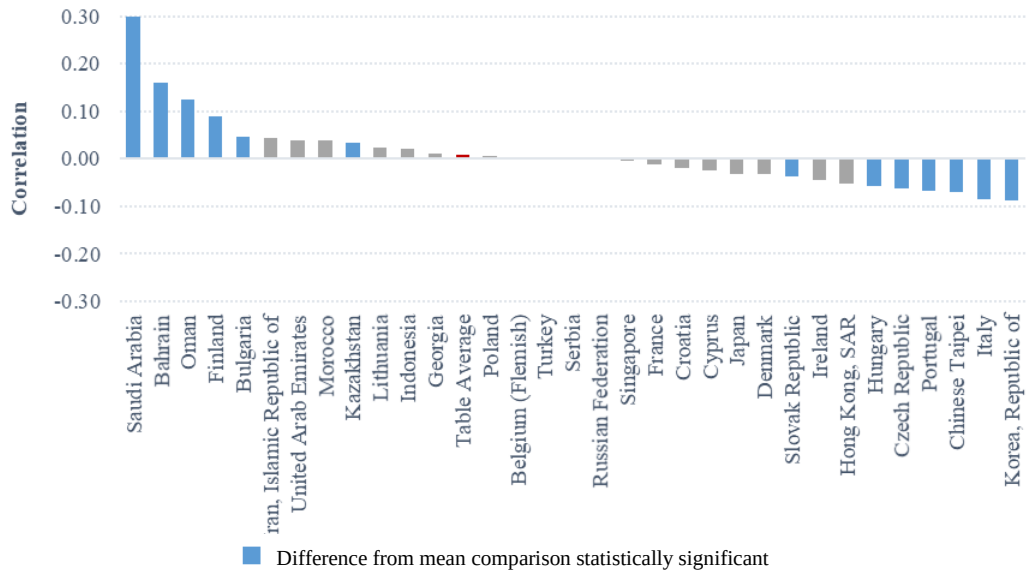


Figure 2 Correlation between gender and science achievement by country.

Attitudes towards mathematics and science

Intrinsic motivation. Results of the comparison of the intrinsic motivation of both subjects, by gender, are shown in Appendix B. The overall mathematics intrinsic motivation was 9.97 (*SD* = 1.66) for girls; and 10.10 (*SD* = 1.76), for boys. The correlation with gender ranged from -.19 to .21. The correlation was negative in most of the countries (see Figure 3), and significantly so in 16 countries. Furthermore, negative correlations were larger than positive ones.

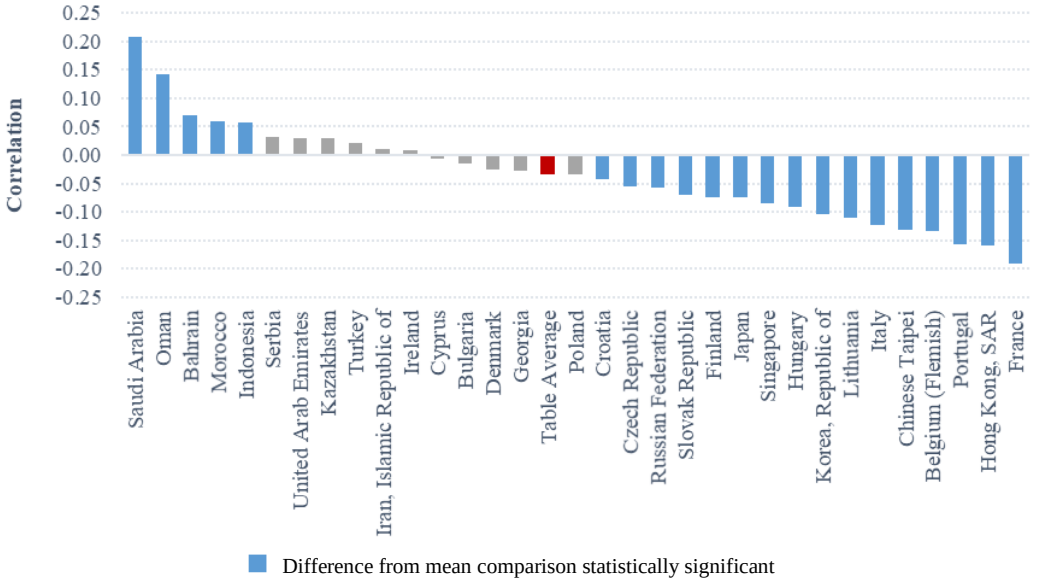


Figure 3 Correlation between gender and mathematics intrinsic motivation by country.

The average science intrinsic motivation was 10.16 (*SD* = 1.88) for girls, and 10.13 (*SD* = 1.98) for boys. The correlation with gender ranged from -.12 to .25. In contrast with mathematics intrinsic motivation, the correlation was positive in more countries (see Figure 4), and significantly so in 12 countries.

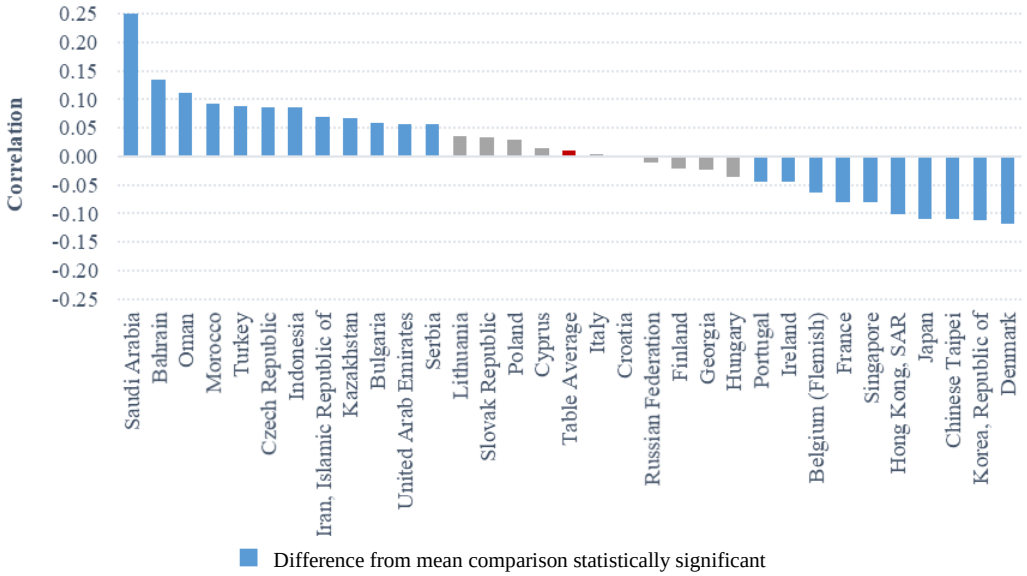


Figure 4 Correlation between gender and science intrinsic motivation by country.

Self-concept. The average mathematics self-concept was 9.81 (*SD* = 1.82) for girls, and 10.07 (*SD* = 1.89) for boys. The correlation with gender ranged from -.24 to .22. The correlation was negative in most of the countries (see Figure 5); significantly so in 20 out of the 32 countries. Furthermore, negative correlations were larger than positive ones.

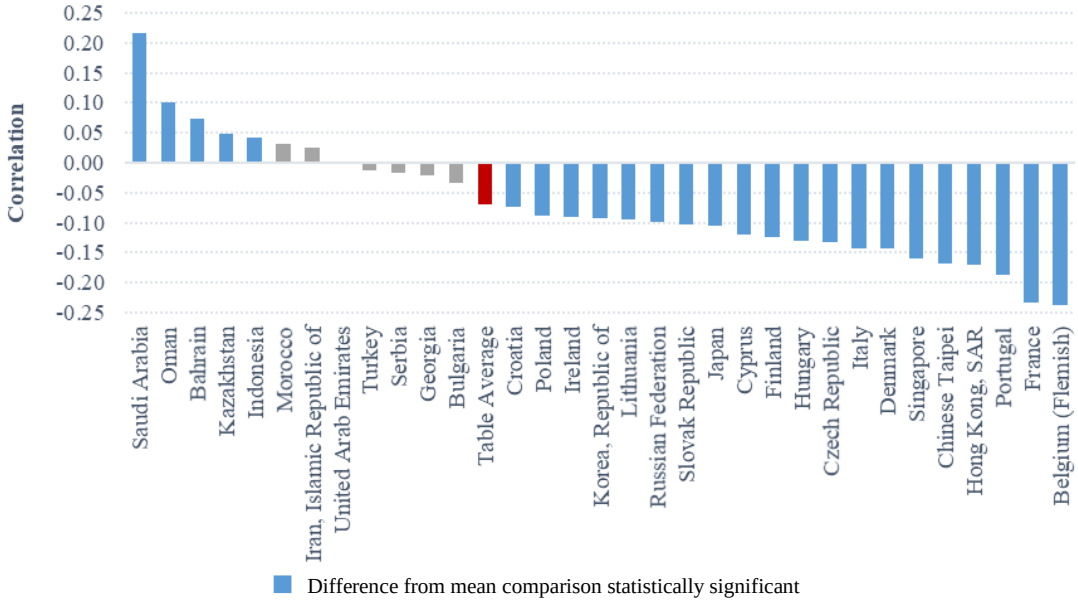


Figure 5 Correlation between gender and mathematics self-concept by country

The average science self-concept for girls was 10.03 (*SD* = 1.78), compared to 9.95 (*SD* = 1.84) for boys. The correlation between gender and science self-concept ranged from -.12 to .25. The correlation was positive in most of the countries, and significantly so in 12 countries. The complete information regarding gender differences in self-concept, for both subjects, is presented in Appendix C.

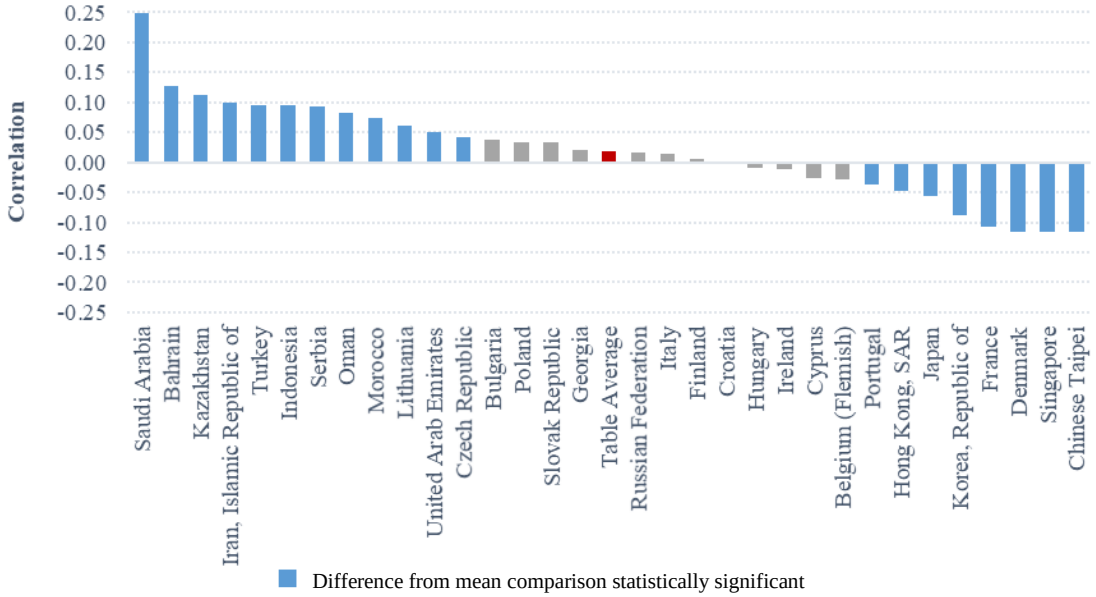


Figure 6 Correlation between gender and science self-concept by country.

Parental influence.

Gender differences in the way parents interact with their children were also calculated (see Appendix D).

Early numeracy activities. The average score for early numeracy activities was 10.10 (*SD* = 1.89) for girls and 10.08 (*SD* = 1.86) for boys. The correlation with gender ranged from -.06 to .08, and it was not significant in most of the countries (see Figure 7).

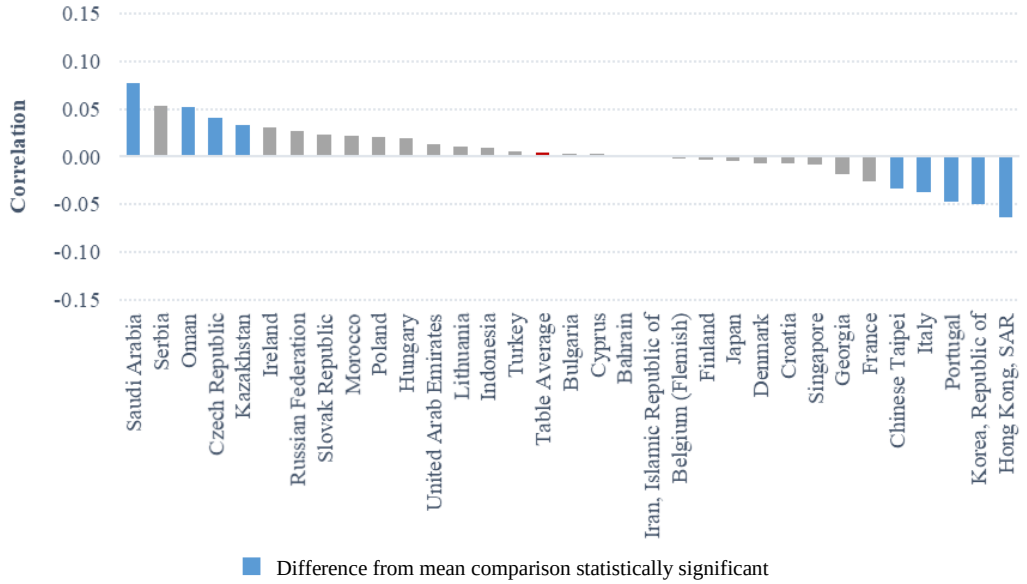


Figure 7 Correlation between gender and early numeracy activities, by country.

Educational expectations. The average score for parents' expectations was 4.80 (*SD* = 1.27) for girls, and 4.70 (*SD* = 1.31) for boys. The correlation with gender ranged from -.08 to .12. The correlation was positive in 26 out of the 32 countries, and significantly so in 14 countries (see Figure 8).

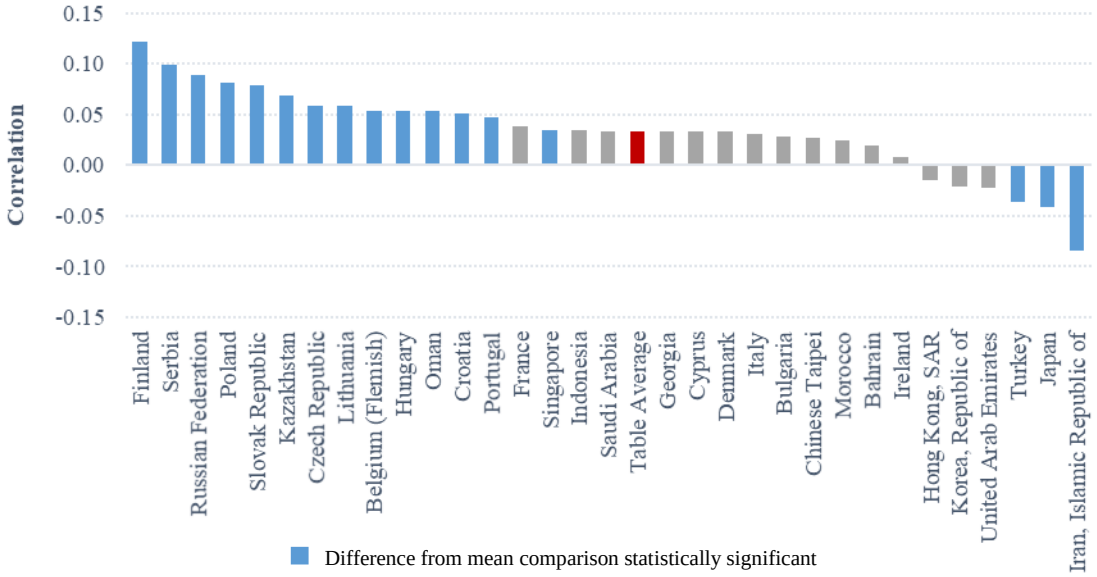


Figure 8 Mean gender difference in parents' expectations by country.

Predictors of students' attitudes towards mathematics and science

Four multiple regression analyses were conducted to explore the effects of student characteristics and parental influence on students' intrinsic motivation and self-concept in mathematics and science (see Appendix E). Two student characteristics (i.e. gender and achievement) and four parental influences (i.e. education, attitudes, expectations and early numeracy activities) were used as the independent variables of the regression models. An overview of the standardized results of the explanatory variables on each of the student attitudes, across all countries, is given in Figure 9.

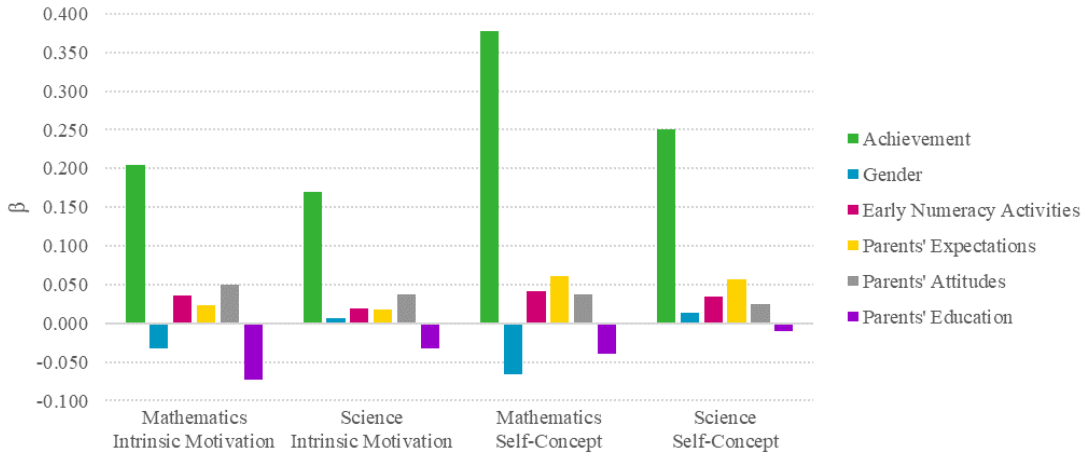


Figure 9 Summary of regression analyses results on students' attitudes.

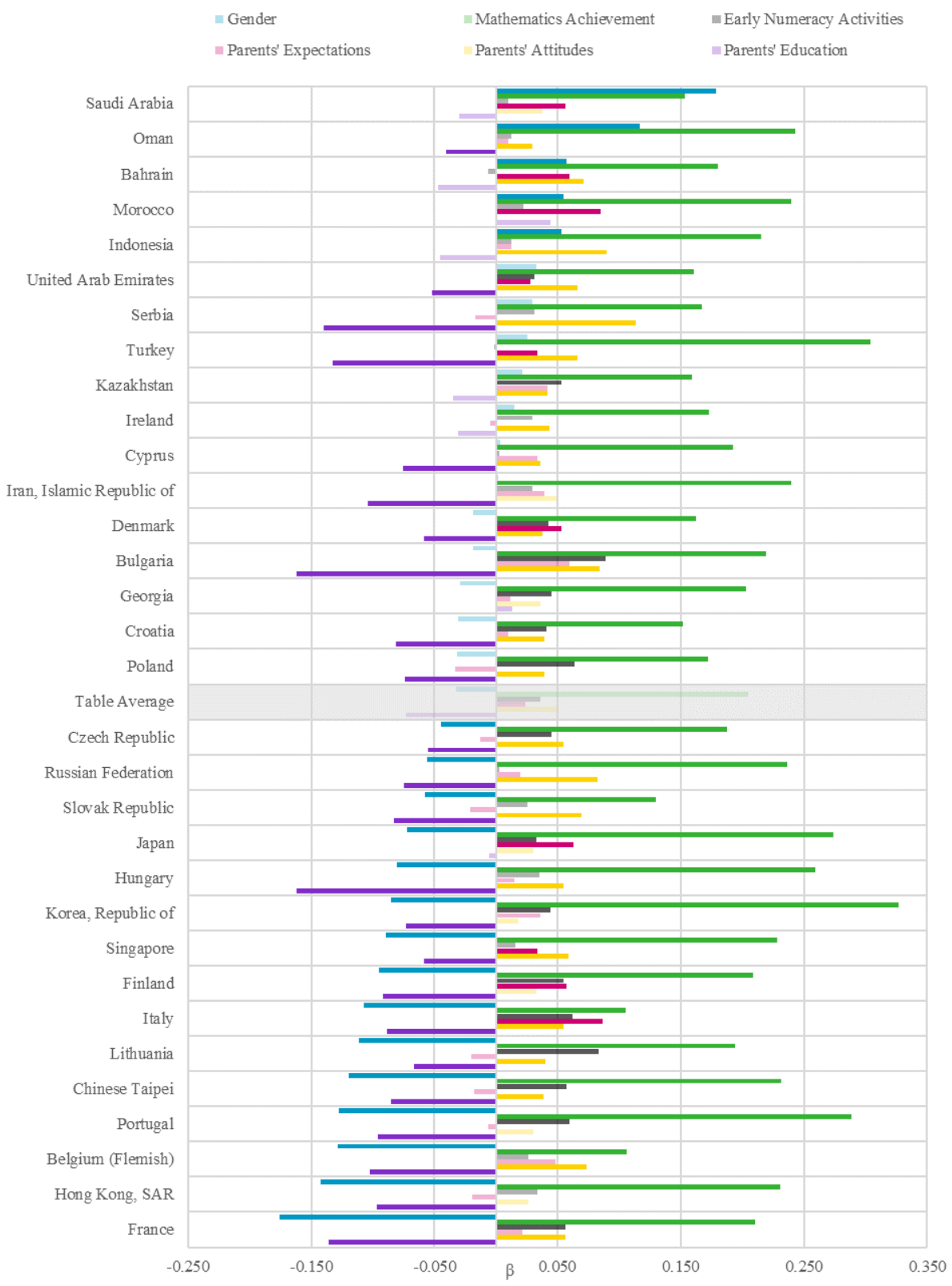
Intrinsic motivation

An overview of the regression analysis results of students' intrinsic motivation for mathematics, for each country, is presented in Figure 10. In mathematics, achievement was significant in all countries and it had a positive effect on students' intrinsic motivation. Comparing countries, mathematics achievement had the largest effect in the Republic of Korea and Turkey (β = 0.327, p < .001; β = 0.304, p < .001, respectively). Gender, the other student characteristic, was significant in 20 countries. Furthermore, in 15 of these countries the effect of gender was negative, meaning girls have significantly lower intrinsic motivation than boys do. The largest significant effect of gender in favor of girls can be seen in Saudi Arabia (β = 0.179, p < .001), and Oman (β = 0.117, p < .001). Favouring boys, the largest effects are in France (β = -0.176, p < .001), and Hong Kong SAR (β = -0.142, p < .001). The countries where gender was not significant were Poland, Croatia, Georgia, Bulgaria, Denmark, the Islamic Republic of Iran, Cyprus, Ireland, Kazakhstan, Turkey, Serbia, and the United Arab Emirates.

The effect of parental influences varied, but parents' attitudes towards mathematics and science was a predominant significant factor in mathematics intrinsic motivation. The largest effects of parents' attitudes were in Bulgaria (β = 0.084, p < .001), Indonesia (β = 0.090, p < .001), and Serbia (β = 0.113, p < .001). The effect of parents' education was significant in 24 countries; however, this effect was consistently negative. The largest effects of parent education were in Bulgaria and Hungary (β = -0.162, p < .001, for both). Early numeracy activities were significant in half of the countries, with the largest standardized coefficients in Bulgaria (β = 0.089, p = .001), and Lithuania (β = 0.084, p < .001).

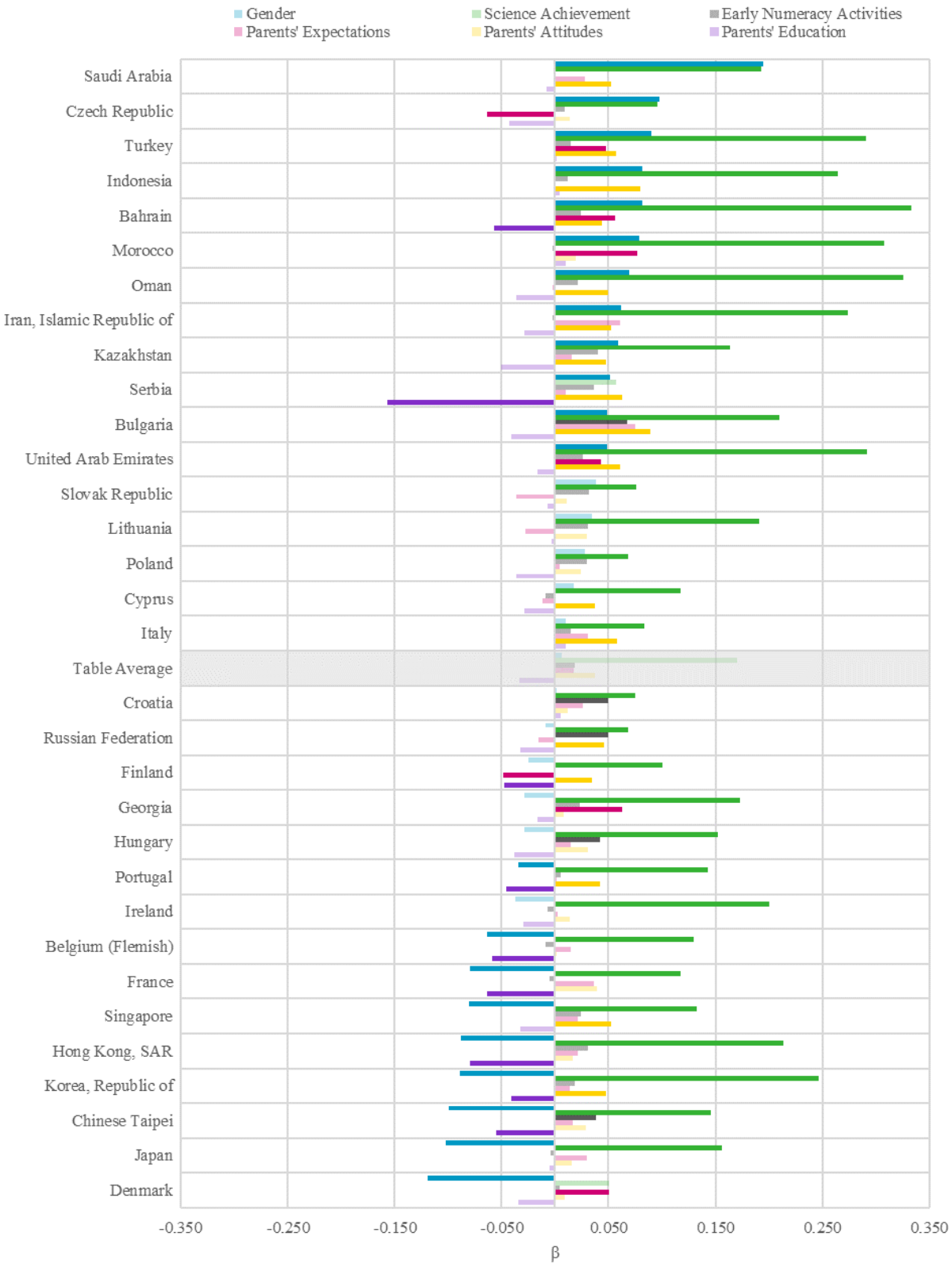
In science (see Figure 11), achievement was significant in all countries except Serbia and Denmark. The largest effects were in Bahrain and Oman (β = 0.333, p < .001; β = 0.326, p < .001, respectively). Gender had a significant effect in 21 countries. Gender held the largest significant effect – in favor of girls – in Saudi Arabia (β = 0.194, p < .001), and Czech Republic (β = 0.097, p < .001); while the largest significant effects of gender – in favor of boys – were in Denmark (β = -0.119, p < .001), and Japan (β = -0.102l, p < .001). Gender was not a significant factor in Croatia, Cyprus, Finland, Georgia, Hungary, Ireland, Italy, Lithuania, Poland, the Russian Federation, and the Slovak Republic.

There were variations on the effects of parental influences, but parents' attitudes towards mathematics and science was a predominant significant factor for science intrinsic motivation. As in mathematics intrinsic motivation, the largest effects of parents' attitudes were in Bulgaria, Indonesia and Serbia (β = 0.089, p < .001; β= 0.079, p = .001; β= 0.063, p = .009, respectively).



Note. Significant effects are marked in a darker tone.

Figure 10 Regression analysis results for mathematics intrinsic motivation by country.



Note. Significant effects are marked in a darker tone.

Figure 11 Regression analysis results for science intrinsic motivation by country.

Self-concept

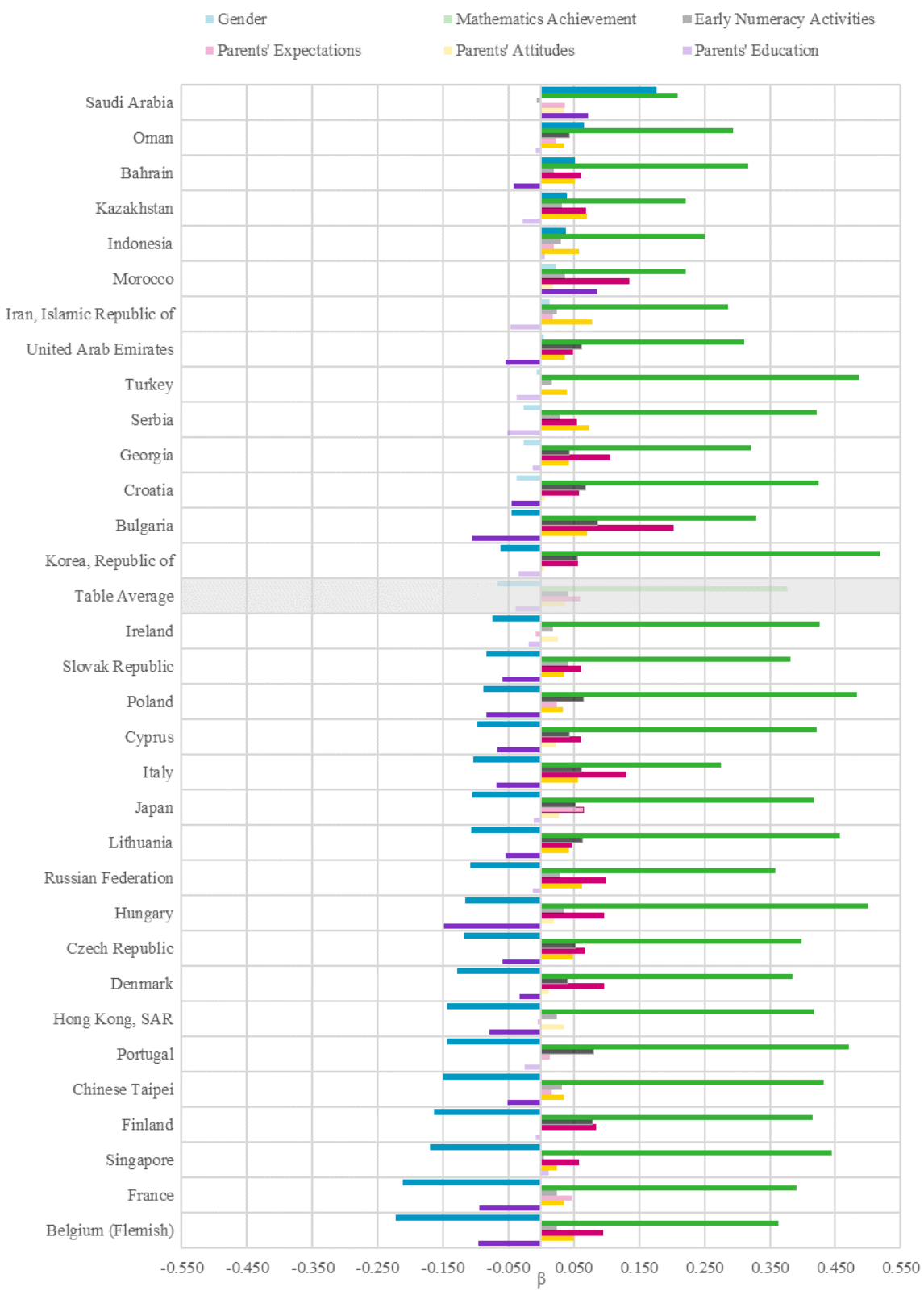
The impact of student characteristics and parental influence on students' self-concept for mathematics (see Figure 12) and science (see Figure 13) in each country was also analysed.

Student achievement had a significant effect on students' mathematics self-concept in all countries. The largest effects of mathematics achievement were in Republic of Korea (β = 0.519, p < .001), and Hungary (β = 0.500, p < .001). Gender had a significant effect in 25 countries, and in 20 of these countries the effect of gender was negative; as with intrinsic motivation, girls in most of the countries had lower levels of self-concept, even with achievement being part of the model. The largest, negative, effects of gender were in Belgium (β = -0.221, p < .001), and France (β = -0.211, p < .001). Only in five countries gender had a significant effect in favor of girls: Indonesia (β = 0.037, p = .042), Kazakhstan (β = 0.039, p = .046), Bahrain (β = 0.051, p = .014), Oman (β = 0.066, p < .001), and Saudi Arabia (β = 0.176, p < .001). Gender was not a significant factor in Croatia, Georgia, the Islamic Republic of Iran, Morocco, Serbia, Turkey, and the United Arab Emirates.

The parental influence variables were significant in most of the countries, some variables more than others. Parents' expectations was significant in 21 countries, and the effect was always positive. The largest effects of parents' expectations were in Italy (β = 0.130, p < .001), Morocco (β = 0.134, p < .001), and Bulgaria (β = 0.202, p < .001). Parents' attitudes towards mathematics and science was significant in 20 countries, and the standardized coefficient for this variable ranged from 0.025, in Singapore, to 0.078, in the Islamic Republic of Iran. As with mathematics intrinsic motivation, parents' education had, mostly, a negative effect in the 18 countries where it was significant. Only in Morocco and Saudi Arabia a higher level of parents' education was related to higher self-concept (β = 0.086, p = .002; β = 0.071, p < .001, respectively). The final variable of the regression model was early numeracy activities, and it was significant in nearly half of the countries, always with a positive effect. Early numeracy activities held the largest effects in Bulgaria, Portugal, and Finland (β = 0.087, p < .001; β= 0.081, p < .001; β= 0.079, p < .001, respectively).

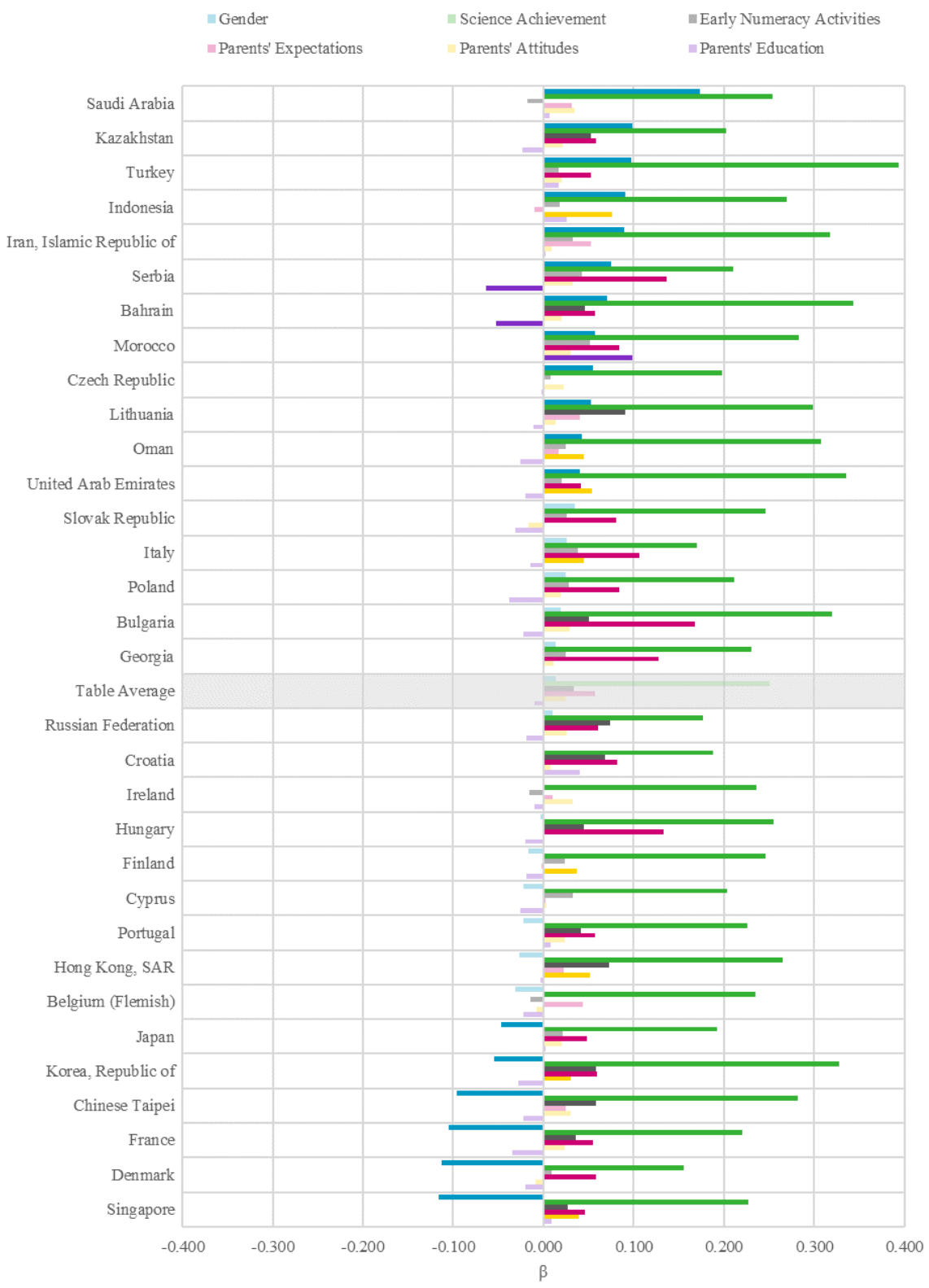
In science, student achievement was also significant in all countries, and the largest effects were in Turkey (β = 0.393, p < .001), and Bahrain (β = 0.343, p < .001). Gender was also significant in several countries; however, it was significant in fewer countries than for mathematics self-concept and in most of these countries the effect of gender was positive. Only in Japan, the Republic of Korea, Chinese Taipei, France, Denmark, and Singapore, gender had a significant negative effect.

Parents' expectations was the principal variable from the parental influences, as it was significant in 20 countries. This effect was positive in all cases, and it was largest in Bulgaria (β = 0.168, p < .001), Serbia (β = 0.137, p < .001), and Hungary (β = 0.133, p < .001). Early numeracy activities were also significant in nearly half of the countries, and it had a largest effect in Lithuania (β = 0.091, p < .001), the Russian Federation (β = 0.074, p < .001), and Hong Kong SAR (β = 0.073, p < .001).



Note. Significant effects are marked in a darker tone.

Figure 12 Regression analysis results for mathematics self-concept by country.



Note. Significant effects are marked in a darker tone.

Figure 13 Regression analysis results for science self-concept by country.

Gender interaction with predictors of students' attitudes towards mathematics and science

To further study gender differences in attitudes towards mathematics and science, and to identify where do these differences come from, the interaction effects between gender and each of the parental influences were included in the regression model. Additionally, the interaction between gender and achievement was also included in the new model, which is composed of a total of eleven explanatory variables. Results for each attitude and subject are presented next.

Overall, few interactions were significant, and this only occurred in few countries. An overview of the average standardized coefficient of each variable is presented in Figure 14. For the complete results of the regression analyses, see Appendix F.

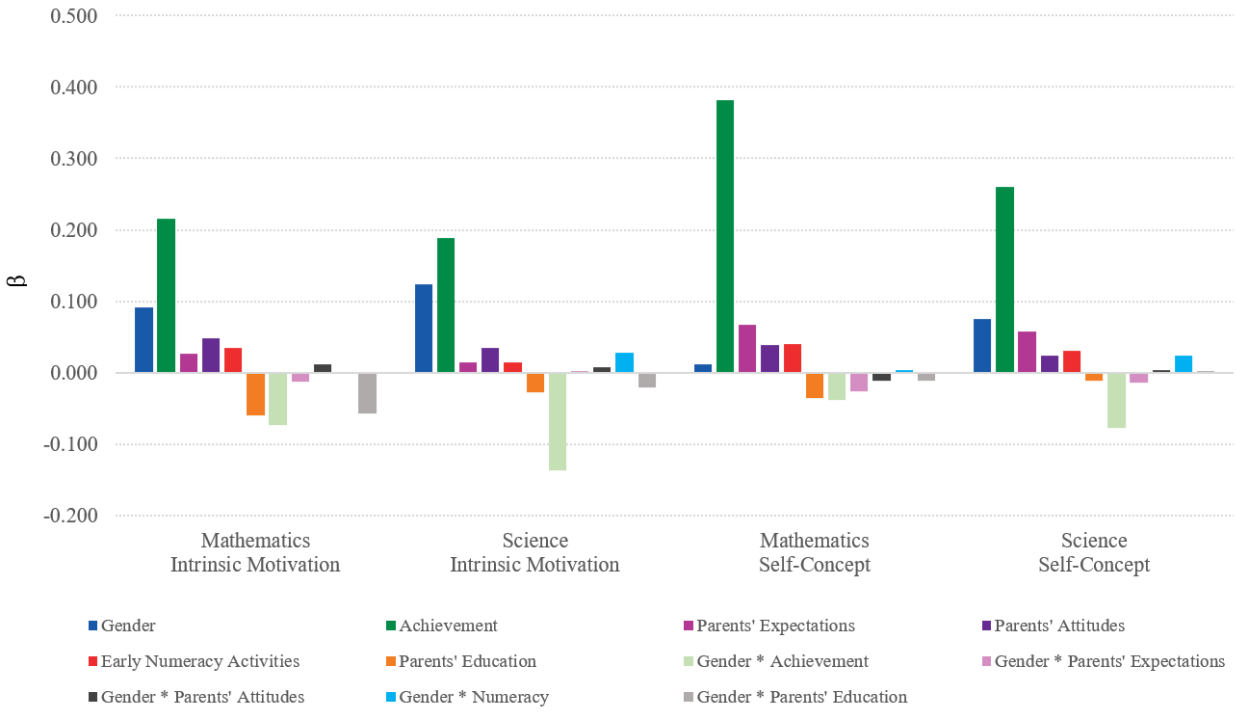


Figure 14 Summary of regression analyses (with gender interaction) results on students' attitudes.

Intrinsic motivation

For mathematics, there was a significant interaction effect between gender and parents' expectations in five countries. In Bulgaria (β = 0.182, p = .029), boys' intrinsic motivation remains the same – regardless of changes in parents' expectations – while girls' intrinsic motivation increases with higher expectations. In Finland (β = -0.121, p = .043) and Japan (β = -0.163, p = .021), the intrinsic motivation of both boys and girls increases with higher parents' expectations, however, increases in boys' motivation are larger. In Georgia (β = 0.307, p = .023), increases in expectations come with increases in girls' intrinsic motivation but decreases in boys' motivation. The opposite occurs in Singapore (β = -0.215, p = .019); girls' intrinsic motivation decreases while boys' intrinsic motivation increases with higher parents' expectations.

Another significant interaction was with parents' education, but this only occurs in four countries. In Belgium (β = -0.226, p = .013), increases in the level of parents' education come with larger decreases in girls' than in boys' motivation, and girls always have lower intrinsic motivation than boys do. In Bulgaria (β = -0.220, p = .022), girls with lower educated parents have higher intrinsic motivation than boys do but, contrarily, girls with higher educated parents have lower intrinsic motivation than boys. Both in Saudi

Arabia (β = -0.164, p = .032) and in the Russian Federation (β = -0.486, p = .003), a higher level of parents' education has opposite effects for girls and boys, as girls' intrinsic motivation decreases but boys' motivation increases.

Gender and parents' attitudes have a significant interaction in three countries. Girls in Bahrain (β = 0.349, p = .036) and in Turkey (β = 0.255, p = .015) benefit more than boys from more positive parents' attitudes. In the Republic of Korea (β = -0.187, p = .031), boys benefit from more positive parents' attitudes while girls' intrinsic motivation decreases. Nevertheless, girls have higher intrinsic motivation than boys do, even when their parents have less positive attitudes towards mathematics and science.

The interaction between gender and early numeracy activities was only significant in the Islamic Republic of Iran (β = 0.255, p = .036). There, the intrinsic motivation of both girls and boys increases when they did more early numeracy activities with their parents, but girls benefit more than boys do.

The final significant interaction was between gender and mathematics achievement, and it only occurred in three countries: Chinese Taipei (β = -0.470, p = .009), Hungary (β = -0.402, p = .002), and Singapore (β = 0.261, $p < .001$). In these three countries, students' intrinsic motivation was higher when achievement increased; however, the increase was larger for boys than for girls.

Regarding science intrinsic motivation, the interaction between gender and early numeracy activities, as well as the interaction between gender and science achievement, were significant in more countries, compared to the rest of the interaction variables. Nevertheless, both interactions were significant in only four out of the 32 countries. Early numeracy activities had a significant interaction with gender in four countries. In Denmark (β = 0.331, p = .019), the Islamic Republic of Iran (β = 0.277, p = .045), and in Saudi Arabia (β = 0.279, p = .040), girls' motivation increased when they did more early numeracy activities, while boys' motivation decreased in the same situation. In Hungary (β = 0.234, p = .036), both girls and boys showed an advantage from more early numeracy activities, but girls' increment on intrinsic motivation was larger.

The interaction with science achievement was also significant in Denmark and the Islamic Republic of Iran, as well as in Ireland and Bulgaria. In Denmark (β = -0.317, p = .046) and the Islamic Republic of Iran (β = -0.317, p = .014), although the intrinsic motivation of all students increases with higher achievement; girls with low achievement have a higher motivation than boys do, but girls with high achievement have lower motivation than boys. In Bulgaria (β = -0.319, p = .008) and Ireland (β = -0.484, p = .006), all students benefit from increases in achievement, but girls benefit more than boys.

Only in two countries – Bulgaria and Saudi Arabia – there was a significant interaction between gender and parents' expectations (β = 0.320, p = .001; β= 0.260, p = .029, respectively); the higher the expectations from parents, the higher the intrinsic motivation of girls but the lower the motivation of boys.

In Saudi Arabia and in Bahrain, gender had a significant interaction with parents' education (β = -0.250, p = .001; β= -0.221, p = .044, respectively). In both cases, having higher educated parents comes with higher intrinsic motivation for boys, but lower motivation for girls. However, in Bahrain, girls with highly educated parents still have a higher intrinsic motivation than boys do.

Finally, the interaction between gender and parents' attitudes towards mathematics and science was only significant in Morocco (β = -0.301, p = .031), with boys benefitting from more positive parents' attitudes while the opposite occurs for girls.

Self-concept

Similar to the regression analysis on intrinsic motivation, very few interactions effects were significant for students' self-concept. In mathematics, a significant interaction effect of gender and parents' education occurred in three countries: Kazakhstan, Singapore, and Turkey. In Turkey (β = -0.820, p = .032) changes

in parents' education does not affect boys' self-concept while girls with highly educated parents have lower self-concept. In Singapore (β = -0.135, p = .042) and in Kazakhstan (β = -0.191, p = .033), girls whose parents have a low education level, have higher self-concept than boys. However, when parents have a high education level, girls' self-concept is lower than the one from boys.

Also in Singapore the interaction between gender and student achievement was significant (β = -0.180, p = .036) and the same situation can be seen in Portugal (β = -0.315, p = .010). In both cases, high achievement girls have lower self-concept than high achievement boys, but when achievement is low, girls' self-concept is higher than boys' self-concept.

The effect of parents' expectations was different for girls and boys in Serbia (β = -0.197, p = .031) and the Slovak Republic (β = -0.122, p = .037), with boys benefitting more from increases in parents' expectations. However, regardless off low or high parents' expectations, in Serbia boys still have higher self-concept than girls do while in the Slovak Republic girls are the ones with higher self-concept.

Another significant interaction effect in the Slovak Republic was between gender and early numeracy activities (β = -0.230, p = .016) and this was the only country in which this interaction was significant. In this case, girls' self-concept is always higher than boys, regardless of low or high frequency of early numeracy activities.

Finally, only in the Russian Federation the interaction effect of gender and parents' attitudes was significant (β = 0.250, p = .014); when parents' attitudes are less positive, girls have a lower self-concept than boys yet, when parents' attitudes are more positive, girls' self-concept is higher than boys' self-concept.

Although still few, the interaction effects for science self-concept were more than for mathematics. The interaction between gender and parents' education was significant in five countries: Finland, Indonesia, Japan, the Republic of Korea, and Saudi Arabia. In Finland and Saudi Arabia (β = -0.273, p = .010; β= -0.218, p = .001, respectively), boys' self-concept increased with higher educated parents while girls' self-concept decrease. The opposite occurs in Japan (β = 0.190, p = .044), the Republic of Korea (β = 0.268, p = .004) and Indonesia (β = 0.118, p = .0345).

Parents' expectations had an interaction with student gender in Bahrain (β = -0.263, p = .044), Croatia (β = -0.216, p = .044), Ireland (β = -0.265, p = .017), and the Republic of Korea (β = -0.272, p = .020). In Bahrain, Croatia and the Republic of Korea, all students' self-concept increase with higher expectations from parents, however, boys gain more self-concept than girls do. In Ireland, boys' self-concept also increases with higher expectations, but girls' self-concept decreases.

In Denmark, Poland, and Portugal, there was a significant interaction effect of gender and early numeracy activities (β = 0.338, p = .005; β= 0.297, p = .018; β= -0.232, p = .030, respectively). In Denmark and in Poland, more early numeracy activities come with an increase in girls' self-concept but a decrease in boys' self-concept. In Portugal, both girls and boys benefit from more early numeracy activities but the benefit for boys is bigger.

Student achievement and gender had a significant interaction effect in Bahrain, Belgium, and Bulgaria (β = 0.343, p = .004; β= -0.402, p = .019; β= -0.338, p = .014, respectively). In all cases, there is a positive relationship between achievement and self-concept. However, in Bahrain girls benefit more from increases in achievement, while in both Belgium and Bulgaria, boys are the ones that benefit more from higher achievement.

Finally, parents' attitudes towards mathematics and science showed a significant interaction with gender in Hong Kong (β = 0.241, p = .026), and Morocco (β = -0.242, p = .046). In Hong Kong, both girls and boys benefit from more positive parents' attitudes, but the impact is bigger on girls. In Morocco, boys' self-concept increases with more positive attitudes while girls' self-concept decreases. Furthermore, when

parents' attitudes are less positive, girls have a higher self-concept than boys do but when parents' attitudes are more positive, girls self-concept is lower than boys self-concept.

DISCUSSION AND CONCLUSIONS

Prior research has stressed about the gender gap in mathematics and science achievement narrowing, even being non-significant (Mullis et al., 2016; OECD, 2016, Spearman & Watt, 2013). Results from this study support those findings, as the average performance of boys and girls across all countries was similar in both mathematics and science. Nevertheless, there are still significant gender differences in some countries. For instance, although the average mathematics performance of boys and girls was similar across all countries, there were several countries in which boys significantly outperformed girls. The overall science performance of girls and boys was also similar but, unlike in mathematics, there were no significant differences in most of the countries and, furthermore, there was a balance of the number of countries where girls significantly performed better than boys and the number of countries where boys significantly outperformed girls.

One of the aims of the present study was to assess the gender gap in students' attitudes towards mathematics and science. Despite overall equal levels of achievement among girls and boys, there were significant differences in their attitudes. Results for mathematics attitudes showed there were significant differences favouring boys, especially in mathematics self-concept, as boys had a higher mathematics self-concepts than girls did in more than half of the countries. Although most of the research on mathematics self-concept has focused on older students, the findings of the present study showed that even in fourth-grade there are significant gender differences, which is in line with Herbert and Stipek (2005) who found significant differences in elementary school.

A remarkable finding was that gender differences in science attitudes were small and were mostly in favor of girls. This was an unexpected finding, as previous research on science intrinsic motivation has found either no significant differences (DeBacker & Nelson, 2000; DeWitt et al., 2013) or significant differences in favor of boys (Patrick et al., 2008). Likewise, research on science self-concept has found no significant gender differences (Andre et al., 1999; Mantzicopoulos & Samarapungavan, 2008) or significant differences favouring boys (DeBacker & Nelson, 2000; DeWitt et al., 2013; Jansen et al., 2014). An explanation for this could be that the present study focused in fourth-grade students. Fourth-grade science is a broad subject and is not yet formally divided into chemistry, physics, biology, and geography. Furthermore, it could be that students do not regard fourth-grade science as a science subject, as it usually has a different name. In fact, in several of the countries of this study the name of the subject does not include the word "science". For example, in Belgium the subject is called World Orientation; in Kazakhstan, Knowledge of the World; in Portugal, Social and Natural Environmental Studies; and in the Russian Federation, Surrounding World (Mullis, Martin, Goh, & Cotter, 2016). Moreover, in some countries – such as Ireland and the Russian Federation – fourth-grade science is mixed with other subjects like history or social studies (Mullis et al., 2016). Once science is divided into individual subjects, which usually takes places at the beginning of secondary education, students' attitudes towards mathematics and science become less positive, especially in girls (Logan & Skamp, 2007). Logan and Skamp (2007) stated that the decline in science attitudes is a consequence of a perceived increase in the difficulty of science, among other factors. Considering some secondary school science subjects involve more mathematics, such as physics and chemistry, as well as girls' significantly lower mathematics self-concept, it might be possible that girls' science attitudes are affected more than those of boys.

Putting achievement and attitudes side by side, a striking result was that even in countries where girls and boys had equal levels of mathematics achievement – such as Singapore, Japan, and the Russian

Federation – girls had a significantly lower mathematics self-concept and intrinsic motivation than boys. Even more, in Finland, where girls significantly outperformed boys in mathematics, girls still had significantly lower mathematics attitudes. Another remarkable finding is that in all the countries where girls had significantly lower mathematics achievement than boys, girls also had significantly lower self-concept. This is a matter of concern; if the relationship between achievement and self-concept follows the self-enhancement model proposed by Calsyn and Kenny (1977), girls' lower achievement might be a consequence of their low self-concept. In science, this comparison is more balanced. In countries with equal levels of performance, girls had significantly lower science attitudes in Hong Kong SAR, Singapore, France, Japan, and Denmark. On the other end, girls had significantly higher science attitudes in Iran, United Arab Emirates, Morocco, Indonesia, Turkey, and Serbia.

When looking at country performance, there was an interesting relationship between achievement and attitudes. In top performers – such as Singapore, Chinese Taipei, and the Republic of Korea – gender had a negative effect; boys had more positive attitudes than girls. On the other hand, in countries with low performance – such as Saudi Arabia, Oman, and Bahrain – the effect of gender was positive, and girls had more positive attitudes than boys. Interestingly, the low performance countries where girls had more positive attitudes also happen to be Middle East countries. It could be that girls' positive attitudes in these countries come from the separation of sexes in their educational systems. For example, in Saudi Arabia, it is mandatory to separate sexes in all levels of public education (Al-Zarah, 2008). This situation is reflected in the TIMSS 2015 sample implementation, as Saudi Arabia, Bahrain, and the Islamic Republic of Iran had an explicit stratification by gender (LaRoche & Foy, 2016, Appendix 5A). Some research results show that girls in single-sex classes have higher confidence in their mathematics and science abilities than girls in coeducational settings, while boys show no difference from being in single-sex or coeducational groups (Kessels & Hannover, 2008; Simpson, Che, & Bridges, 2016)

Besides assessing gender differences in students' attitudes towards mathematics and science, this study also aimed to examine which are the factors that have an influence on said attitudes. There were two categories of variables under study: student characteristics, including gender and achievement; and parental influences, including parents' attitudes towards mathematics and science, early numeracy activities performed with children, parents' expectations about their child's educational future, and parents' level of education. Following the explanations given by Spearman and Watt (2013), it was expected that parents would influence students' attitudes, and the results support this to some extent.

In line with findings by Fan and Williams (2011), who stated that parents' expectations influence students' self-concept for mathematics and English, one of the most significant influences of self-concept were parents' expectations about how far in education they think their child will reach. The further they think their child will reach, such as finish a Bachelor or Masters' degree, the higher the self-concept of the student. The effect was similar for both mathematics and science, so it could also be that parents' expectations affect self-concept in general. If parents convey their expectations to students, then students might feel more confident in their own abilities, for any subject. However, parents' expectations did not have the same influence for students' intrinsic motivation. Parents' expectations were significant for mathematics and science self-concept in 21 and 20 countries, respectively; but only in ten and eight countries for intrinsic motivation. This differs, partly, from findings by Fan and Williams (2011) who stated that parental expectations for children's future education is also a predictor of mathematics intrinsic motivation (Fan & Williams, 2011).

For intrinsic motivation, parents' attitudes towards mathematics and science were the most significant factor, from all parental influences. More positive attitudes from parents were reflected in higher mathematics and science intrinsic motivation, in line with findings by Farr (2015). Additionally, parents' attitudes had a significant impact on students' mathematics self-concept, but not so in their science self-concept.

Early numeracy activities were significant in half of the countries for both mathematics attitudes and for science self-concept. They do not seem to have an influence on science intrinsic motivation, as they were only significant in five out of the 32 countries. An explanation for the lack of influence on science intrinsic motivation could be that the data from TIMSS only asked about numeracy activities (e.g. sing counting songs, count different things) and not science activities (e.g. going to a science museum, going to the zoo, run experiments). Additionally, and as previously mentioned in the discussion, fourth-grade science does not usually involve mathematics, which is why the enjoyment of the subject might not be closely related to numeracy activities. Regarding mathematics, since the early learning activities involved numbers it is plausible that they have an influence on mathematics attitudes. The higher the frequency in which parents did this type of activities with their children, the more likely that they (1) have better mathematical outcomes (LeFevre et al., 2009), which might increase their self-concept; and (2) become more familiar with mathematics and develop a liking of the subject. It could also be that frequent early numeracy activities help develop thinking and learning skills that are useful for any academic subject (e.g. logical reasoning, spatial awareness), which could explain the significance of early numeracy activities on science self-concept (Clements & Sarama, 2011).

A remarkable – and unexpected – finding was the negative effect that parents' education had on student attitudes. This effect was, as shown by the results, especially significant for their mathematics attitudes, as they were significant in 24 countries for mathematics intrinsic motivation, and 18 countries for mathematics self-concept. It would seem that students' with highly educated parents have less positive attitudes towards mathematics, but one must be careful when interpreting this result. It could be that the effect of parents' education is no longer positive when taking into account the other parental influences as these can be highly correlated with parents' education. For example, highly educated parents might expect their children to also attain a high level of education.

Despite the significance of some parental influences on some of the student attitudes, the main finding was that student characteristics are more important factors, as both achievement and gender were consistently significant in nearly all the countries. In fact, the gender gap could be mainly explained by differences in achievement; low achieving students have a lower self-concept than high achieving students, and they also have less intrinsic motivation. Comparing the results from the correlations and the regressions – in other words, comparing the effect of gender when achievement is taken into account – the effect of gender on intrinsic motivation remains the same while it decreases slightly for self-concept. Nevertheless, the effect of gender on self-concept continues to be significant in all cases.

The final aim of this study was to find if interactions between students' gender and parents' influence could explain differences in attitudes towards mathematics. Given the prevalence of gender stereotypes that identify mathematics and science as typically main domains, it was expected that parents would differ in the way they interact with their daughters and sons or that their interactions would affect girls and boys differently. Yet, the overall correlation between gender and early numeracy activities was zero, and in most of the countries parents performed, on average, the same amount of numeracy activities with girls and with boys. This differs from previous findings by Gustaffson, Hansen, and Rosén (2013), who stated that early numeracy activities are more frequently performed with boys. Parents did, however, have significantly higher expectations for girls than for boys in most of the countries, although in all cases the correlation between gender and parents' expectations was very low (from -.08 to .12). Additionally, the regression analyses with interaction effects showed that few interaction effects were significant. The regression analyses for each attitude can be seen as Bernoulli trials as they (1) involve a repeated number of trials; (2) have only two possible outcomes (a success or a failure); (3) have the same probability of success on every trial; and (4) all trials are independent from one another (De Veaux, Velleman, & Bock, 2014). In this case, there were a total of 160 trials in each attitude, 5 interactions effects per regression analysis and 32 analyses conducted (one per country). A success was finding a significant interaction effect and the probability of success in each trial was 5%, as each test was performed with a .05 significance level. Following the binomial probability model for Bernoulli trials (De Veaux et al., 2014):

$$P\,(X = x) = \binom{n}{x} p^x (1-p)^{n-x}$$

where *n* is the number of trials, *p* is the probability of success, and *X* is the number of successes in n trials; the probability of finding up to 13 significant interaction effects is more than 5% (Stat Trek, n.d.). This means that the number of significant interaction effects in mathematics self-concept (9) and in science intrinsic motivation (13) could have been merely a result of good luck. For mathematics intrinsic motivation and science self-concept the number of significant interaction effects (16 and 17, respectively) was too large to be regarded as mere chance, as the probability of finding 16 or more significant interaction effects is only 0.67%. Nevertheless, the results are too modest to count as convincing evidence of an interaction between student gender and parental involvement.

Limitations and Recommendations for Future Research

There are some limitations that should be considered when interpreting the findings from this study. First, although the study was able to find a significant relationship between some of the variables and students' attitudes towards mathematics and science, it is not possible to determine causality (e.g. an increase in achievement will lead to more positive attitudes) because data was collected at one point in time. A second limitation is that TIMSS questionnaires involve self-report measures which could give incorrect information in two ways. One source of incorrect information comes from answers that require recalling past activities; for example, when parents were asked about early learning activities, which were activities that took place before their children started elementary education. It could be that parents did not accurately recall the frequency in which these activities took place. Another way in which self-reports limit the study is because they might allow for social desirability bias to be present. For instance, parents might have reported more positive attitudes than what they actual have or children might have reported more positive attitudes.

This study aimed to identify where does the gender gap in STEM participation comes from. It was expected that some of this gap could be explained by differences in how parents interact with girls and boys, however, there was not enough evidence to support a gender interaction in these variables for some attitudes. This could have been because of the high number of interaction effects (5) in the regression model of each attitude, as well as the regression analyses conducted per attitude (32). Since there was not enough evidence of an interaction of gender with parental influences that could explain the gender gap in students' attitudes, further research could be conducted to study the effect that other significant adults – such as teachers – have on students. Teachers, in particularly the way they approach their mathematics or science lessons, can influence students' enjoyment and interest in these subjects (Di Martino & Zan, 2010; Maltese & Tai, 2010; Mata, Monteiro & Pexoto, 2012; Vandecandelaere et al., 2012).

Additionally, despite there is proof that the gender gap develops as early as in the elementary grades, it might be interesting to study the effect of parents on older students. This was the first time that TIMSS included a home questionnaire, and it was only done so for fourth-grade students. Perhaps including a home questionnaire also for the eight-grade assessment might provide valuable insights into why girls and boys choose to pursue STEM at different rates. It would be also valuable to analyse data from TIMSS Advanced, the third modality of the TIMSS assessment, which is aimed to students in advanced STEM programs. In this way, the unit analysis could be students that actually chose to pursue a STEM course.

Conclusion

The results of the present study showed that students' attitudes towards mathematics and science are mainly explained by their relationship with student achievement and student gender. Parents' also have an influence

on students' attitudes, but on a minor scale. Although it was expected that there would be an interaction between student gender and parental influences, only few interaction effects were significant.

Despite gender differences in mathematics and science achievement narrowing, differences in the intrinsic motivation and self-concept in these subjects are considerable. In mathematics, girls have significantly lower self-concept and intrinsic motivation than boys in several countries. For science the situation is reversed, as girls have significantly higher self-concept and intrinsic motivation than boys. However, neither extremes are good. Ideally, there should be no statistically significant difference between girls and boys in their attitudes towards mathematics and science.

Gender being a significant factor for attitudes is a matter of concern, especially when thinking about future educational choices such as enrolment in advanced programs or choosing college majors. If girls already have a low mathematics self-concept and intrinsic motivation at such a young age, it might be too difficult to encourage their STEM interest in the future, as there is evidence that student attitudes only become less positive throughout the school years (Wilkins, 2004). At the end, is about allowing everyone to experience the wonders of mathematics and science, and to give them a real free choice of education that is not jeopardized by cultural bias and stereotypes.

References

Ajzen, I. (1988). *Attitudes, personality and behavior*. Milton Keynes: Open University Press.

Al-Zarah, L. N. (2008). *An investigative study of the female initial teacher preparation programme in Saudi Arabia in an Islamic context: Perceptions of the key participants* (Doctoral dissertation, Durham University).

Andre, T., Whigham, M., Hendrickson, A., & Chambers, S. (1999). Competency beliefs, positive affect, and gender stereotypes of elementary students and their parents about science versus other school subjects. *Journal of Research in Science Teaching, 36*(6), 719-747.

Aunola, K., Leskinen, E., Onatsu-Arvilommi, T., & Nurmi, J-E. (2002). Three methods for studying developmental change: A case of reading skills and self-concept. *British Journal of Educational Psychology, 72*, 343-364. doi: 10.1348/000709902320634447

Bleeker, M. M., & Jacobs, J. E. (2004). Achievement in math and science: Do mothers' beliefs matter 12 years later? *Journal of Educational Psychology, 96*(1), 97.

Bong, M., & Skaalvik, E. M. (2003). Academic self-concept and self-efficacy: How different are they really? *Educational psychology review, 15*(1), 1-40.

Calsyn, R. J., & Kenny, D. A. (1977). Self-concept of ability and perceived evaluation of others: Cause or effect of academic achievement? *Journal of Educational Psychology, 69*(2), 136-145. doi: 10.1037/0022-0663.69.2.136.

Carnevale, A. P., Smith, N., & Melton, M. (2011). *STEM: Science Technology Engineering Mathematics.* Georgetown University Center on Education and the Workforce.

Chang, C. Y., & Cheng, W. Y. (2008). Science Achievement and Students' Self-confidence and Interest in Science: A Taiwanese representative sample study. *International Journal of Science Education, 30*(9), 1183-1200. doi: 10.1080/09500690701435384.

Clements, D. H., & Sarama, J. (2011). Early childhood mathematics intervention. *Science, 333*(6045), 968-970.

Corbett, C., & Hill, C. (2015). *Solving the equation: the variables for women's success in engineering and computing.* Retrieved from: https://www.aauw.org/what-we-do/research/

Crombie, G., Sinclair, N., Silverthorn, N., Byrne, B. M., DuBois, D. L., & Trinneer, A. (2005). Predictors of young adolescents' math grades and course enrollment intentions: Gender similarities and differences. *Sex Roles, 52*(5), 351-367. doi: 10.1007/s11199-005-2678-1.

Cvencek, D., Meltzoff, A. N., & Greenwald, A. G. (2011). Math–gender stereotypes in elementary school children. *Child development, 82*(3), 766-779. Retrieved from http://www.jstor.org/stable/29782871

Dasgupta, N., & Stout, J. G. (2014). Girls and women in science, technology, engineering, and mathematics: STEMing the tide and broadening participation in STEM careers. *Policy Insights from the Behavioral and Brain Sciences, 1*(1), 21-29. doi: 10.1177/2372732214549471.

DeBacker, T. K., & Nelson, R. M. (2000). Motivation to learn science: Differences related to gender, class type, and ability. *The Journal of Educational Research, 93*(4), 245-254. doi: 10.1080/00220670009598713.

Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of research in personality, 19*(2), 109-134.

De Veaux, R., Velleman, P., & Bock, D. (2014). *Stats: data and models.* Harlow, Essex: Pearson.

DeWitt, J., Osborne, J., Archer, L., Dillon, J., Willis, B., & Wong, B. (2013). Young children's aspirations in science: The unequivocal, the uncertain and the unthinkable. *International Journal of Science Education, 35*(6), 1037-1063. doi: 10.1080/09500693.2011.608197.

Di Martino, P., & Zan, R. (2010). 'Me and maths': towards a definition of attitude grounded on students' narratives. *Journal of Mathematics Teacher Education, 13*(1), 27-48.

Fan, X., & Chen, M. (2001). Parental involvement and students' academic achievement: A meta-analysis. *Educational psychology review, 13*(1), 1-22. Retrieved from http://files.eric.ed.gov/fulltext/ED430048.pdf

Fan, W., & Williams, C. M. (2010). The effects of parental involvement on students' academic self-efficacy, engagement and intrinsic motivation. *Educational Psychology, 30*(1), 53-74. doi: 10.1080/01443410903353302.

Farr, S. M. (2015). *The Role of Parents in Children's Attitudes towards Mathematics* (Doctoral dissertation, University of Waikato). Retrieved from http://researchcommons.waikato.ac.nz/handle/10289/10007

Foy, P. (2017). *TIMSS 2015 User Guide for the International Database*. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/timss2015/international-database/

Goldman, A. D., & Penner, A. M. (2016). Exploring international gender differences in mathematics self-concept. *International journal of adolescence and youth, 21*(4), 403-418. doi: 10.1080/02673843.2013.847850

Green, J., Martin, A. J., & Marsh, H. W. (2007). Motivation and engagement in English, mathematics and science high school subjects: Towards an understanding of multidimensional domain specificity. *Learning and Individual Differences*, *17*(3), 269-279.

Gustaffson, J. E., Hansen, K. Y., & Rosén, M. (2011). Effects of home background on student achievement in reading, mathematics, and science at the fourth grade. In M. O. Martin, & I. V. S. Mullis (Eds.), *TIMSS and PIRLS 2011: Relationships Among Reading, Mathematics, and Science Achievement at the Fourth Grade—Implications for Early Learning* (pp. 181-287). Retrieved from Boston College, TIMSS & PIRLS International Study Center website https://timssandpirls.bc.edu/timsspirls2011/downloads/TP11_Chapter_4.pdf

Herbert, J. & Stipek, D. (2005). The emergence of gender differences in children's perceptions of their academic competence. *Applied Developmental Psychology, 26*(3), 276 – 295. doi: 10.1016/j.appdev.2005.02.007

Hooper, M., Mullis, I. V. S., & Martin, M. O. (2013). TIMSS 2015 Context Questionnaire Framework. In I. V. S, Mullis, & M. O. Martin (Eds.), *TIMSS 2015 Assessment Frameworks* (pp. 61-82). Retrieved from Boston College, TIMSS & PIRLS International Study Center website: https://timssandpirls.bc.edu/timss2015/downloads/T15_FW_Chap3.pdf

Hossain, M., & G Robinson, M. (2012). How to motivate US students to pursue STEM (science, technology, engineering and mathematics) careers. Online Submission. Retrieved from http://files.eric.ed.gov/fulltext/ED533548.pdf

Hyde, J. S., Fennema, E., Ryan, M., Frost, L. A., & Hopp, C. (1990). Gender Comparisons of Mathematics Attitudes and Affect: A Meta-Analysis. *Psychology of Women Quarterly, 14*, 299-324.

IEA (2017). Help Manual for the IEA IDB Analyzer (Version 4.0). Hamburg, Germany. Retrieved from www.iea.nl/data.html

Jacobs, J. E., & Eccles, J. S. (2000). Parents, task values, and real-life achievement-related choices. Intrinsic and extrinsic motivation: The search for optimal motivation and performance, 405-439. Retrieved from http://www.rcgd.isr.umich.edu/garp/articles/eccles00c.pdf

Jansen, M., Schroeders, U., & Lüdtke, O. (2014). Academic self-concept in science: Multidimensionality, relations to achievement measures, and gender differences. *Learning and Individual Differences, 30*, 11-21. doi: 10.1016/j.lindif.2013.12.00.

Kadijevic, G. M. (2015). TIMSS 2011: Relationship between self-concept and cognitive achievement for Serbia and Slovenia. *REDIE: Revista Electrónica de Investigación Educativa, 17*(3), 109-115. Retrieved from https://redie.uabc.mx/redie/article/view/529/1292

Kanny, M. A., Sax, L. J., & Riggers-Piehl, T. A. (2014). Investigating forty years of STEM research: How explanations for the gender gap have evolved over time. *Journal of Women and Minorities in Science and Engineering, 20*(2), 127-148. doi: 10.1615/JWomenMinorScienEng.2014007246

Kessels, U., & Hannover, B. (2008). When being a girl matters less: Accessibility of gender-related self-knowledge in single-sex and coeducational classes and its impact on students' physics-related self-concept of ability. *British Journal of Educational Psychology, 78*(2), 273-289.

King, R. B., McInerney, D. M. (2014). Mapping changes in students' English and math self-concepts: a latent growth model study. *Educational Psychology, 34*(5), 581-597. doi: 10.1080/01443410.2014.909009

LaRoche, S., & Foy, P. (2016). Sample Implementation in TIMSS 2015. In M. O. Martin, I. V. S. Mullis, & M. Hooper (Eds.), *Methods and Procedures in TIMSS 2015* (pp. 5.1-5.175). Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timss.bc.edu/publications/timss/2015-methods/chapter-5.html

LeFevre, J. A., Skwarchuk, S. L., Smith-Chant, B. L., Fast, L., Kamawar, D., & Bisanz, J. (2009). Home numeracy experiences and children's math performance in the early school years. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 41*(2), 55.

Logan, M., & Skamp, K. (2008). Engaging students in science across the primary secondary interface: Listening to the students' voice. *Research in science education, 38*(4), 501-527.

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*, 26-47.

Maltese, A. V., & Tai, R. H. (2010). Eyeballs in the fridge: Sources of early interest in science. *International Journal of Science Education, 32*(5), 669-685.

Margolis, J., & Fisher, A. (2002). *Unlocking the club house: women in computing.* Cambridge, MA: MIT Press.

Martin, M. O., Mullis, I. V. S., Foy, P., & Hooper, M. (2016). *TIMSS 2015 International Results in Science*. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/international-results/

Martin, M. O., Mullis, I. V. S., and Hooper, M. (Eds.). (2016). *Methods and Procedures in TIMSS 2015*. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/publications/timss/2015-methods.html

Marsh, H. W., & Craven, R. G. (2006). Reciprocal effects of self-concept and performance from a multidimensional perspective: Beyond seductive pleasure and unidimensional perspectives. *Perspectives on psychological science, 1*(2), 133-163. doi: 10.1111/j.1745-6916.2006.00010.x

Marsh, H. W., Trautwein, U., Lüdtke, O., Köller, O., & Baumert, J. (2005). Academic self-concept, interest, grades, and standardized test scores: Reciprocal effects models of causal ordering. *Child development, 76*(2), 397-416. Retrieved from http://www.jstor.org/stable/3696511

Meelissen, M., & Luyten, H. (2008). The Dutch gender gap in mathematics: Small for achievement, substantial for beliefs and attitudes. *Studies in Educational Evaluation, 34*(2), 82-93. doi: 10.1016/j.stueduc.2008.04.004

Mullis, I.V.S. & Martin, M.O. (Eds.) (2013). *TIMSS 2015 Assessment Frameworks.* Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/frameworks.html

Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). *TIMSS 2015 International Results in Mathematics.* Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/international-results/

Mullis, I. V. S., Martin, M. O., Goh, S., & Cotter, K. (Eds.) (2016). *TIMSS 2015 Encyclopedia: Education Policy and Curriculum in Mathematics and Science.* Retrieved from Boston College, TIMSS & PIRLS International Study Center website: http://timssandpirls.bc.edu/timss2015/encyclopedia/

Nosek, B. A., Smyth, F. L., Sriram, N., Lindner, N. M., Devos, T., Ayala, A., ... & Kesebir, S. (2009). National differences in gender–science stereotypes predict national sex differences in science and math achievement. *Proceedings of the National Academy of Sciences, 106*(26), 10593-10597. doi:10.1073/pnas.0809921106

OECD (2016). PISA 2015 Assessment and Analytical Framework: Science, Reading, Mathematic and Financial Literacy, OECD Publishing, Paris. doi: 10.1787/9789264255425-en

OECD (2016), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264266490-en

OECD (2017), *OECD Science, Technology and Industry Scoreboard 2017: The digital transformation*, OECD Publishing, Paris. http://dx.doi.org/10.1787/9789264268821-en

Oliver, J. S., & Simpson, R. D. (1988). Influences of attitude toward science, achievement motivation, and science self concept on achievement in science: A longitudinal study. *Science Education, 72*(2), 143-155.

Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: A review of the literature and its implications. *International journal of science education*, *25*(9), 1049-1079.

Patrick, H., Mantzicopoulos, P., & Samarapungavan, A. (2009). Motivation for learning science in kindergarten: Is there a gender gap and does integrated inquiry and literacy instruction make a difference. *Journal of Research in Science Teaching*, *46*(2), 166-191.

Pinxton, M., Marsh, H. W., De Fraine, B., Van Den Noortgate, W., & Van Damme, J. (2014). Enjoying mathematics or feeling competent in mathematics? Reciprocal effects on mathematics achievement and perceived math effort expenditure. British Journal of Educational Psychology, 84, 152-174. doi: 10.1111/bjep.12028

Perera, L. D. (2014). Parents' Attitudes Towards Science and their Children's Science Achievement, *International Journal of Science Education, 3*6(18), 3021-3041, DOI: 10.1080/09500693.2014.949900

Pesu, L. (2017). The role of parents' and teachers' child-related competence beliefs in the development of students' self-concept of ability. *Jyväskylä studies in education, psychology and social research 579.*

Roeser, R.W. (2006). On the study of educational and occupational life-paths in psychology: Commentary on the special issue. *Educational Research and Evaluation, 12*(4), 409–421. doi: 10.1080/13803610600765968

Simpson, A., Che, S. M., & Bridges, W. C. (2016). Girls' and Boys' Academic Self-Concept in Science in Single-Sex and Coeducational Classes. *International Journal of Science and Mathematics Education*, *14*(8), 1407-1418.

Simpson, R. D., & Oliver, J. S. (1985). Attitude toward science and achievement motivation profiles of male and female science students in grades six through ten. *Science Education*, *69*(4), 511-525.

Skaalvik, S., & Skaalvik, E. M. (2004). Gender differences in math and verbal self-concept, performance expectations, and motivation. *Sex roles*, *50*(3), 241-252. Retrieved from https://link.springer.com/content/pdf/10.1023/B:SERS.0000015555.40976.e6.pdf

Smyth, F. L., & Nosek, B. A. (2015). On the gender–science stereotypes held by scientists: explicit accord with gender-ratios, implicit accord with scientific identity. *Frontiers in psychology*, *6*, 415.

Spearman J, & Watt, H. (2013). Women`s Aspirations Towards "STEM" Careers: A Motivational Analysis. In W. Patton (Ed.) *Conceptualising women`s working lives. Moving the Boundaries of Discourse. Career development series.* (pp. 175-191). Rotterdam/Boston/Taipei: Sense Publishers. doi: 10.1007/978-94-6209-209-9_10.

Stake, J. E. (2006). The Critical Mediating Role of Social Encouragement for Science Motivation and Confidence Among High School Girls and Boys1. *Journal of Applied Social Psychology, 36*(4), 1017-1045. doi: 10.1111/j.0021-9029.2006.00053.x

Stat Trek. (n.d.). Binomial Calculator. Retrieved January 8, 2018, from http://stattrek.com/online-calculator/binomial.aspx

Tapia, M., & Marsh, G. E. (2005). An instrument to measure mathematics attitudes. Academic Exchange Quarterly, 8, 16–21, Retrieved from http://www.rapidintellect.- com/AEQweb/cho25344l.htm

Tenenbaum, H. R., & Leaper, C. (2003). Parent-child conversations about science: The socialization of gender inequities? *Developmental Psychology, 39*(1), 34. doi:10.1037/0012-1649.39.1.34

TIMSS & PIRLS. (n.d.). About TIMSS 2015. Retrieved from http://timssandpirls.bc.edu/timss2015/international-results/timss-2015/about-timss-2015/

Vandecandelaere, M., Speybroeck, S., Vanlaar, G., De Fraine, B., & Van Damme, J. (2012). Learning environment and students' mathematics attitude. *Studies in Educational Evaluation, 38*(3), 107-120. doi: 10.1016/j.stueduc.2012.09.001.

Wigfield, A., & Eccles, J. S. (2000). Expectancy–value theory of achievement motivation. *Contemporary educational psychology, 25*(1), 68-81. doi: doi:10.1006/ceps.1999.1015.

Wilkins, J. L. (2004). Mathematics and science self-concept: An international investigation. *The Journal of Experimental Education, 72*(4), 331-346. doi: 10.3200/ JEXE.72.4.331-346.

Williams, T., Williams, K., Kastberg, D., & Jocelyn, L. (2005). Achievement and affect in OECD nations. *Oxford Review of Education, 31*(4), 517-545.

Appendix A
Gender differences in student achievement

Table A1

Mathematics achievement by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1713	406.83	80.76	.17	29.85	.000*
	Boy	1401	376.98	93.96			
Oman	Girl	3085	445.48	96.04	.10	20.75	.000*
	Boy	3026	424.74	100.53			
Bahrain	Girl	1626	463.56	78.83	.07	12.39	.013*
	Boy	1472	451.17	90.54			
Finland	Girl	2301	542.58	63.45	.07	9.05	.001*
	Boy	2343	533.54	68.21			
Iran, Islamic Republic of	Girl	1494	438.60	94.20	.04	8.86	.303
	Boy	1550	429.74	103.10			
Lithuania	Girl	1918	541.02	67.83	.02	3.34	.335
	Boy	1871	537.68	74.28			
Bulgaria	Girl	1861	532.27	78.30	.02	3.25	.324
	Boy	1893	529.01	80.38			
Indonesia	Girl	1580	398.62	87.11	.02	3.23	.453
	Boy	1666	395.39	90.75			
Kazakhstan	Girl	2153	546.41	81.02	.02	3.06	.292
	Boy	2213	543.35	82.57			
Singapore	Girl	2991	622.03	83.16	.01	2.45	.406
	Boy	3048	619.58	86.21			
Morocco	Girl	1735	388.67	89.00	.01	1.55	.725
	Boy	1775	387.12	92.51			
Japan	Girl	2054	594.59	64.99	.01	0.91	.687
	Boy	2020	593.68	71.13			
Russian Federation	Girl	2328	565.55	72.43	.01	0.74	.798
	Boy	2343	564.81	72.10			
Serbia	Girl	1832	522.82	79.74	.00	0.72	.881
	Boy	1870	522.10	88.98			
Georgia	Girl	1697	469.41	80.95	.00	0.70	.864
	Boy	1707	468.71	86.10			
United Arab Emirates	Girl	6135	461.02	100.07	.00	-0.80	.894
	Boy	5861	461.82	108.42			
Table Average	Girl	2175	516.18	75.81	-.01	-1.03	
	Boy	2184	517.21	80.47			
Poland	Girl	2241	536.15	67.54	-.01	-1.34	.616
	Boy	2229	537.49	73.87			
Turkey	Girl	2594	487.86	89.73	-.01	-2.46	.393
	Boy	2618	490.32	95.37			
Chinese Taipei	Girl	1933	597.01	66.00	-.04	-5.83	.020*
	Boy	1994	602.84	72.24			
Belgium (Flemish)	Girl	2430	545.58	59.74	-.05	-6.15	.011*
	Boy	2288	551.73	60.77			
Ireland	Girl	1869	548.28	69.48	-.04	-6.29	.050
	Boy	1998	554.58	73.31			
Denmark	Girl	1554	539.39	72.85	-.05	-6.82	.030*
	Boy	1535	546.21	74.90			
Czech Republic	Girl	2354	527.16	68.25	-.05	-7.21	.019*

	Boy	2357	534.37	69.25			
Hungary	Girl	2163	531.77	83.84	-.04	-7.37	.032*
	Boy	2207	539.14	86.33			
Korea, Republic of	Girl	2203	605.65	64.09	-.06	-7.42	.000*
	Boy	2329	613.07	68.95			
France	Girl	2020	489.41	71.88	-.05	-7.73	.012*
	Boy	1946	497.15	75.16			
Hong Kong, SAR	Girl	1486	611.95	63.01	-.06	-7.91	.024*
	Boy	1788	619.86	67.01			
Cyprus	Girl	1865	523.85	75.44	-.06	-9.73	.000*
	Boy	1855	533.58	80.10			
Slovak Republic	Girl	2526	498.42	75.69	-.06	-9.77	.000*
	Boy	2657	508.19	78.16			
Portugal	Girl	2123	537.94	69.55	-.09	-12.27	.000*
	Boy	2180	550.21	73.07			
Croatia	Girl	1875	497.19	62.61	-.10	-12.52	.000*
	Boy	1945	509.71	66.98			
Italy	Girl	1867	500.80	68.35	-.16	-22.15	.000*
	Boy	1895	522.94	69.84			

*p < .05, two-tailed.

Table A2

Science achievement by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1713	433.58	97.74	.30	66.14	.000*
	Boy	1401	367.44	113.00			
Bahrain	Girl	1626	484.87	93.85	.16	32.65	.000*
	Boy	1472	452.22	108.69			
Oman	Girl	3085	458.57	112.79	.13	29.19	.000*
	Boy	3026	429.38	118.11			
Finland	Girl	2301	561.93	60.54	.09	11.39	.000*
	Boy	2343	550.54	65.99			
Morocco	Girl	1735	369.66	115.01	.04	9.20	.083
	Boy	1775	360.47	122.44			
United Arab Emirates	Girl	6135	468.56	112.84	.04	9.17	.189
	Boy	5861	459.40	123.25			
Iran, Islamic Republic of	Girl	1494	436.70	95.09	.04	8.57	.282
	Boy	1550	428.13	103.74			
Bulgaria	Girl	1861	547.40	88.80	.05	8.48	.020*
	Boy	1893	538.92	92.18			
Kazakhstan	Girl	2153	553.83	82.98	.03	5.88	.030*
	Boy	2213	547.95	86.09			
Indonesia	Girl	1580	407.81	99.61	.02	4.22	.358
	Boy	1666	403.60	102.51			
Lithuania	Girl	1918	533.46	66.30	.02	3.27	.349
	Boy	1871	530.19	70.78			

Table Average	Girl	2175	512.78	77.29	.01	3.11	
	Boy	2184	509.67	82.34			
Georgia	Girl	1697	458.08	80.95	.01	1.97	.639
	Boy	1707	456.11	87.35			
Poland	Girl	2241	549.32	64.93	.01	0.89	.751
	Boy	2229	548.43	71.26			
Turkey	Girl	2594	489.52	86.00	.00	0.51	.871
	Boy	2618	489.02	92.32			
Serbia	Girl	1832	529.18	72.40	.00	0.41	.930
	Boy	1870	528.77	83.71			
Belgium (Flemish)	Girl	2430	514.94	60.55	.00	0.37	.885
	Boy	2288	514.57	61.54			
Russian Federation	Girl	2328	568.48	67.99	.00	-0.15	.957
	Boy	2343	568.63	68.18			
Singapore	Girl	2991	593.16	82.44	-.01	-0.85	.762
	Boy	3048	594.02	84.57			
France	Girl	2020	491.39	70.13	-.01	-1.80	.523
	Boy	1946	493.20	73.38			
Croatia	Girl	1875	533.65	60.10	-.02	-2.39	.406
	Boy	1945	536.04	62.71			
Cyprus	Girl	1865	485.23	71.06	-.02	-3.47	.217
	Boy	1855	488.70	73.89			
Japan	Girl	2054	568.31	61.26	-.03	-4.13	.097
	Boy	2020	572.44	67.22			
Denmark	Girl	1554	528.20	65.19	-.03	-4.39	.158
	Boy	1535	532.59	69.54			
Slovak Republic	Girl	2526	522.83	80.45	-.04	-5.92	.025*
	Boy	2657	528.75	83.34			
Ireland	Girl	1869	529.29	65.83	-.04	-6.04	.063
	Boy	1998	535.33	70.93			
Hong Kong, SAR	Girl	1486	554.00	67.46	-.05	-7.40	.064
	Boy	1788	561.40	71.30			
Portugal	Girl	2123	506.22	59.03	-.07	-8.06	.000*
	Boy	2180	514.27	59.71			
Czech Republic	Girl	2354	532.54	66.96	-.06	-8.62	.001*
	Boy	2357	541.15	69.84			
Hungary	Girl	2163	543.37	77.96	-.06	-8.96	.005*
	Boy	2207	552.33	80.39			
Chinese Taipei	Girl	1933	554.02	64.19	-.07	-9.16	.001*
	Boy	1994	563.19	68.30			
Korea, Republic of	Girl	2203	584.72	59.18	-.09	-10.74	.000*
	Boy	2329	595.46	63.94			
Italy	Girl	1867	516.05	63.68	-.08	-10.81	.000*
	Boy	1895	526.85	64.64			

*p < .05, two-tailed.

Appendix B

Gender differences in intrinsic motivation

Table B1

Mathematics intrinsic motivation by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1,713	10.76	1.80	.21	0.76	.000*
	Boy	1,401	10.00	1.78			
Oman	Girl	3,085	11.27	1.48	.14	0.45	.000*
	Boy	3,026	10.82	1.62			
Bahrain	Girl	1,626	10.59	1.79	.07	0.25	.003*
	Boy	1,472	10.34	1.83			
Morocco	Girl	1,735	11.04	1.53	.06	0.19	.003*
	Boy	1,775	10.85	1.59			
Indonesia	Girl	1,580	10.85	1.42	.06	0.17	.015*
	Boy	1,666	10.68	1.46			
Serbia	Girl	1,832	10.13	1.92	.03	0.13	.109
	Boy	1,870	10.01	1.96			
United Arab Emirates	Girl	6,135	10.49	1.75	.03	0.11	.207
	Boy	5,861	10.38	1.75			
Kazakhstan	Girl	2,153	11.04	1.48	.03	0.09	.087
	Boy	2,213	10.95	1.53			
Turkey	Girl	2,594	11.37	1.49	.02	0.06	.229
	Boy	2,618	11.31	1.52			
Iran, Islamic Republic of	Girl	1,494	10.83	1.61	.01	0.03	.753
	Boy	1,550	10.80	1.66			
Ireland	Girl	1,869	9.61	1.76	.01	0.03	.644
	Boy	1,998	9.57	1.86			
Cyprus	Girl	1,865	10.26	1.96	-.01	-0.03	.741
	Boy	1,855	10.29	2.09			
Bulgaria	Girl	1,861	10.36	1.79	-.02	-0.06	.414
	Boy	1,893	10.42	1.88			
Georgia	Girl	1,697	10.48	1.51	-.03	-0.08	.142
	Boy	1,707	10.56	1.54			
Denmark	Girl	1,554	9.59	1.65	-.02	-0.08	.298
	Boy	1,535	9.67	1.71			
Poland	Girl	2,241	9.36	1.69	-.03	-0.12	.107
	Boy	2,229	9.48	1.71			
Table Average	Girl	2,175	9.97	1.66	-.03	-0.12	
	Boy	2,184	10.10	1.76			
Croatia	Girl	1,875	9.23	1.60	-.04	-0.15	.043*
	Boy	1,945	9.38	1.79			
Russian Federation	Girl	2,328	10.13	1.56	-.06	-0.18	.000*
	Boy	2,343	10.31	1.62			
Czech Republic	Girl	2,354	9.38	1.68	-.06	-0.20	.007*
	Boy	2,357	9.58	1.85			
Japan	Girl	2,054	9.13	1.51	-.07	-0.24	.000*
	Boy	2,020	9.37	1.71			
Finland	Girl	2,301	9.05	1.60	-.07	-0.25	.001*
	Boy	2,343	9.30	1.77			
Slovak Republic	Girl	2,526	9.63	1.76	-.07	-0.26	.000*
	Boy	2,657	9.88	1.85			
Singapore	Girl	2,991	9.50	1.71	-.09	-0.30	.000*

	Boy	3,048	9.80	1.81			
Korea, Republic of	Girl	2,203	8.79	1.44	-.10	-0.33	.000*
	Boy	2,329	9.12	1.65			
Hungary	Girl	2,163	9.52	1.72	-.09	-0.33	.000*
	Boy	2,207	9.85	1.92			
Lithuania	Girl	1,918	10.00	1.62	-.11	-0.37	.000*
	Boy	1,871	10.37	1.72			
Italy	Girl	1,867	9.82	1.84	-.12	-0.45	.000*
	Boy	1,895	10.28	1.84			
Belgium (Flemish)	Girl	2,430	9.00	1.63	-.13	-0.47	.000*
	Boy	2,288	9.47	1.81			
Chinese Taipei	Girl	1,933	8.68	1.74	-.13	-0.50	.000*
	Boy	1,994	9.18	2.01			
Portugal	Girl	2,123	10.33	1.71	-.16	-0.55	.000*
	Boy	2,180	10.88	1.73			
Hong Kong, SAR	Girl	1,486	9.16	1.76	-.16	-0.60	.000*
	Boy	1,788	9.76	1.93			
France	Girl	2,020	9.77	1.63	-.19	-0.65	.000*
	Boy	1,946	10.42	1.70			

*p < .05, two-tailed.

Table B2

Science intrinsic motivation by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1,713	10.76	2.06	.25	1.08	.000*
	Boy	1,401	9.68	2.05			
Bahrain	Girl	1,626	11.04	1.96	.14	0.55	.000*
	Boy	1,472	10.49	2.07			
Oman	Girl	3,085	11.20	1.72	.11	0.40	.000*
	Boy	3,026	10.80	1.86			
Czech Republic	Girl	2,354	9.65	2.00	.09	0.36	.000*
	Boy	2,357	9.29	2.10			
Morocco	Girl	1,735	10.96	1.78	.09	0.35	.000*
	Boy	1,775	10.61	1.94			
Indonesia	Girl	1,580	10.71	1.68	.09	0.30	.000*
	Boy	1,666	10.42	1.71			
Turkey	Girl	2,594	11.34	1.56	.09	0.29	.000*
	Boy	2,618	11.04	1.73			
Iran, Islamic Republic of	Girl	1,494	11.16	1.75	.07	0.25	.025*
	Boy	1,550	10.91	1.84			
Kazakhstan	Girl	2,153	10.62	1.74	.07	0.24	.000*
	Boy	2,213	10.38	1.79			
Serbia	Girl	1,832	10.14	2.00	.06	0.23	.005*
	Boy	1,870	9.91	2.05			
United Arab Emirates	Girl	6,135	10.71	1.96	.06	0.23	.010*
	Boy	5,861	10.48	2.01			
Bulgaria	Girl	1,861	10.81	1.77	.06	0.22	.001*
	Boy	1,893	10.58	1.96			
Lithuania	Girl	1,918	10.34	1.82	.04	0.14	.121
	Boy	1,871	10.20	2.00			
Slovak Republic	Girl	2,526	9.60	1.98	.03	0.13	.100
	Boy	2,657	9.47	2.10			

Poland	Girl	2,241	9.69	1.90	.03	0.11	.122
	Boy	2,229	9.58	1.89			
Cyprus	Girl	1,865	9.49	2.22	.01	0.06	.464
	Boy	1,855	9.43	2.33			
Table Average	Girl	2,175	10.16	1.88	.01	0.03	
	Boy	2,184	10.13	1.98			
Italy	Girl	1,867	10.15	1.77	.00	0.02	.793
	Boy	1,895	10.14	1.87			
Croatia	Girl	1,875	9.78	1.82	.00	0.00	.991
	Boy	1,945	9.78	1.97			
Russian Federation	Girl	2,328	10.03	1.79	-.01	-0.04	.654
	Boy	2,343	10.07	1.82			
Finland	Girl	2,301	9.17	1.82	-.02	-0.08	.261
	Boy	2,343	9.25	1.99			
Georgia	Girl	1,697	9.98	1.73	-.02	-0.09	.194
	Boy	1,707	10.06	1.84			
Hungary	Girl	2,163	9.68	1.83	-.04	-0.14	.062
	Boy	2,207	9.82	2.04			
Portugal	Girl	2,123	11.25	1.69	-.04	-0.15	.008*
	Boy	2,180	11.40	1.71			
Ireland	Girl	1,869	10.06	1.99	-.05	-0.19	.047*
	Boy	1,998	10.24	2.09			
Belgium (Flemish)	Girl	2,430	9.42	1.91	-.06	-0.26	.005*
	Boy	2,288	9.68	2.14			
Singapore	Girl	2,991	9.92	2.06	-.08	-0.33	.000*
	Boy	3,048	10.26	2.06			
France	Girl	2,020	9.45	2.06	-.08	-0.34	.000*
	Boy	1,946	9.79	2.12			
Japan	Girl	2,054	9.75	1.94	-.11	-0.43	.000*
	Boy	2,020	10.18	1.98			
Hong Kong, SAR	Girl	1,486	9.91	2.07	-.10	-0.43	.000*
	Boy	1,788	10.35	2.18			
Korea, Republic of	Girl	2,203	9.30	1.88	-.11	-0.44	.000*
	Boy	2,329	9.74	2.04			
Chinese Taipei	Girl	1,933	9.97	2.09	-.11	-0.46	.000*
	Boy	1,994	10.44	2.10			
Denmark	Girl	1,554	9.23	1.96	-.12	-0.49	.000*
	Boy	1,535	9.71	2.09			

*p < .05, two-tailed.

Appendix C

Gender differences in self-concept

Table C1

Mathematics self-concept by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1,713	10.59	2.00	.22	0.85	.000*
	Boy	1,401	9.74	1.82			
Oman	Girl	3,085	10.41	1.84	.10	0.36	.000*
	Boy	3,026	10.04	1.77			
Bahrain	Girl	1,626	10.39	1.97	.07	0.29	.000*
	Boy	1,472	10.10	1.92			
Kazakhstan	Girl	2,153	10.69	1.99	.05	0.19	.017*
	Boy	2,213	10.49	1.96			
Indonesia	Girl	1,580	9.82	1.67	.04	0.14	.029*
	Boy	1,666	9.68	1.66			
Morocco	Girl	1,735	10.11	1.84	.03	0.12	.103
	Boy	1,775	10.00	1.81			
Iran, Islamic Republic of	Girl	1,494	10.30	1.94	.03	0.10	.491
	Boy	1,550	10.20	1.89			
United Arab Emirates	Girl	6,135	10.10	1.81	.00	0.01	.919
	Boy	5,861	10.09	1.84			
Turkey	Girl	2,594	10.44	2.06	-.01	-0.05	.445
	Boy	2,618	10.50	2.09			
Serbia	Girl	1,832	10.48	2.23	-.02	-0.07	.408
	Boy	1,870	10.55	2.19			
Georgia	Girl	1,697	10.28	1.73	-.02	-0.08	.280
	Boy	1,707	10.36	1.85			
Bulgaria	Girl	1,861	10.42	2.16	-.03	-0.15	.095
	Boy	1,893	10.57	2.23			
Table Average	Girl	2,175	9.81	1.82	-.07	-0.26	
	Boy	2,184	10.07	1.89			
Korea, Republic of	Girl	2,203	8.95	1.41	-.09	-0.27	.000*
	Boy	2,329	9.23	1.52			
Croatia	Girl	1,875	9.95	1.79	-.07	-0.27	.001*
	Boy	1,945	10.22	1.92			
Japan	Girl	2,054	8.91	1.45	-.11	-0.32	.000*
	Boy	2,020	9.23	1.60			
Lithuania	Girl	1,918	9.81	1.68	-.09	-0.33	.000*
	Boy	1,871	10.13	1.76			
Poland	Girl	2,241	9.61	1.84	-.09	-0.33	.000*
	Boy	2,229	9.95	1.92			
Ireland	Girl	1,869	10.02	1.85	-.09	-0.34	.000*
	Boy	1,998	10.36	1.87			
Russian Federation	Girl	2,328	9.52	1.87	-.10	-0.38	.000*
	Boy	2,343	9.90	1.94			
Slovak Republic	Girl	2,526	9.79	1.87	-.10	-0.40	.000*
	Boy	2,657	10.19	1.99			
Finland	Girl	2,301	9.59	1.62	-.12	-0.42	.000*
	Boy	2,343	10.02	1.75			
Czech Republic	Girl	2,354	9.34	1.67	-.13	-0.48	.000*
	Boy	2,357	9.82	1.86			
Denmark	Girl	1,554	9.87	1.68	-.14	-0.50	.000*

	Boy	1,535	10.37	1.79			
Cyprus	Girl	1,865	10.31	2.09	-.12	-0.52	.000*
	Boy	1,855	10.83	2.19			
Italy	Girl	1,867	9.89	1.85	-.14	-0.54	.000*
	Boy	1,895	10.43	1.87			
Hungary	Girl	2,163	9.91	2.00	-.13	-0.54	.000*
	Boy	2,207	10.46	2.14			
Singapore	Girl	2,991	8.88	1.68	-.16	-0.58	.000*
	Boy	3,048	9.45	1.86			
Chinese Taipei	Girl	1,933	8.59	1.63	-.17	-0.61	.000*
	Boy	1,994	9.20	1.89			
Hong Kong, SAR	Girl	1,486	8.93	1.72	-.17	-0.63	.000*
	Boy	1,788	9.56	1.91			
Portugal	Girl	2,123	9.23	1.73	-.19	-0.71	.000*
	Boy	2,180	9.94	2.02			
France	Girl	2,020	9.58	1.74	-.23	-0.88	.000*
	Boy	1,946	10.46	1.93			
Belgium (Flemish)	Girl	2,430	9.34	1.77	-.24	-0.89	.000*
	Boy	2,288	10.23	1.88			

*p < .05, two-tailed.

Table C2

Science self-concept by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1,713	10.51	2.01	.25	1.00	.000*
	Boy	1,401	9.51	1.83			
Bahrain	Girl	1,626	10.60	1.96	.13	0.50	.000*
	Boy	1,472	10.11	1.92			
Kazakhstan	Girl	2,153	10.70	1.87	.11	0.42	.000*
	Boy	2,213	10.29	1.84			
Iran, Islamic Republic of	Girl	1,494	10.94	2.01	.10	0.40	.001*
	Boy	1,550	10.54	2.00			
Serbia	Girl	1,832	10.75	2.01	.09	0.38	.000*
	Boy	1,870	10.37	2.05			
Turkey	Girl	2,594	11.09	1.89	.10	0.37	.000*
	Boy	2,618	10.72	1.97			
Indonesia	Girl	1,580	10.00	1.83	.09	0.34	.000*
	Boy	1,666	9.66	1.76			
Oman	Girl	3,085	10.60	1.95	.08	0.33	.000*
	Boy	3,026	10.28	1.97			
Morocco	Girl	1,735	10.21	1.94	.07	0.29	.000*
	Boy	1,775	9.92	1.89			
Lithuania	Girl	1,918	10.18	1.70	.06	0.21	.016*
	Boy	1,871	9.97	1.74			
United Arab Emirates	Girl	6,135	10.22	1.86	.05	0.19	.017*
	Boy	5,861	10.03	1.86			
Czech Republic	Girl	2,354	9.66	1.74	.04	0.15	.018*
	Boy	2,357	9.51	1.89			
Bulgaria	Girl	1,861	10.93	1.94	.04	0.15	.139
	Boy	1,893	10.78	2.04			
Slovak Republic	Girl	2,526	9.85	1.90	.03	0.13	.091
	Boy	2,657	9.72	1.93			

Poland	Girl	2,241	10.00	1.75	.03	0.11	.102
	Boy	2,229	9.88	1.73			
Table Average	Girl	2,175	10.03	1.78	.02	0.08	
	Boy	2,184	9.95	1.84			
Georgia	Girl	1,697	10.15	1.70	.02	0.07	.305
	Boy	1,707	10.08	1.88			
Russian Federation	Girl	2,328	9.89	1.90	.02	0.06	.369
	Boy	2,343	9.83	1.88			
Italy	Girl	1,867	10.00	1.68	.01	0.05	.400
	Boy	1,895	9.95	1.74			
Finland	Girl	2,301	9.70	1.44	.00	0.01	.788
	Boy	2,343	9.69	1.56			
Croatia	Girl	1,875	10.40	1.80	.00	0.00	.962
	Boy	1,945	10.41	1.90			
Ireland	Girl	1,869	9.79	1.66	-.01	-0.04	.598
	Boy	1,998	9.83	1.74			
Hungary	Girl	2,163	10.17	1.94	-.01	-0.04	.606
	Boy	2,207	10.21	2.04			
Belgium (Flemish)	Girl	2,430	9.82	1.72	-.03	-0.10	.122
	Boy	2,288	9.92	1.84			
Cyprus	Girl	1,865	9.67	2.10	-.03	-0.12	.159
	Boy	1,855	9.79	2.21			
Portugal	Girl	2,123	10.17	1.69	-.04	-0.13	.043*
	Boy	2,180	10.30	1.78			
Japan	Girl	2,054	9.23	1.30	-.06	-0.15	.001*
	Boy	2,020	9.38	1.39			
Hong Kong, SAR	Girl	1,486	9.21	1.63	-.05	-0.16	.036*
	Boy	1,788	9.37	1.78			
Korea, Republic of	Girl	2,203	9.02	1.27	-.09	-0.25	.000*
	Boy	2,329	9.27	1.53			
France	Girl	2,020	9.24	1.80	-.11	-0.39	.000*
	Boy	1,946	9.63	1.85			
Chinese Taipei	Girl	1,933	9.67	1.66	-.12	-0.40	.000*
	Boy	1,994	10.07	1.76			
Denmark	Girl	1,554	9.58	1.68	-.12	-0.41	.000*
	Boy	1,535	9.99	1.81			
Singapore	Girl	2,991	8.98	1.73	-.12	-0.42	.000*
	Boy	3,048	9.39	1.83			

*p < .05, two-tailed.

Appendix D

Gender difference in parents' influence

Table D1

Early numeracy activities by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Saudi Arabia	Girl	1,678	10.20	1.96	.08	0.31	.048*
	Boy	1,381	9.89	2.06			
Serbia	Girl	1,825	10.79	1.83	.05	0.20	.053
	Boy	1,861	10.59	1.79			
Oman	Girl	3,043	9.62	1.79	.05	0.19	.001*
	Boy	2,987	9.43	1.84			
Czech Republic	Girl	2,344	10.85	1.62	.04	0.13	.004*
	Boy	2,346	10.72	1.57			
Ireland	Girl	1,860	10.98	1.99	.03	0.12	.147
	Boy	1,987	10.86	1.95			
Kazakhstan	Girl	2,133	11.02	1.85	.03	0.12	.022*
	Boy	2,186	10.90	1.78			
Morocco	Girl	1,704	8.01	2.58	.02	0.11	.321
	Boy	1,727	7.90	2.54			
Russian Federation	Girl	2,322	11.23	1.91	.03	0.10	.159
	Boy	2,329	11.13	1.85			
Slovak Republic	Girl	2,502	10.97	1.83	.02	0.08	.173
	Boy	2,640	10.89	1.77			
Poland	Girl	2,236	11.07	1.75	.02	0.07	.257
	Boy	2,224	11.00	1.68			
Hungary	Girl	2,156	10.99	1.64	.02	0.06	.240
	Boy	2,199	10.93	1.64			
United Arab Emirates	Girl	6,109	10.26	2.04	.01	0.05	.354
	Boy	5,829	10.20	1.99			
Indonesia	Girl	1,557	9.09	1.85	.01	0.04	.655
	Boy	1,651	9.05	2.01			
Lithuania	Girl	1,888	10.36	1.68	.01	0.03	.582
	Boy	1,840	10.32	1.58			
Turkey	Girl	2,564	9.04	2.19	.01	0.02	.711
	Boy	2,589	9.02	2.21			
Bulgaria	Girl	1,852	9.89	2.31	.00	0.02	.862
	Boy	1,884	9.87	2.40			
Table Average	Girl	2,157	10.10	1.89	.00	0.02	
	Boy	2,165	10.08	1.86			
Cyprus	Girl	1,835	10.36	2.04	.00	0.01	.855
	Boy	1,827	10.35	2.01			
Bahrain	Girl	1,596	10.24	1.92	.00	0.00	.971
	Boy	1,454	10.24	1.84			
Iran, Islamic Republic of	Girl	1,476	9.52	2.05	.00	0.00	.972
	Boy	1,535	9.52	1.96			
Belgium (Flemish)	Girl	2,422	9.70	1.76	.00	-0.01	.899
	Boy	2,271	9.70	1.70			
Finland	Girl	2,290	9.55	1.49	.00	-0.01	.878
	Boy	2,329	9.56	1.45			
Japan	Girl	2,043	9.30	1.86	.00	-0.02	.764
	Boy	2,013	9.32	1.80			

Denmark	Girl	1,540	9.83	1.62	-.01	-0.02	.716
	Boy	1,524	9.85	1.60			
Croatia	Girl	1,873	10.73	1.72	-.01	-0.02	.705
	Boy	1,944	10.76	1.68			
Singapore	Girl	2,971	9.98	2.11	-.01	-0.03	.543
	Boy	3,029	10.01	2.08			
Georgia	Girl	1,661	10.10	1.81	-.02	-0.07	.313
	Boy	1,678	10.16	1.77			
France	Girl	2,003	10.21	1.74	-.03	-0.09	.139
	Boy	1,932	10.29	1.68			
Italy	Girl	1,852	10.35	1.81	-.04	-0.13	.048*
	Boy	1,876	10.48	1.73			
Chinese Taipei	Girl	1,909	9.32	2.05	-.03	-0.14	.041*
	Boy	1,962	9.46	2.13			
Portugal	Girl	2,114	10.10	1.75	-.05	-0.17	.006*
	Boy	2,163	10.26	1.78			
Korea, Republic of	Girl	2,187	10.22	2.08	-.05	-0.20	.003*
	Boy	2,311	10.42	2.00			
Hong Kong, SAR	Girl	1,467	9.27	1.86	-.06	-0.23	.000*
	Boy	1,761	9.51	1.81			

*p < .05, two-tailed.

Table D2.

Parents' expectations by gender

Country	Gender	N	*M*	*SD*	Correlation	Mean Difference	Sig.
Finland	Girl	2,253	4.35	1.61	.12	0.40	.000*
	Boy	2,308	3.95	1.68			
Slovak Republic	Girl	2,477	4.50	1.80	.08	0.29	.000*
	Boy	2,593	4.20	1.87			
Serbia	Girl	1,807	4.63	1.25	.10	0.26	.000*
	Boy	1,840	4.36	1.39			
Poland	Girl	2,222	5.01	1.51	.08	0.25	.000*
	Boy	2,209	4.76	1.59			
Russian Federation	Girl	2,214	4.93	1.35	.09	0.25	.000*
	Boy	2,187	4.68	1.46			
Czech Republic	Girl	2,304	3.72	1.79	.06	0.21	.002*
	Boy	2,308	3.51	1.80			
Hungary	Girl	2,101	4.14	1.50	.05	0.16	.006*
	Boy	2,138	3.97	1.54			
Kazakhstan	Girl	2,137	5.10	1.04	.07	0.15	.001*
	Boy	2,184	4.94	1.20			
Belgium (Flemish)	Girl	2,240	4.69	1.32	.05	0.15	.002*
	Boy	2,066	4.54	1.45			
Oman	Girl	2,985	5.10	1.35	.05	0.15	.000*
	Boy	2,939	4.95	1.45			
Lithuania	Girl	1,895	4.82	1.17	.06	0.14	.004*
	Boy	1,846	4.68	1.23			
Portugal	Girl	2,063	5.06	1.36	.05	0.13	.005*
	Boy	2,114	4.93	1.42			
France	Girl	1,864	4.43	1.58	.04	0.13	.052
	Boy	1,762	4.30	1.65			

Indonesia	Girl	1,537	4.47	1.53	.03	0.10	.103
	Boy	1,615	4.37	1.55			
Table Average	Girl	2111	4.80	1.27	.03	0.10	
	Boy	2,116	4.70	1.31			
Georgia	Girl	1,532	4.80	1.44	.03	0.10	.142
	Boy	1,590	4.70	1.47			
Croatia	Girl	1,839	4.39	0.94	.05	0.10	.015*
	Boy	1,915	4.29	0.97			
Bulgaria	Girl	1,832	4.52	1.71	.03	0.09	.180
	Boy	1,862	4.42	1.69			
Italy	Girl	1,750	4.18	1.41	.03	0.09	.099
	Boy	1,776	4.09	1.43			
Morocco	Girl	1,638	4.39	1.79	.02	0.09	.337
	Boy	1,678	4.30	1.85			
Saudi Arabia	Girl	1,670	5.16	1.14	.03	0.08	.189
	Boy	1,344	5.08	1.21			
Denmark	Girl	1,513	4.87	1.12	.03	0.08	.083
	Boy	1,490	4.79	1.22			
Cyprus	Girl	1,782	5.32	0.98	.03	0.07	.050
	Boy	1,792	5.25	1.06			
Singapore	Girl	2,938	5.07	0.78	.03	0.06	.005*
	Boy	2,984	5.01	0.82			
Chinese Taipei	Girl	1,913	5.19	0.86	.03	0.05	.171
	Boy	1,969	5.14	0.95			
Bahrain	Girl	1,576	5.18	1.22	.02	0.05	.414
	Boy	1,423	5.13	1.25			
Ireland	Girl	1,835	5.01	1.04	.01	0.02	.732
	Boy	1,981	5.00	1.00			
Hong Kong, SAR	Girl	1,465	5.06	0.90	-.01	-0.03	.529
	Boy	1,758	5.09	0.92			
Korea, Republic of	Girl	2,194	5.23	0.71	-.02	-0.03	.282
	Boy	2,316	5.26	0.66			
United Arab Emirates	Girl	5,901	5.41	0.94	-.02	-0.04	.207
	Boy	5,591	5.45	0.98			
Turkey	Girl	2,575	5.43	0.99	-.04	-0.07	.023*
	Boy	2,597	5.50	0.85			
Japan	Girl	2,025	4.29	1.05	-.04	-0.09	.013*
	Boy	1,994	4.38	1.15			
Iran, Islamic Republic of	Girl	1,486	5.25	1.35	-.08	-0.21	.011*
	Boy	1,543	5.46	1.08			

*p < .05, two-tailed.

Appendix E

Regression analysis results for students' attitudes towards mathematics and science

Table E1

Regression analysis results for mathematics intrinsic motivation

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	7.731	0.354		21.811	.000*
R^2 = .052	Early Numeracy Activities	-0.006	0.021	-0.007	-0.308	.758
	Gender (Dummy)	0.207	0.086	0.057	2.406	.016*
	Mathematics Achievement	0.004	0.001	0.181	5.281	.000*
	Parents' Attitudes	0.073	0.016	0.071	4.573	.000*
	Parents' Education	-0.077	0.048	-0.047	-1.616	.106
	Parents' Expectations	0.088	0.041	0.060	2.172	.030*
Belgium (Flemish)	(Constant)	7.369	0.377		19.524	.000*
R^2 = .043	Early Numeracy Activities	0.027	0.014	0.026	1.867	.062
	Gender (Dummy)	-0.445	0.057	-0.128	-7.784	.000*
	Mathematics Achievement	0.003	0.001	0.106	3.945	.000*
	Parents' Attitudes	0.069	0.016	0.074	4.235	.000*
	Parents' Education	-0.174	0.040	-0.102	-4.347	.000*
	Parents' Expectations	0.060	0.036	0.048	1.696	.090
Bulgaria	(Constant)	6.776	0.380		17.822	.000*
R^2 = .071	Early Numeracy Activities	0.069	0.020	0.089	3.435	.001*
	Gender (Dummy)	-0.069	0.068	-0.019	-1.013	.311
	Mathematics Achievement	0.005	0.001	0.219	8.238	.000*
	Parents' Attitudes	0.076	0.020	0.084	3.759	.000*
	Parents' Education	-0.223	0.041	-0.162	-5.415	.000*
	Parents' Expectations	0.065	0.038	0.060	1.715	.086
Chinese Taipei	(Constant)	5.348	0.410		13.032	.000*
R^2 = .073	Early Numeracy Activities	0.052	0.020	0.058	2.637	.008
	Gender (Dummy)	-0.453	0.082	-0.119	-5.549	.000*
	Mathematics Achievement	0.006	0.001	0.232	11.022	.000*
	Parents' Attitudes	0.036	0.018	0.039	2.036	.042*
	Parents' Education	-0.163	0.037	-0.085	-4.411	.000*
	Parents' Expectations	-0.037	0.037	-0.018	-1.011	.312
Croatia	(Constant)	7.229	0.336		21.508	.000*
R^2 = .029	Early Numeracy Activities	0.041	0.018	0.041	2.249	.025*
	Gender (Dummy)	-0.103	0.070	-0.030	-1.483	.138
	Mathematics Achievement	0.004	0.001	0.152	7.058	.000*
	Parents' Attitudes	0.042	0.021	0.039	2.061	.039*
	Parents' Education	-0.186	0.058	-0.081	-3.193	.001*
	Parents' Expectations	0.018	0.042	0.010	0.433	.665
Cyprus	(Constant)	7.446	0.386		19.269	.000*
R^2 = .039	Early Numeracy Activities	0.002	0.017	0.002	0.135	.892
	Gender (Dummy)	0.014	0.086	0.004	0.166	.868
	Mathematics Achievement	0.005	0.001	0.192	8.826	.000*
	Parents' Attitudes	0.042	0.019	0.036	2.206	.027*
	Parents' Education	-0.155	0.041	-0.075	-3.736	.000*
	Parents' Expectations	0.066	0.035	0.033	1.891	.059
Czech Republic	(Constant)	6.383	0.331		19.291	.000*
R^2 = .038	Early Numeracy Activities	0.050	0.020	0.045	2.460	.014*
	Gender (Dummy)	-0.157	0.070	-0.044	-2.224	.026*
	Mathematics Achievement	0.005	0.001	0.188	9.275	.000*
	Parents' Attitudes	0.054	0.017	0.055	3.147	.002*
	Parents' Education	-0.104	0.040	-0.055	-2.632	.009*
	Parents' Expectations	-0.013	0.025	-0.013	-0.523	.601
Denmark	(Constant)	7.044	0.344		20.477	.000*
R^2 = .039	Early Numeracy Activities	0.044	0.017	0.042	2.542	.011*
	Gender (Dummy)	-0.062	0.078	-0.018	-0.786	.432
	Mathematics Achievement	0.004	0.001	0.163	6.763	.000*

	Parents' Attitudes	0.037	0.017	0.038	2.161	.031*
	Parents' Education	-0.127	0.043	-0.058	-2.961	.003*
	Parents' Expectations	0.077	0.032	0.053	2.381	.017*
Finland	(Constant)	6.041	0.308		19.634	.000*
R^2 = .062	Early Numeracy Activities	0.063	0.024	0.054	2.592	.010*
	Gender (Dummy)	-0.321	0.078	-0.095	-4.109	.000*
	Mathematics Achievement	0.005	0.001	0.209	8.737	.000*
	Parents' Attitudes	0.029	0.016	0.033	1.811	.070
	Parents' Education	-0.171	0.037	-0.092	-4.587	.000*
	Parents' Expectations	0.059	0.025	0.057	2.385	.017*
France	(Constant)	7.723	0.282		27.427	.000*
R^2 = .088	Early Numeracy Activities	0.056	0.021	0.057	2.708	.007*
	Gender (Dummy)	-0.595	0.074	-0.176	-8.073	.000*
	Mathematics Achievement	0.005	0.000	0.211	10.095	.000*
	Parents' Attitudes	0.051	0.019	0.057	2.767	.006*
	Parents' Education	-0.230	0.037	-0.136	-6.244	.000*
	Parents' Expectations	0.023	0.028	0.022	0.816	.415
Georgia	(Constant)	7.970	0.351		22.705	.000*
R^2 = .052	Early Numeracy Activities	0.038	0.017	0.045	2.267	.023*
	Gender (Dummy)	-0.088	0.058	-0.029	-1.516	.130
	Mathematics Achievement	0.004	0.000	0.203	7.410	.000*
	Parents' Attitudes	0.031	0.020	0.036	1.561	.119
	Parents' Education	0.023	0.037	0.013	0.618	.537
	Parents' Expectations	0.012	0.037	0.011	0.323	.747
Hong Kong, SAR	(Constant)	5.790	0.513		11.275	.000*
R^2 = .077	Early Numeracy Activities	0.034	0.019	0.034	1.792	.073
	Gender (Dummy)	-0.536	0.085	-0.142	-6.269	.000*
	Mathematics Achievement	0.007	0.001	0.230	8.153	.000*
	Parents' Attitudes	0.026	0.019	0.026	1.371	.171
	Parents' Education	-0.143	0.036	-0.097	-3.993	.000*
	Parents' Expectations	-0.040	0.041	-0.019	-0.969	.333
Hungary	(Constant)	6.846	0.497		13.770	.000*
R^2 = .069	Early Numeracy Activities	0.039	0.022	0.035	1.817	.069
	Gender (Dummy)	-0.294	0.074	-0.080	-3.953	.000*
	Mathematics Achievement	0.006	0.001	0.259	8.589	.000*
	Parents' Attitudes	0.055	0.020	0.054	2.719	.007
	Parents' Education	-0.279	0.048	-0.162	-5.874	.000*
	Parents' Expectations	0.018	0.042	0.015	0.433	.665
Indonesia	(Constant)	8.373	0.352		23.762	.000*
R^2 = .057	Early Numeracy Activities	0.009	0.015	0.012	0.638	.523
	Gender (Dummy)	0.153	0.065	0.053	2.366	.018
	Mathematics Achievement	0.003	0.001	0.216	5.367	.000*
	Parents' Attitudes	0.080	0.023	0.090	3.492	.000*
	Parents' Education	-0.049	0.034	-0.045	-1.458	.145
	Parents' Expectations	0.012	0.028	0.012	0.407	.684
Iran, Islamic Republic of	(Constant)	8.417	0.340		24.736	.000*
R^2 = .059	Early Numeracy Activities	0.024	0.021	0.029	1.151	.250
	Gender (Dummy)	0.006	0.103	0.002	0.058	.953
	Mathematics Achievement	0.004	0.001	0.239	6.853	.000*
	Parents' Attitudes	0.047	0.025	0.049	1.917	.055
	Parents' Education	-0.124	0.042	-0.104	-2.972	.003*
	Parents' Expectations	0.052	0.040	0.039	1.299	.194
Ireland	(Constant)	6.655	0.364		18.267	.000*
R^2 = .033	Early Numeracy Activities	0.027	0.019	0.030	1.423	.155
	Gender (Dummy)	0.055	0.073	0.015	0.755	.451
	Mathematics Achievement	0.004	0.001	0.173	7.120	.000*
	Parents' Attitudes	0.044	0.021	0.044	2.083	.037*
	Parents' Education	-0.056	0.041	-0.031	-1.371	.171
	Parents' Expectations	-0.008	0.045	-0.005	-0.182	.856
Italy	(Constant)	7.670	0.433		17.718	.000*
R^2 = .046	Early Numeracy Activities	0.065	0.020	0.062	3.173	.002*
	Gender (Dummy)	-0.399	0.073	-0.108	-5.431	.000*

	Mathematics Achievement	0.003	0.001	0.105	4.365	.000*
	Parents' Attitudes	0.058	0.020	0.055	2.874	.004*
	Parents' Education	-0.159	0.043	-0.088	-3.685	.000*
	Parents' Expectations	0.112	0.031	0.086	3.653	.000*
Japan	(Constant)	4.661	0.287		16.259	.000*
R^2 = .104	Early Numeracy Activities	0.029	0.013	0.033	2.156	.031*
	Gender (Dummy)	-0.233	0.050	-0.072	-4.678	.000*
	Mathematics Achievement	0.007	0.000	0.274	15.185	.000*
	Parents' Attitudes	0.028	0.016	0.030	1.737	.082
	Parents' Education	-0.011	0.032	-0.006	-0.339	.735
	Parents' Expectations	0.092	0.024	0.063	3.845	.000*
Kazakhstan	(Constant)	8.358	0.389		21.462	.000*
R^2 = .035	Early Numeracy Activities	0.044	0.015	0.053	2.961	.003*
	Gender (Dummy)	0.065	0.052	0.021	1.250	.211
	Mathematics Achievement	0.003	0.000	0.159	6.395	.000*
	Parents' Attitudes	0.041	0.021	0.042	1.977	.048*
	Parents' Education	-0.055	0.041	-0.035	-1.360	.174
	Parents' Expectations	0.056	0.029	0.042	1.905	.057
Korea, Republic of	(Constant)	4.075	0.340		12.001	.000*
R^2 = .123	Early Numeracy Activities	0.034	0.012	0.044	2.768	.006*
	Gender (Dummy)	-0.265	0.047	-0.085	-5.683	.000*
	Mathematics Achievement	0.008	0.001	0.327	14.349	.000*
	Parents' Attitudes	0.015	0.014	0.018	1.068	.286
	Parents' Education	-0.132	0.034	-0.073	-3.852	.000*
	Parents' Expectations	0.083	0.043	0.036	1.924	.054
Lithuania	(Constant)	7.293	0.416		17.525	.000*
R^2 = .055	Early Numeracy Activities	0.086	0.023	0.084	3.721	.000*
	Gender (Dummy)	-0.375	0.072	-0.111	-5.240	.000*
	Mathematics Achievement	0.005	0.001	0.194	7.368	.000*
	Parents' Attitudes	0.041	0.020	0.040	2.019	.044*
	Parents' Education	-0.135	0.045	-0.067	-3.016	.003*
	Parents' Expectations	-0.028	0.036	-0.020	-0.768	.443
Morocco	(Constant)	8.724	0.375		23.278	.000*
R^2 = .089	Early Numeracy Activities	0.013	0.016	0.022	0.819	.413
	Gender (Dummy)	0.171	0.064	0.055	2.672	.008*
	Mathematics Achievement	0.004	0.001	0.240	5.273	.000*
	Parents' Attitudes	0.000	0.025	0.001	0.017	.986
	Parents' Education	0.053	0.043	0.044	1.233	.218
	Parents' Expectations	0.073	0.030	0.085	2.402	.016*
Oman	(Constant)	8.869	0.237		37.459	.000*
R^2 = .080	Early Numeracy Activities	0.011	0.015	0.013	0.741	.459
	Gender (Dummy)	0.366	0.042	0.117	8.654	.000*
	Mathematics Achievement	0.004	0.000	0.243	12.187	.000*
	Parents' Attitudes	0.028	0.013	0.029	2.047	.041*
	Parents' Education	-0.042	0.019	-0.040	-2.198	.028*
	Parents' Expectations	0.011	0.020	0.010	0.572	.567
Poland	(Constant)	6.735	0.358		18.823	.000*
R^2 = .034	Early Numeracy Activities	0.063	0.016	0.064	4.029	.000*
	Gender (Dummy)	-0.106	0.070	-0.031	-1.522	.128
	Mathematics Achievement	0.004	0.001	0.172	6.887	.000*
	Parents' Attitudes	0.037	0.015	0.040	2.506	.012*
	Parents' Education	-0.103	0.034	-0.074	-3.021	.003*
	Parents' Expectations	-0.037	0.033	-0.034	-1.115	.265
Portugal	(Constant)	6.479	0.356		18.184	.000*
R^2 = .106	Early Numeracy Activities	0.059	0.017	0.059	3.364	.001*
	Gender (Dummy)	-0.447	0.068	-0.128	-6.599	.000*
	Mathematics Achievement	0.007	0.001	0.288	13.508	.000*
	Parents' Attitudes	0.034	0.019	0.030	1.777	.076
	Parents' Education	-0.123	0.021	-0.096	-5.872	.000*
	Parents' Expectations	-0.008	0.022	-0.006	-0.362	.717
Russian Federation	(Constant)	7.087	0.367		19.305	.000*
R^2 = .063	Early Numeracy Activities	0.002	0.016	0.003	0.146	.884

	Gender (Dummy)	-0.177	0.046	-0.056	-3.877	.000*
	Mathematics Achievement	0.005	0.000	0.237	10.495	.000*
	Parents' Attitudes	0.072	0.021	0.083	3.443	.001*
	Parents' Education	-0.137	0.040	-0.075	-3.455	.001*
	Parents' Expectations	0.022	0.031	0.020	0.724	.469
Saudi Arabia	(Constant)	8.048	0.288		27.983	.000*
R^2 = .073	Early Numeracy Activities	0.009	0.022	0.010	0.409	.683
	Gender (Dummy)	0.656	0.123	0.179	5.354	.000*
	Mathematics Achievement	0.003	0.001	0.153	5.573	.000*
	Parents' Attitudes	0.035	0.023	0.038	1.568	.117
	Parents' Education	-0.039	0.028	-0.030	-1.364	.173
	Parents' Expectations	0.088	0.032	0.056	2.729	.006*
Serbia	(Constant)	7.711	0.999		7.716	.000*
R^2 = .045	Early Numeracy Activities	0.033	0.031	0.031	1.073	.284
	Gender (Dummy)	0.114	0.083	0.029	1.369	.171
	Mathematics Achievement	0.004	0.001	0.167	3.435	.001*
	Parents' Attitudes	0.109	0.026	0.113	4.143	.000*
	Parents' Education	-0.319	0.066	-0.140	-4.847	.000*
	Parents' Expectations	-0.025	0.044	-0.017	-0.570	.569
Singapore	(Constant)	6.161	0.273		22.605	.000*
R^2 = .066	Early Numeracy Activities	0.014	0.013	0.016	1.058	.290
	Gender (Dummy)	-0.316	0.049	-0.089	-6.463	.000*
	Mathematics Achievement	0.005	0.000	0.228	12.608	.000*
	Parents' Attitudes	0.056	0.014	0.059	3.988	.000*
	Parents' Education	-0.101	0.029	-0.058	-3.463	.001*
	Parents' Expectations	0.074	0.032	0.033	2.304	.021*
Slovak Republic	(Constant)	8.018	0.450		17.829	.000*
R^2 = .026	Early Numeracy Activities	0.026	0.021	0.026	1.213	.225
	Gender (Dummy)	-0.210	0.058	-0.058	-3.607	.000*
	Mathematics Achievement	0.003	0.001	0.130	4.646	.000*
	Parents' Attitudes	0.070	0.018	0.070	3.879	.000*
	Parents' Education	-0.148	0.040	-0.083	-3.749	.000*
	Parents' Expectations	-0.021	0.024	-0.021	-0.868	.386
Turkey	(Constant)	8.336	0.225		37.091	.000*
R^2 = .085	Early Numeracy Activities	-0.001	0.012	-0.001	-0.062	.951
	Gender (Dummy)	0.076	0.051	0.025	1.486	.137
	Mathematics Achievement	0.005	0.000	0.304	16.096	.000*
	Parents' Attitudes	0.056	0.014	0.066	3.928	.000*
	Parents' Education	-0.142	0.021	-0.133	-6.773	.000*
	Parents' Expectations	0.056	0.026	0.034	2.125	.034*
United Arab Emirates	(Constant)	8.295	0.220		37.656	.000*
R^2 = .036	Early Numeracy Activities	0.027	0.013	0.031	2.003	.045*
	Gender (Dummy)	0.116	0.081	0.033	1.424	.155
	Mathematics Achievement	0.003	0.000	0.161	8.463	.000*
	Parents' Attitudes	0.061	0.011	0.066	5.779	.000*
	Parents' Education	-0.080	0.023	-0.052	-3.518	.000*
	Parents' Expectations	0.050	0.020	0.028	2.528	.011*
Table Average	(Constant)	7.177	0.070		102.658	
R^2 = .061	Early Numeracy Activities	0.034	0.003	0.036	10.280	
	Gender (Dummy)	-0.114	0.013	-0.032	-8.978	
	Mathematics Achievement	0.005	0.000	0.205	42.711	
	Parents' Attitudes	0.048	0.003	0.050	14.278	
	Parents' Education	-0.122	0.007	-0.073	-17.633	
	Parents' Expectations	0.033	0.006	0.024	5.539	

*p < .05, two-tailed.

Table E2

Regression analysis results for science intrinsic motivation

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	6.626	0.377		17.575	.000*
R^2 = .143	Early Numeracy Activities	0.026	0.022	0.024	1.188	.235
	Gender (Dummy)	0.333	0.107	0.082	3.096	.002*
	Parents' Attitudes	0.051	0.022	0.044	2.347	.019*
	Parents' Education	-0.104	0.036	-0.057	-2.906	.004*
	Parents' Expectations	0.092	0.038	0.056	2.443	.015*
	Science Achievement	0.007	0.001	0.333	13.049	.000*
Belgium (Flemish)	(Constant)	7.947	0.464		17.111	.000*
R^2 = .020	Early Numeracy Activities	-0.011	0.021	-0.009	-0.505	.614
	Gender (Dummy)	-0.259	0.092	-0.064	-2.804	.005*
	Parents' Attitudes	0.002	0.017	0.001	0.096	.924
	Parents' Education	-0.118	0.045	-0.059	-2.622	.009*
	Parents' Expectations	0.022	0.036	0.015	0.609	.542
	Science Achievement	0.004	0.001	0.130	5.060	.000*
Bulgaria	(Constant)	6.730	0.352		19.101	.000*
R^2 = .089	Early Numeracy Activities	0.054	0.020	0.068	2.736	.006*
	Gender (Dummy)	0.183	0.059	0.049	3.086	.002*
	Parents' Attitudes	0.082	0.021	0.089	3.831	.000*
	Parents' Education	-0.057	0.041	-0.041	-1.389	.165
	Parents' Expectations	0.083	0.045	0.075	1.830	.067
	Science Achievement	0.004	0.001	0.210	6.676	.000*
Chinese Taipei	(Constant)	7.457	0.423		17.640	.000*
R^2 = .036	Early Numeracy Activities	0.038	0.017	0.038	2.302	.021*
	Gender (Dummy)	-0.417	0.082	-0.099	-5.105	.000*
	Parents' Attitudes	0.029	0.018	0.029	1.644	.100
	Parents' Education	-0.117	0.051	-0.055	-2.268	.023*
	Parents' Expectations	0.039	0.041	0.017	0.943	.346
	Science Achievement	0.005	0.001	0.145	6.523	.000*
Croatia	(Constant)	7.541	0.420		17.968	.000*
R^2 = .013	Early Numeracy Activities	0.056	0.020	0.050	2.756	.006*
	Gender (Dummy)	0.004	0.077	0.001	0.055	.956
	Parents' Attitudes	0.015	0.020	0.012	0.762	.446
	Parents' Education	0.014	0.056	0.005	0.243	.808
	Parents' Expectations	0.051	0.049	0.026	1.050	.294
	Science Achievement	0.002	0.001	0.075	3.089	.002*
Cyprus	(Constant)	7.630	0.425		17.952	.000*
R^2 = .014	Early Numeracy Activities	-0.010	0.020	-0.009	-0.492	.622
	Gender (Dummy)	0.080	0.087	0.018	0.924	.355
	Parents' Attitudes	0.050	0.021	0.037	2.368	.018*
	Parents' Education	-0.066	0.048	-0.029	-1.396	.163
	Parents' Expectations	-0.025	0.042	-0.011	-0.600	.549
	Science Achievement	0.004	0.001	0.117	4.693	.000*
Czech Republic	(Constant)	8.052	0.512		15.727	.000*
R^2 = .017	Early Numeracy Activities	0.012	0.026	0.009	0.453	.651
	Gender (Dummy)	0.401	0.078	0.097	5.137	.000*
	Parents' Attitudes	0.016	0.023	0.014	0.684	.494
	Parents' Education	-0.093	0.055	-0.043	-1.707	.088
	Parents' Expectations	-0.072	0.026	-0.063	-2.837	.005
	Science Achievement	0.003	0.001	0.096	3.647	.000*
Denmark	(Constant)	8.725	0.626		13.936	.000*
R^2 = .020	Early Numeracy Activities	0.006	0.030	0.004	0.192	.848
	Gender (Dummy)	-0.486	0.075	-0.119	-6.493	.000*
	Parents' Attitudes	0.011	0.024	0.009	0.449	.653
	Parents' Education	-0.091	0.068	-0.035	-1.351	.177
	Parents' Expectations	0.087	0.043	0.050	2.038	.042*

	Science Achievement	0.002	0.001	0.050	1.602	.109
Finland	(Constant)	7.879	0.469		16.798	.000*
R^2 = .012	Early Numeracy Activities	0.001	0.028	0.001	0.035	.972
	Gender (Dummy)	-0.094	0.073	-0.025	-1.286	.198
	Parents' Attitudes	0.035	0.017	0.034	2.061	.039*
	Parents' Education	-0.100	0.041	-0.047	-2.435	.015*
	Parents' Expectations	-0.055	0.021	-0.048	-2.648	.008*
	Science Achievement	0.003	0.001	0.101	4.505	.000*
France	(Constant)	8.037	0.435		18.482	.000*
R^2 = .024	Early Numeracy Activities	-0.006	0.028	-0.005	-0.203	.839
	Gender (Dummy)	-0.332	0.073	-0.079	-4.559	.000*
	Parents' Attitudes	0.044	0.023	0.039	1.887	.059
	Parents' Education	-0.133	0.047	-0.063	-2.825	.005*
	Parents' Expectations	0.048	0.033	0.037	1.455	.146
	Science Achievement	0.003	0.001	0.118	4.023	.000*
Georgia	(Constant)	7.852	0.388		20.249	.000*
R^2 = .042	Early Numeracy Activities	0.023	0.024	0.023	0.966	.334
	Gender (Dummy)	-0.101	0.066	-0.028	-1.544	.123
	Parents' Attitudes	0.008	0.024	0.008	0.339	.735
	Parents' Education	-0.033	0.047	-0.016	-0.706	.480
	Parents' Expectations	0.077	0.039	0.063	1.968	.049*
	Science Achievement	0.004	0.000	0.173	7.703	.000*
Hong Kong, SAR	(Constant)	6.373	0.390		16.328	.000*
R^2 = .058	Early Numeracy Activities	0.036	0.020	0.031	1.818	.069
	Gender (Dummy)	-0.376	0.090	-0.088	-4.176	.000*
	Parents' Attitudes	0.018	0.023	0.016	0.809	.418
	Parents' Education	-0.135	0.038	-0.080	-3.546	.000*
	Parents' Expectations	0.050	0.057	0.021	0.877	.381
	Science Achievement	0.007	0.001	0.213	7.976	.000*
Hungary	(Constant)	7.077	0.374		18.908	.000*
R^2 = .027	Early Numeracy Activities	0.050	0.021	0.042	2.357	.018*
	Gender (Dummy)	-0.111	0.074	-0.029	-1.497	.134
	Parents' Attitudes	0.033	0.021	0.031	1.585	.113
	Parents' Education	-0.070	0.043	-0.038	-1.627	.104
	Parents' Expectations	0.019	0.037	0.015	0.506	.613
	Science Achievement	0.004	0.001	0.152	5.869	.000*
Indonesia	(Constant)	7.576	0.353		21.454	.000*
R^2 = .088	Early Numeracy Activities	0.010	0.020	0.012	0.512	.609
	Gender (Dummy)	0.278	0.065	0.082	4.269	.000*
	Parents' Attitudes	0.082	0.025	0.079	3.264	.001*
	Parents' Education	0.005	0.034	0.004	0.145	.885
	Parents' Expectations	0.000	0.030	0.000	-0.011	.992
	Science Achievement	0.004	0.000	0.264	9.764	.000*
Iran, Islamic Republic of	(Constant)	7.824	0.428		18.298	.000*
R^2 = .094	Early Numeracy Activities	-0.002	0.033	-0.002	-0.062	.951
	Gender (Dummy)	0.222	0.102	0.062	2.172	.030*
	Parents' Attitudes	0.056	0.025	0.052	2.263	.024*
	Parents' Education	-0.038	0.044	-0.029	-0.861	.389
	Parents' Expectations	0.089	0.065	0.061	1.371	.170
	Science Achievement	0.005	0.001	0.274	8.263	.000*
Ireland	(Constant)	7.185	0.489		14.689	.000*
R^2 = .040	Early Numeracy Activities	-0.007	0.022	-0.007	-0.325	.745
	Gender (Dummy)	-0.154	0.090	-0.038	-1.713	.087
	Parents' Attitudes	0.016	0.023	0.014	0.700	.484
	Parents' Education	-0.059	0.052	-0.029	-1.137	.256
	Parents' Expectations	0.004	0.041	0.002	0.102	.918
	Science Achievement	0.006	0.001	0.201	7.057	.000*
Italy	(Constant)	7.955	0.495		16.071	.000*
R^2 = .015	Early Numeracy Activities	0.015	0.022	0.014	0.674	.500
	Gender (Dummy)	0.038	0.061	0.010	0.625	.532
	Parents' Attitudes	0.061	0.022	0.058	2.812	.005*
	Parents' Education	0.017	0.039	0.010	0.431	.666

	Parents' Expectations	0.039	0.024	0.031	1.640	.101
	Science Achievement	0.002	0.001	0.084	2.920	.004*
Japan	(Constant)	7.169	0.434		16.523	.000*
R^2 = .040	Early Numeracy Activities	-0.004	0.017	-0.004	-0.248	.804
	Gender (Dummy)	-0.403	0.074	-0.102	-5.438	.000*
	Parents' Attitudes	0.018	0.018	0.016	0.967	.334
	Parents' Education	-0.013	0.045	-0.005	-0.278	.781
	Parents' Expectations	0.053	0.030	0.030	1.761	.078*
	Science Achievement	0.005	0.001	0.156	5.955	.000*
Kazakhstan	(Constant)	7.710	0.485		15.897	
R^2 = .037	Early Numeracy Activities	0.039	0.021	0.040	1.858	.063
	Gender (Dummy)	0.208	0.070	0.059	2.952	.003*
	Parents' Attitudes	0.055	0.019	0.048	2.968	.003*
	Parents' Education	-0.094	0.049	-0.050	-1.902	.057
	Parents' Expectations	0.025	0.027	0.016	0.954	.340
	Science Achievement	0.003	0.001	0.164	5.968	.000*
Korea, Republic of	(Constant)	4.651	0.442		10.519	.000*
R^2 = .077	Early Numeracy Activities	0.018	0.017	0.019	1.100	.271
	Gender (Dummy)	-0.352	0.065	-0.089	-5.415	.000*
	Parents' Attitudes	0.049	0.017	0.047	2.826	.005*
	Parents' Education	-0.094	0.045	-0.041	-2.108	.035*
	Parents' Expectations	0.039	0.053	0.013	0.727	.467
	Science Achievement	0.008	0.001	0.246	10.617	.000*
Lithuania	(Constant)	6.873	0.428		16.052	.000*
R^2 = .036	Early Numeracy Activities	0.036	0.022	0.030	1.618	.106
	Gender (Dummy)	0.130	0.083	0.034	1.569	.117
	Parents' Attitudes	0.035	0.023	0.030	1.514	.130
	Parents' Education	-0.007	0.050	-0.003	-0.142	.887
	Parents' Expectations	-0.044	0.039	-0.028	-1.132	.258
	Science Achievement	0.005	0.001	0.191	7.466	.000
Morocco	(Constant)	8.326	0.345		24.141	.000*
R^2 = .126	Early Numeracy Activities	-0.002	0.024	-0.002	-0.074	.941
	Gender (Dummy)	0.293	0.072	0.078	4.059	.000
	Parents' Attitudes	0.018	0.026	0.020	0.695	.487
	Parents' Education	0.014	0.035	0.010	0.400	.689
	Parents' Expectations	0.079	0.039	0.077	2.010	.044*
	Science Achievement	0.005	0.001	0.308	8.878	.000*
Oman	(Constant)	8.011	0.205		39.065	.000*
R^2 = .120	Early Numeracy Activities	0.021	0.014	0.021	1.473	.141
	Gender (Dummy)	0.250	0.050	0.069	5.018	.000*
	Parents' Attitudes	0.054	0.015	0.050	3.554	.000*
	Parents' Education	-0.043	0.023	-0.036	-1.833	.067
	Parents' Expectations	-0.003	0.022	-0.002	-0.120	.904
	Science Achievement	0.005	0.000	0.326	17.867	.000*
Poland	(Constant)	8.114	0.440		18.448	.000*
R^2 = .007	Early Numeracy Activities	0.032	0.018	0.029	1.816	.069
	Gender (Dummy)	0.107	0.070	0.028	1.522	.128
	Parents' Attitudes	0.024	0.019	0.024	1.297	.195
	Parents' Education	-0.056	0.032	-0.036	-1.728	.084
	Parents' Expectations	0.006	0.032	0.005	0.176	.860
	Science Achievement	0.002	0.001	0.068	2.636	.008*
Portugal	(Constant)	8.934	0.359		24.855	.000*
R^2 = .023	Early Numeracy Activities	0.005	0.019	0.005	0.252	.801
	Gender (Dummy)	-0.117	0.056	-0.034	-2.082	.037*
	Parents' Attitudes	0.045	0.016	0.042	2.766	.006*
	Parents' Education	-0.058	0.024	-0.046	-2.436	.015*
	Parents' Expectations	0.002	0.024	0.002	0.091	.928
	Science Achievement	0.004	0.001	0.143	6.754	.000*
Russian Federation	(Constant)	8.447	0.405		20.837	.000*
R^2 = .009	Early Numeracy Activities	0.047	0.016	0.049	2.941	.003*
	Gender (Dummy)	-0.031	0.081	-0.008	-0.377	.706
	Parents' Attitudes	0.045	0.016	0.046	2.871	.004*

	Parents' Education	-0.068	0.043	-0.033	-1.565	.118
	Parents' Expectations	-0.020	0.037	-0.016	-0.543	.587
	Science Achievement	0.002	0.001	0.068	2.284	.022*
Saudi Arabia	(Constant)	7.524	0.356		21.133	.000*
R^2 = .105	Early Numeracy Activities	0.000	0.024	0.000	0.011	.991
	Gender (Dummy)	0.826	0.162	0.194	5.097	.000*
	Parents' Attitudes	0.056	0.025	0.052	2.253	.024*
	Parents' Education	-0.012	0.034	-0.008	-0.334	.739
	Parents' Expectations	0.050	0.040	0.028	1.247	.212
	Science Achievement	0.004	0.001	0.193	7.409	.000*
Serbia	(Constant)	9.242	1.088		8.497	.000*
R^2 = .029	Early Numeracy Activities	0.041	0.027	0.036	1.497	.134
	Gender (Dummy)	0.208	0.085	0.051	2.433	.015*
	Parents' Attitudes	0.063	0.024	0.063	2.616	.009*
	Parents' Education	-0.373	0.067	-0.156	-5.535	.000*
	Parents' Expectations	0.015	0.044	0.010	0.332	.740
	Science Achievement	0.001	0.001	0.057	1.111	.267
Singapore	(Constant)	7.440	0.325		22.883	.000*
R^2 = .030	Early Numeracy Activities	0.023	0.013	0.024	1.756	.079
	Gender (Dummy)	-0.334	0.057	-0.081	-5.839	.000*
	Parents' Attitudes	0.058	0.017	0.053	3.437	.001*
	Parents' Education	-0.065	0.036	-0.032	-1.822	.068
	Parents' Expectations	0.056	0.039	0.022	1.453	.146
	Science Achievement	0.003	0.000	0.133	7.397	.000*
Slovak Republic	(Constant)	8.184	0.516		15.850	.000*
R^2 = .007	Early Numeracy Activities	0.036	0.020	0.032	1.799	.072
	Gender (Dummy)	0.155	0.084	0.038	1.850	.064
	Parents' Attitudes	0.012	0.022	0.011	0.540	.589
	Parents' Education	-0.014	0.058	-0.007	-0.242	.809
	Parents' Expectations	-0.040	0.028	-0.036	-1.436	.151
	Science Achievement	0.002	0.001	0.076	2.972	.003*
Turkey	(Constant)	7.259	0.270		26.898	.000*
R^2 = .115	Early Numeracy Activities	0.011	0.014	0.014	0.751	.453
	Gender (Dummy)	0.298	0.051	0.090	5.874	.000*
	Parents' Attitudes	0.053	0.018	0.057	2.945	.003*
	Parents' Education	0.002	0.023	0.002	0.088	.930
	Parents' Expectations	0.086	0.032	0.048	2.719	.007*
	Science Achievement	0.005	0.000	0.291	11.161	.000*
United Arab Emirates	(Constant)	6.940	0.239		29.086	.000*
R^2 = .110	Early Numeracy Activities	0.026	0.014	0.026	1.789	.074
	Gender (Dummy)	0.194	0.071	0.049	2.711	.007*
	Parents' Attitudes	0.064	0.014	0.061	4.426	.000*
	Parents' Education	-0.029	0.033	-0.017	-0.894	.371
	Parents' Expectations	0.089	0.027	0.043	3.308	.001*
	Science Achievement	0.005	0.000	0.292	16.537	.000*
Table Average	(Constant)	7.603	0.080		94.862	
R^2 = .051	Early Numeracy Activities	0.019	0.004	0.019	5.077	
	Gender (Dummy)	0.020	0.014	0.007	1.414	
	Parents' Attitudes Towards Math and Science	0.039	0.004	0.037	10.688	
	Parents' Education	-0.065	0.008	-0.033	-8.277	
	Parents' Expectations	0.029	0.007	0.017	4.350	
	Science Achievement	0.004	0.000	0.170	32.142	

*p < .05, two-tailed.

Table E3

Regression Analysis Results for mathematics self-concept

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	5.810	0.314		18.498	.000*
R^2 = .124	Early Numeracy Activities	0.020	0.022	0.019	0.906	.365
	Gender (Dummy)	0.198	0.081	0.051	2.453	.014*
	Mathematics Achievement	0.007	0.000	0.317	14.656	.000*
	Parents' Attitudes	0.057	0.022	0.052	2.641	.008*
	Parents' Education	-0.073	0.033	-0.042	-2.238	.025*
	Parents' Expectations	0.094	0.034	0.060	2.753	.006*
Belgium (Flemish)	(Constant)	3.443	0.368		9.355	.000*
R^2 = .214	Early Numeracy Activities	0.026	0.014	0.024	1.916	.055
	Gender (Dummy)	-0.830	0.060	-0.221	-13.784	.000*
	Mathematics Achievement	0.011	0.001	0.364	15.318	.000*
	Parents' Attitudes	0.051	0.018	0.051	2.819	.005*
	Parents' Education	-0.176	0.029	-0.096	-6.014	.000*
	Parents' Expectations	0.127	0.032	0.094	4.022	.000*
Bulgaria	(Constant)	3.629	0.380		9.558	.000*
R^2 = .198	Early Numeracy Activities	0.081	0.020	0.087	3.950	.000*
	Gender (Dummy)	-0.193	0.075	-0.044	-2.587	.010*
	Mathematics Achievement	0.009	0.001	0.330	13.042	.000*
	Parents' Attitudes	0.077	0.021	0.071	3.718	.000*
	Parents' Education	-0.173	0.037	-0.105	-4.683	.000*
	Parents' Expectations	0.261	0.041	0.202	6.319	.000*
Chinese Taipei	(Constant)	2.078	0.303		6.858	.000*
R^2 = .218	Early Numeracy Activities	0.028	0.016	0.032	1.784	.074
	Gender (Dummy)	-0.538	0.062	-0.150	-8.678	.000*
	Mathematics Achievement	0.011	0.001	0.433	21.364	.000*
	Parents' Attitudes	0.030	0.014	0.035	2.121	.034*
	Parents' Education	-0.093	0.034	-0.052	-2.759	.006*
	Parents' Expectations	0.034	0.029	0.017	1.192	.233
Croatia	(Constant)	3.155	0.310		10.186	.000*
R^2 = .209	Early Numeracy Activities	0.075	0.017	0.068	4.368	.000*
	Gender (Dummy)	-0.139	0.074	-0.037	-1.888	.059
	Mathematics Achievement	0.012	0.001	0.424	22.062	.000*
	Parents' Attitudes	0.006	0.018	0.005	0.327	.744
	Parents' Education	-0.115	0.058	-0.046	-1.996	.046*
	Parents' Expectations	0.113	0.038	0.058	2.956	.003*
Cyprus	(Constant)	3.737	0.356		10.497	.000*
R^2 = .204	Early Numeracy Activities	0.046	0.018	0.044	2.540	.011*
	Gender (Dummy)	-0.417	0.064	-0.097	-6.558	.000*
	Mathematics Achievement	0.012	0.001	0.422	21.913	.000*
	Parents' Attitudes	0.029	0.021	0.023	1.372	.170
	Parents' Education	-0.144	0.040	-0.066	-3.620	.000*
	Parents' Expectations	0.128	0.036	0.061	3.547	.000*
Czech Republic	(Constant)	3.390	0.367		9.229	.000*
R^2 = .198	Early Numeracy Activities	0.058	0.018	0.052	3.272	.001*
	Gender (Dummy)	-0.415	0.057	-0.116	-7.289	.000*
	Mathematics Achievement	0.010	0.001	0.399	19.978	.000*
	Parents' Attitudes	0.049	0.018	0.049	2.701	.007*
	Parents' Education	-0.111	0.040	-0.059	-2.772	.006*
	Parents' Expectations	0.066	0.022	0.067	3.016	.003*
Denmark	(Constant)	4.470	0.359		12.448	.000*
R^2 = .200	Early Numeracy Activities	0.045	0.019	0.041	2.335	.020*
	Gender (Dummy)	-0.449	0.072	-0.128	-6.267	.000*
	Mathematics Achievement	0.009	0.001	0.385	15.893	.000*
	Parents' Attitudes	0.012	0.016	0.012	0.759	.448
	Parents' Education	-0.074	0.036	-0.033	-2.035	.042*
	Parents' Expectations	0.144	0.028	0.096	5.127	.000*
Finland	(Constant)	3.180	0.352		9.035	.000*

R^2 = .230	Early Numeracy Activities	0.092	0.019	0.079	4.874	.000*
	Gender (Dummy)	-0.551	0.057	-0.162	-9.706	.000*
	Mathematics Achievement	0.011	0.001	0.416	19.166	.000*
	Parents' Attitudes	-0.002	0.015	-0.002	-0.117	.907
	Parents' Education	-0.017	0.041	-0.009	-0.406	.685
	Parents' Expectations	0.086	0.018	0.084	4.669	.000*
France	(Constant)	5.308	0.339		15.640	.000*
R^2 = .207	Early Numeracy Activities	0.026	0.025	0.023	1.030	.303
	Gender (Dummy)	-0.797	0.070	-0.211	-11.327	.000*
	Mathematics Achievement	0.010	0.001	0.391	19.838	.000*
	Parents' Attitudes	0.036	0.016	0.036	2.287	.022*
	Parents' Education	-0.179	0.037	-0.095	-4.890	.000*
	Parents' Expectations	0.055	0.029	0.047	1.914	.056
Georgia	(Constant)	5.736	0.363		15.800	.000*
R^2 = .145	Early Numeracy Activities	0.044	0.020	0.044	2.223	.026*
	Gender (Dummy)	-0.096	0.062	-0.027	-1.548	.122
	Mathematics Achievement	0.007	0.000	0.322	16.017	.000*
	Parents' Attitudes	0.044	0.019	0.043	2.249	.025*
	Parents' Education	-0.027	0.044	-0.014	-0.616	.538
	Parents' Expectations	0.130	0.028	0.105	4.556	.000*
Hong Kong, SAR	(Constant)	2.135	0.509		4.192	.000*
R^2 = .196	Early Numeracy Activities	0.025	0.020	0.025	1.249	.212
	Gender (Dummy)	-0.528	0.062	-0.142	-8.546	.000*
	Mathematics Achievement	0.012	0.001	0.418	11.836	.000*
	Parents' Attitudes	0.034	0.020	0.035	1.678	.093
	Parents' Education	-0.114	0.034	-0.079	-3.338	.001*
	Parents' Expectations	-0.010	0.043	-0.005	-0.243	.808
Hungary	(Constant)	3.675	0.618		5.948	.000*
R^2 = .270	Early Numeracy Activities	0.045	0.025	0.036	1.801	.072
	Gender (Dummy)	-0.480	0.065	-0.115	-7.347	.000*
	Mathematics Achievement	0.012	0.001	0.500	18.396	.000*
	Parents' Attitudes	0.022	0.018	0.019	1.218	.223
	Parents' Education	-0.292	0.051	-0.148	-5.703	.000*
	Parents' Expectations	0.132	0.037	0.096	3.548	.000*
Indonesia	(Constant)	6.794	0.300		22.663	.000*
R^2 = .077	Early Numeracy Activities	0.026	0.018	0.030	1.424	.155
	Gender (Dummy)	0.122	0.060	0.037	2.036	.042
	Mathematics Achievement	0.005	0.001	0.251	8.039	.000*
	Parents' Attitudes	0.060	0.022	0.059	2.772	.006*
	Parents' Education	0.007	0.028	0.006	0.258	.797
	Parents' Expectations	0.022	0.025	0.020	0.885	.376
Iran, Islamic Republic of	(Constant)	6.661	0.510		13.060	.000*
R^2 = .091	Early Numeracy Activities	0.024	0.035	0.025	0.677	.498
	Gender (Dummy)	0.052	0.140	0.014	0.372	.710
	Mathematics Achievement	0.006	0.001	0.287	8.085	.000*
	Parents' Attitudes	0.088	0.025	0.078	3.502	.000*
	Parents' Education	-0.066	0.045	-0.047	-1.454	.146
	Parents' Expectations	0.027	0.051	0.017	0.528	.598
Ireland	(Constant)	3.933	0.323		12.184	.000*
R^2 = .188	Early Numeracy Activities	0.016	0.021	0.017	0.801	.423
	Gender (Dummy)	-0.274	0.079	-0.073	-3.485	.000*
	Mathematics Achievement	0.011	0.001	0.426	17.510	.000*
	Parents' Attitudes	0.027	0.020	0.026	1.375	.169
	Parents' Education	-0.034	0.041	-0.018	-0.844	.399
	Parents' Expectations	-0.015	0.050	-0.008	-0.293	.770
Italy	(Constant)	5.022	0.400		12.563	.000*
R^2 = .134	Early Numeracy Activities	0.065	0.019	0.062	3.505	.000*
	Gender (Dummy)	-0.385	0.077	-0.103	-4.982	.000*
	Mathematics Achievement	0.007	0.001	0.276	12.818	.000*
	Parents' Attitudes	0.061	0.019	0.057	3.153	.002*
	Parents' Education	-0.124	0.036	-0.068	-3.454	.001*
	Parents' Expectations	0.172	0.028	0.130	6.105	.000*

Japan	(Constant)	2.744	0.270		10.179	.000*
R^2 = .220	Early Numeracy Activities	0.044	0.012	0.052	3.539	.000*
	Gender (Dummy)	-0.319	0.042	-0.104	-7.616	.000*
	Mathematics Achievement	0.009	0.000	0.418	23.407	.000*
	Parents' Attitudes	0.024	0.014	0.027	1.673	.094
	Parents' Education	-0.021	0.029	-0.012	-0.721	.471
	Parents' Expectations	0.090	0.023	0.065	3.943	.000*
Kazakhstan	(Constant)	5.823	0.510		11.422	.000*
R^2 = .066	Early Numeracy Activities	0.034	0.024	0.031	1.419	.156
	Gender (Dummy)	0.153	0.077	0.039	1.998	.046*
	Mathematics Achievement	0.005	0.001	0.221	9.185	.000*
	Parents' Attitudes	0.091	0.026	0.071	3.563	.000*
	Parents' Education	-0.058	0.042	-0.028	-1.391	.164
	Parents' Expectations	0.121	0.036	0.069	3.385	.001*
Korea, Republic of	(Constant)	1.345	0.266		5.051	.000*
R^2 = .304	Early Numeracy Activities	0.041	0.010	0.056	4.142	.000*
	Gender (Dummy)	-0.180	0.043	-0.061	-4.211	.000*
	Mathematics Achievement	0.011	0.000	0.519	28.854	.000*
	Parents' Attitudes	0.003	0.011	0.004	0.268	.789
	Parents' Education	-0.058	0.033	-0.034	-1.777	.076
	Parents' Expectations	0.121	0.035	0.056	3.491	.000*
Lithuania	(Constant)	3.188	0.342		9.317	.000*
R^2 = .239	Early Numeracy Activities	0.066	0.018	0.063	3.605	.000*
	Gender (Dummy)	-0.368	0.060	-0.106	-6.177	.000*
	Mathematics Achievement	0.011	0.001	0.457	17.850	.000*
	Parents' Attitudes	0.044	0.016	0.042	2.793	.005*
	Parents' Education	-0.114	0.045	-0.055	-2.514	.012*
	Parents' Expectations	0.067	0.031	0.047	2.168	.030*
Morocco	(Constant)	7.089	0.425		16.696	.000*
R^2 = .114	Early Numeracy Activities	0.026	0.019	0.036	1.326	.185
	Gender (Dummy)	0.084	0.067	0.023	1.245	.213
	Mathematics Achievement	0.004	0.001	0.222	6.371	.000*
	Parents' Attitudes	0.017	0.025	0.018	0.666	.505
	Parents' Education	0.120	0.038	0.086	3.142	.002*
	Parents' Expectations	0.135	0.029	0.134	4.569	.000*
Oman	(Constant)	6.808	0.233		29.203	.000*
R^2 = .108	Early Numeracy Activities	0.044	0.015	0.044	2.939	.003*
	Gender (Dummy)	0.238	0.051	0.066	4.641	.000*
	Mathematics Achievement	0.005	0.000	0.294	17.205	.000*
	Parents' Attitudes	0.039	0.015	0.036	2.564	.010*
	Parents' Education	-0.010	0.019	-0.008	-0.522	.602
	Parents' Expectations	0.030	0.019	0.023	1.565	.118
Poland	(Constant)	2.204	0.331		6.660	.000*
R^2 = .241	Early Numeracy Activities	0.072	0.018	0.065	3.982	.000*
	Gender (Dummy)	-0.327	0.059	-0.087	-5.539	.000*
	Mathematics Achievement	0.013	0.001	0.484	23.777	.000*
	Parents' Attitudes	0.034	0.017	0.033	2.006	.045*
	Parents' Education	-0.129	0.033	-0.084	-3.924	.000*
	Parents' Expectations	0.029	0.028	0.024	1.058	.290
Portugal	(Constant)	2.115	0.380		5.565	.000*
R^2 = .270	Early Numeracy Activities	0.088	0.018	0.081	4.976	.000*
	Gender (Dummy)	-0.547	0.063	-0.143	-8.661	.000*
	Mathematics Achievement	0.013	0.001	0.471	24.389	.000*
	Parents' Attitudes	0.001	0.023	0.001	0.060	.952
	Parents' Education	-0.036	0.022	-0.026	-1.641	.101
	Parents' Expectations	0.018	0.021	0.013	0.848	.396
Russian Federation	(Constant)	3.046	0.434		7.020	.000*
R^2 = .176	Early Numeracy Activities	0.029	0.016	0.029	1.818	.069
	Gender (Dummy)	-0.414	0.064	-0.108	-6.473	.000*
	Mathematics Achievement	0.010	0.001	0.359	17.196	.000*
	Parents' Attitudes	0.065	0.018	0.062	3.723	.000*
	Parents' Education	-0.030	0.036	-0.013	-0.822	.411

	Parents' Expectations	0.134	0.028	0.099	4.739	.000*
Saudi Arabia	(Constant)	7.020	0.338		20.740	.000*
R^2 = .105	Early Numeracy Activities	-0.006	0.024	-0.006	-0.252	.801
	Gender (Dummy)	0.693	0.133	0.176	5.198	.000*
	Mathematics Achievement	0.005	0.001	0.210	7.559	.000*
	Parents' Attitudes	0.035	0.023	0.035	1.504	.133
	Parents' Education	0.098	0.032	0.071	3.042	.002*
	Parents' Expectations	0.062	0.035	0.037	1.759	.079
Serbia	(Constant)	3.646	1.116		3.268	.000*
R^2 = .202	Early Numeracy Activities	0.034	0.029	0.028	1.190	.234
	Gender (Dummy)	-0.118	0.097	-0.027	-1.216	.224
	Mathematics Achievement	0.011	0.001	0.422	9.679	.000*
	Parents' Attitudes	0.081	0.028	0.074	2.869	.004*
	Parents' Education	-0.133	0.068	-0.051	-1.936	.053
	Parents' Expectations	0.092	0.039	0.055	2.336	.020*
Singapore	(Constant)	2.591	0.263		9.856	.000*
R^2 = .253	Early Numeracy Activities	0.003	0.011	0.003	0.277	.782
	Gender (Dummy)	-0.607	0.038	-0.169	-15.935	.000*
	Mathematics Achievement	0.009	0.000	0.445	23.962	.000*
	Parents' Attitudes	0.023	0.011	0.025	2.047	.041*
	Parents' Education	0.020	0.025	0.011	0.808	.419
	Parents' Expectations	0.129	0.032	0.057	4.001	.000*
Slovak Republic	(Constant)	4.601	0.490		9.383	.000*
R^2 = .169	Early Numeracy Activities	0.044	0.025	0.041	1.765	.078
	Gender (Dummy)	-0.321	0.059	-0.082	-5.430	.000*
	Mathematics Achievement	0.010	0.001	0.381	17.961	.000*
	Parents' Attitudes	0.038	0.016	0.035	2.397	.017*
	Parents' Education	-0.113	0.042	-0.059	-2.724	.006*
	Parents' Expectations	0.064	0.023	0.061	2.811	.005*
Turkey	(Constant)	4.635	0.408		11.350	.000*
R^2 = .230	Early Numeracy Activities	0.016	0.016	0.017	1.010	.313
	Gender (Dummy)	-0.026	0.057	-0.006	-0.453	.650
	Mathematics Achievement	0.011	0.001	0.486	19.621	.000*
	Parents' Attitudes	0.046	0.019	0.040	2.481	.013*
	Parents' Education	-0.056	0.030	-0.038	-1.898	.058
	Parents' Expectations	0.002	0.039	0.001	0.063	.950
United Arab Emirates	(Constant)	6.520	0.178		36.593	.000*
R^2 = .111	Early Numeracy Activities	0.056	0.013	0.062	4.281	.000*
	Gender (Dummy)	0.014	0.063	0.004	0.222	.825
	Mathematics Achievement	0.005	0.000	0.311	21.705	.000*
	Parents' Attitudes	0.035	0.009	0.037	3.808	.000*
	Parents' Education	-0.087	0.020	-0.054	-4.337	.000*
	Parents' Expectations	0.091	0.018	0.048	5.204	.000*
Table Average	(Constant)	4.235	0.074		57.034	
R^2 = .185	Early Numeracy Activities	0.042	0.004	0.041	11.868	
	Gender (Dummy)	-0.243	0.013	-0.066	-19.172	
	Mathematics Achievement	0.009	0.000	0.377	87.373	
	Parents' Attitudes	0.039	0.003	0.037	11.684	
	Parents' Education	-0.075	0.007	-0.039	-11.189	
	Parents' Expectations	0.086	0.006	0.060	14.977	

*p < .05, two-tailed.

Table E4

Regression analysis results for science self-concept

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	6.324	0.262		24.100	.000*
R^2 = .149	Early Numeracy Activities	0.048	0.021	0.046	2.293	.022*
	Gender (Dummy)	0.276	0.089	0.071	3.121	.002*
	Parents' Attitudes	0.022	0.021	0.020	1.057	.290
	Parents' Education	-0.093	0.037	-0.053	-2.523	.012*
	Parents' Expectations	0.091	0.032	0.057	2.834	.005*
	Science Achievement	0.007	0.001	0.343	12.572	.000*
Belgium (Flemish)	(Constant)	6.515	0.370		17.587	.000*
R^2 = .061	Early Numeracy Activities	-0.015	0.018	-0.014	-0.824	.410
	Gender (Dummy)	-0.112	0.067	-0.031	-1.681	.093
	Parents' Attitudes	-0.007	0.015	-0.008	-0.487	.627
	Parents' Education	-0.040	0.036	-0.023	-1.107	.268
	Parents' Expectations	0.056	0.030	0.044	1.859	.063
	Science Achievement	0.007	0.001	0.235	9.665	.000*
Bulgaria	(Constant)	5.519	0.304		18.141	.000*
R^2 = .193	Early Numeracy Activities	0.042	0.018	0.050	2.297	.022*
	Gender (Dummy)	0.076	0.086	0.019	0.875	.382
	Parents' Attitudes	0.029	0.016	0.030	1.766	.077
	Parents' Education	-0.033	0.045	-0.022	-0.740	.459
	Parents' Expectations	0.197	0.042	0.168	4.677	.000*
	Science Achievement	0.007	0.000	0.320	14.142	.000*
Chinese Taipei	(Constant)	5.178	0.320		16.193	.000*
R^2 = .105	Early Numeracy Activities	0.048	0.014	0.058	3.291	.001*
	Gender (Dummy)	-0.330	0.068	-0.096	-4.836	.000*
	Parents' Attitudes	0.025	0.016	0.030	1.593	.111
	Parents' Education	-0.038	0.036	-0.022	-1.059	.290
	Parents' Expectations	0.047	0.036	0.025	1.313	.189
	Science Achievement	0.007	0.001	0.281	13.243	.000*
Croatia	(Constant)	5.398	0.387		13.931	.000*
R^2 = .076	Early Numeracy Activities	0.075	0.021	0.069	3.629	.000*
	Gender (Dummy)	0.005	0.077	0.001	0.063	.950
	Parents' Attitudes	0.009	0.018	0.008	0.505	.614
	Parents' Education	0.102	0.059	0.041	1.745	.081
	Parents' Expectations	0.159	0.042	0.082	3.752	.000*
	Science Achievement	0.006	0.001	0.187	8.724	.000*
Cyprus	(Constant)	6.633	0.437		15.180	.000*
R^2 = .043	Early Numeracy Activities	0.035	0.020	0.033	1.762	.078
	Gender (Dummy)	-0.096	0.081	-0.022	-1.187	.235
	Parents' Attitudes	0.005	0.020	0.004	0.248	.804
	Parents' Education	-0.056	0.045	-0.025	-1.242	.214
	Parents' Expectations	0.005	0.039	0.002	0.118	.906
	Science Achievement	0.006	0.001	0.203	9.086	.000*
Czech Republic	(Constant)	6.385	0.443		14.408	.000*
R^2 = .042	Early Numeracy Activities	0.009	0.020	0.008	0.449	.654
	Gender (Dummy)	0.199	0.062	0.055	3.196	.001*
	Parents' Attitudes	0.023	0.017	0.022	1.356	.175
	Parents' Education	-0.004	0.043	-0.002	-0.092	.927
	Parents' Expectations	-0.001	0.024	-0.001	-0.030	.976
	Science Achievement	0.005	0.001	0.198	8.642	.000*
Denmark	(Constant)	7.620	0.437		17.454	.000*
R^2 = .044	Early Numeracy Activities	0.010	0.022	0.009	0.439	.661
	Gender (Dummy)	-0.397	0.069	-0.113	-5.727	.000*
	Parents' Attitudes	-0.009	0.020	-0.009	-0.456	.649
	Parents' Education	-0.046	0.052	-0.020	-0.893	.372
	Parents' Expectations	0.087	0.035	0.058	2.456	.014*
	Science Achievement	0.004	0.001	0.155	5.281	.000*
Finland	(Constant)	6.122	0.324		18.908	.000*

R^2 = .064	Early Numeracy Activities	0.024	0.021	0.024	1.133	.257
	Gender (Dummy)	-0.051	0.052	-0.017	-0.988	.323
	Parents' Attitudes	0.029	0.014	0.037	2.138	.033*
	Parents' Education	-0.032	0.037	-0.019	-0.869	.385
	Parents' Expectations	-0.002	0.019	-0.003	-0.126	.900
	Science Achievement	0.006	0.000	0.246	12.007	.000*
France	(Constant)	6.210	0.281		22.065	.000*
R^2 = .071	Early Numeracy Activities	0.038	0.018	0.036	2.163	.031*
	Gender (Dummy)	-0.383	0.061	-0.105	-6.254	.000*
	Parents' Attitudes	0.023	0.018	0.024	1.293	.196
	Parents' Education	-0.062	0.039	-0.034	-1.600	.110
	Parents' Expectations	0.063	0.029	0.055	2.153	.031*
	Science Achievement	0.006	0.001	0.220	9.729	.000*
Georgia	(Constant)	6.731	0.320		21.053	.000*
R^2 = .095	Early Numeracy Activities	0.025	0.019	0.025	1.344	.179
	Gender (Dummy)	0.050	0.066	0.014	0.751	.453
	Parents' Attitudes	0.012	0.018	0.012	0.653	.514
	Parents' Education	0.000	0.048	0.000	0.001	.999
	Parents' Expectations	0.157	0.038	0.128	4.166	.000*
	Science Achievement	0.005	0.001	0.230	9.037	.000*
Hong Kong, SAR	(Constant)	4.418	0.321		13.780	.000*
R^2 = .097	Early Numeracy Activities	0.068	0.019	0.073	3.612	.000*
	Gender (Dummy)	-0.091	0.066	-0.026	-1.379	.168
	Parents' Attitudes	0.047	0.016	0.052	2.912	.004*
	Parents' Education	-0.005	0.028	-0.003	-0.166	.868
	Parents' Expectations	0.041	0.035	0.022	1.176	.240
	Science Achievement	0.007	0.001	0.265	9.883	.000*
Hungary	(Constant)	5.540	0.473		11.707	.000*
R^2 = .119	Early Numeracy Activities	0.054	0.020	0.044	2.663	.008*
	Gender (Dummy)	-0.014	0.070	-0.003	-0.195	.846
	Parents' Attitudes	0.001	0.020	0.001	0.055	.956
	Parents' Education	-0.038	0.040	-0.020	-0.950	.342
	Parents' Expectations	0.173	0.035	0.133	4.912	.000*
	Science Achievement	0.006	0.001	0.255	10.064	.000*
Indonesia	(Constant)	6.579	0.292		22.564	.000*
R^2 = .096	Early Numeracy Activities	0.016	0.025	0.017	0.656	.512
	Gender (Dummy)	0.326	0.075	0.090	4.347	.000*
	Parents' Attitudes	0.083	0.020	0.076	4.214	.000*
	Parents' Education	0.035	0.030	0.026	1.181	.238
	Parents' Expectations	-0.011	0.033	-0.009	-0.332	.740
	Science Achievement	0.005	0.000	0.270	9.828	.000*
Iran, Islamic Republic of	(Constant)	6.892	0.554		12.448	.000*
R^2 = .135	Early Numeracy Activities	0.032	0.036	0.032	0.886	.376
	Gender (Dummy)	0.362	0.119	0.090	3.033	.002*
	Parents' Attitudes	0.010	0.031	0.009	0.340	.734
	Parents' Education	0.004	0.048	0.003	0.082	.935
	Parents' Expectations	0.087	0.055	0.053	1.585	.113
	Science Achievement	0.006	0.001	0.318	9.272	.000*
Ireland	(Constant)	6.491	0.360		18.029	.000*
R^2 = .058	Early Numeracy Activities	-0.013	0.017	-0.015	-0.760	.447
	Gender (Dummy)	0.000	0.065	0.000	-0.004	.997
	Parents' Attitudes	0.031	0.020	0.033	1.594	.111
	Parents' Education	-0.018	0.044	-0.010	-0.396	.692
	Parents' Expectations	0.017	0.042	0.010	0.411	.681
	Science Achievement	0.006	0.001	0.237	9.584	.000*
Italy	(Constant)	6.341	0.439		14.456	.000*
R^2 = .055	Early Numeracy Activities	0.037	0.020	0.038	1.861	.063
	Gender (Dummy)	0.090	0.057	0.026	1.589	.112
	Parents' Attitudes	0.044	0.019	0.045	2.310	.021*
	Parents' Education	-0.025	0.037	-0.015	-0.670	.503
	Parents' Expectations	0.127	0.024	0.106	5.287	.000*
	Science Achievement	0.004	0.001	0.169	5.927	.000*

Japan	(Constant)	6.533	0.268		24.340	.000*
R^2 = .052	Early Numeracy Activities	0.016	0.012	0.021	1.335	.182
	Gender (Dummy)	-0.126	0.047	-0.047	-2.655	.008*
	Parents' Attitudes	0.016	0.012	0.021	1.273	.203
	Parents' Education	0.004	0.031	0.002	0.119	.906
	Parents' Expectations	0.059	0.021	0.048	2.811	.005*
	Science Achievement	0.004	0.000	0.193	8.882	.000*
Kazakhstan	(Constant)	6.667	0.456		14.624	.000*
R^2 = .064	Early Numeracy Activities	0.054	0.021	0.053	2.607	.009*
	Gender (Dummy)	0.368	0.077	0.099	4.798	.000*
	Parents' Attitudes	0.026	0.026	0.021	1.000	.317
	Parents' Education	-0.045	0.041	-0.023	-1.113	.266
	Parents' Expectations	0.097	0.028	0.059	3.446	.001*
	Science Achievement	0.004	0.001	0.202	8.013	.000*
Korea, Republic of	(Constant)	3.740	0.241		15.546	.000*
R^2 = .140	Early Numeracy Activities	0.040	0.011	0.058	3.622	.000*
	Gender (Dummy)	-0.155	0.052	-0.055	-2.989	.003*
	Parents' Attitudes	0.023	0.011	0.031	1.973	.049*
	Parents' Education	-0.046	0.028	-0.028	-1.628	.104
	Parents' Expectations	0.123	0.029	0.059	4.279	.000*
	Science Achievement	0.007	0.000	0.327	19.299	.000*
Lithuania	(Constant)	4.688	0.367		12.781	.000*
R^2 = .116	Early Numeracy Activities	0.096	0.023	0.091	4.112	.000*
	Gender (Dummy)	0.181	0.082	0.052	2.197	.028*
	Parents' Attitudes	0.014	0.021	0.013	0.660	.509
	Parents' Education	-0.024	0.046	-0.012	-0.520	.603
	Parents' Expectations	0.058	0.033	0.040	1.736	.083
	Science Achievement	0.007	0.001	0.298	11.930	.000*
Morocco	(Constant)	7.007	0.313		22.393	.000*
R^2 = .154	Early Numeracy Activities	0.039	0.020	0.052	1.904	.057
	Gender (Dummy)	0.218	0.073	0.057	3.000	.003*
	Parents' Attitudes	0.029	0.027	0.031	1.095	.274
	Parents' Education	0.145	0.041	0.099	3.546	.000*
	Parents' Expectations	0.089	0.031	0.084	2.831	.005*
	Science Achievement	0.005	0.000	0.283	10.801	.000*
Oman	(Constant)	7.210	0.237		30.384	.000*
R^2 = .108	Early Numeracy Activities	0.027	0.016	0.025	1.656	.098
	Gender (Dummy)	0.166	0.062	0.042	2.657	.008*
	Parents' Attitudes	0.053	0.018	0.045	3.037	.002*
	Parents' Education	-0.033	0.024	-0.026	-1.367	.172
	Parents' Expectations	0.024	0.021	0.017	1.158	.247
	Science Achievement	0.005	0.000	0.308	17.191	.000*
Poland	(Constant)	6.172	0.384		16.054	.000*
R^2 = .063	Early Numeracy Activities	0.028	0.016	0.028	1.774	.076
	Gender (Dummy)	0.085	0.067	0.024	1.272	.204
	Parents' Attitudes	0.018	0.017	0.019	1.082	.279
	Parents' Education	-0.054	0.028	-0.038	-1.913	.056
	Parents' Expectations	0.094	0.021	0.084	4.475	.000*
	Science Achievement	0.005	0.001	0.212	8.624	.000*
Portugal	(Constant)	5.807	0.357		16.286	.000*
R^2 = .073	Early Numeracy Activities	0.041	0.018	0.041	2.226	.026*
	Gender (Dummy)	-0.078	0.063	-0.022	-1.247	.213
	Parents' Attitudes	0.026	0.018	0.024	1.453	.146
	Parents' Education	0.010	0.024	0.008	0.417	.677
	Parents' Expectations	0.071	0.024	0.057	2.903	.004*
	Science Achievement	0.007	0.001	0.226	10.504	.000*
Russian Federation	(Constant)	5.751	0.501		11.473	.000*
R^2 = .051	Early Numeracy Activities	0.074	0.016	0.074	4.555	.000*
	Gender (Dummy)	0.036	0.059	0.010	0.623	.534
	Parents' Attitudes	0.026	0.017	0.026	1.567	.117
	Parents' Education	-0.042	0.045	-0.019	-0.933	.351
	Parents' Expectations	0.081	0.037	0.060	2.165	.030*

	Science Achievement	0.005	0.001	0.177	5.785	.000*
Saudi Arabia	(Constant)	7.332	0.309		23.725	.000*
R^2 = .127	Early Numeracy Activities	-0.018	0.021	-0.018	-0.840	.401
	Gender (Dummy)	0.691	0.139	0.173	4.969	.000*
	Parents' Attitudes	0.035	0.022	0.035	1.561	.119
	Parents' Education	0.010	0.028	0.007	0.366	.714
	Parents' Expectations	0.054	0.032	0.032	1.711	.087
	Science Achievement	0.005	0.000	0.254	10.283	.000*
Serbia	(Constant)	6.239	1.501		4.158	.000*
R^2 = .095	Early Numeracy Activities	0.047	0.032	0.042	1.476	.140
	Gender (Dummy)	0.306	0.097	0.075	3.154	.002*
	Parents' Attitudes	0.033	0.030	0.033	1.081	.280
	Parents' Education	-0.153	0.072	-0.064	-2.125	.034*
	Parents' Expectations	0.210	0.041	0.137	5.083	.000*
	Science Achievement	0.005	0.002	0.210	3.076	.002*
Singapore	(Constant)	5.286	0.299		17.683	.000*
R^2 = .084	Early Numeracy Activities	0.023	0.010	0.027	2.230	.026
	Gender (Dummy)	-0.418	0.051	-0.116	-8.229	.000*
	Parents' Attitudes	0.037	0.015	0.039	2.533	.011*
	Parents' Education	0.016	0.031	0.009	0.515	.607
	Parents' Expectations	0.103	0.034	0.046	3.012	.003*
	Science Achievement	0.005	0.000	0.227	12.754	.000*
Slovak Republic	(Constant)	6.416	0.444		14.462	.000*
R^2 = .081	Early Numeracy Activities	0.027	0.019	0.026	1.399	.162
	Gender (Dummy)	0.131	0.074	0.034	1.784	.074
	Parents' Attitudes	-0.017	0.022	-0.016	-0.773	.440
	Parents' Education	-0.060	0.051	-0.032	-1.171	.242
	Parents' Expectations	0.083	0.029	0.080	2.829	.005*
	Science Achievement	0.006	0.001	0.246	10.215	.000*
Turkey	(Constant)	5.508	0.271		20.332	.000*
R^2 = .196	Early Numeracy Activities	0.015	0.016	0.017	0.920	.358
	Gender (Dummy)	0.376	0.060	0.097	6.260	.000*
	Parents' Attitudes	0.022	0.017	0.020	1.343	.179
	Parents' Education	0.023	0.025	0.016	0.919	.358
	Parents' Expectations	0.110	0.032	0.052	3.445	.001*
	Science Achievement	0.009	0.000	0.393	19.804	.000*
United Arab Emirates	(Constant)	6.561	0.192		34.166	.000*
R^2 = .134	Early Numeracy Activities	0.019	0.013	0.020	1.386	.166
	Gender (Dummy)	0.152	0.060	0.041	2.540	.011*
	Parents' Attitudes	0.052	0.012	0.054	4.325	.000*
	Parents' Education	-0.032	0.021	-0.020	-1.550	.121
	Parents' Expectations	0.080	0.018	0.041	4.308	.000*
	Science Achievement	0.005	0.000	0.336	21.615	.000*
Table Average	(Constant)	6.119	0.079			
R^2 = .095	Early Numeracy Activities	0.033	0.004	0.034	9.562	
	Gender (Dummy)	0.058	0.013	0.013	3.696	
	Parents' Attitudes	0.024	0.003	0.024	7.291	
	Parents' Education	-0.020	0.007	-0.010	-2.519	
	Parents' Expectations	0.082	0.006	0.057	13.957	
	Science Achievement	0.006	0.000	0.251	55.667	

*p < .05, two-tailed.

Appendix F

Regression analyses results for students' attitudes towards mathematics and science with gender interactions

Table F1

Regression analysis results with gender interactions for mathematics intrinsic motivation

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	7.761	0.497		15.624	.000*
R^2 = .059	Early Numeracy Activities	-0.014	0.028	-0.014	-0.487	.626
	Gender (Dummy)	0.301	0.784	0.083	0.384	.701
	Gender * Achievement	-0.002	0.001	-0.251	-1.803	.072
	Gender * Attitudes	0.116	0.055	0.349	2.103	.036*
	Gender * Education	-0.157	0.124	-0.184	-1.266	.206
	Gender * Expectations	0.007	0.079	0.010	0.083	.934
	Gender * Numeracy	0.013	0.041	0.037	0.311	.756
	Mathematics Achievement	0.005	0.001	0.221	4.555	.000*
	Parents' Attitudes	0.012	0.033	0.011	0.354	.724
	Parents' Education	0.003	0.096	0.002	0.035	.972
	Parents' Expectations	0.086	0.048	0.059	1.801	.072
Belgium (Flemish)	(Constant)	7.534	0.599		12.585	.000*
R^2 = .046	Early Numeracy Activities	0.016	0.021	0.016	0.772	.440
	Gender (Dummy)	-0.867	0.771	-0.250	-1.124	.261
	Gender * Achievement	0.001	0.001	0.194	0.943	.346
	Gender * Attitudes	0.020	0.036	0.053	0.549	.583
	Gender * Education	-0.174	0.070	-0.226	-2.488	.013*
	Gender * Expectations	0.023	0.076	0.033	0.304	.761
	Gender * Numeracy	0.022	0.029	0.063	0.754	.451
	Mathematics Achievement	0.002	0.001	0.087	2.122	.034*
	Parents' Attitudes	0.060	0.024	0.064	2.468	.014*
	Parents' Education	-0.086	0.058	-0.051	-1.489	.137
	Parents' Expectations	0.050	0.053	0.040	0.938	.349
Bulgaria	(Constant)	6.510	0.518		12.562	.000*
R^2 = .074	Early Numeracy Activities	0.086	0.026	0.111	3.367	.001*
	Gender (Dummy)	0.503	0.611	0.137	0.823	.411
	Gender * Achievement	-0.001	0.001	-0.090	-0.657	.511
	Gender * Attitudes	0.026	0.041	0.075	0.641	.522
	Gender * Education	-0.203	0.089	-0.220	-2.292	.022*
	Gender * Expectations	0.131	0.060	0.182	2.178	.029*
	Gender * Numeracy	-0.039	0.035	-0.111	-1.124	.261
	Mathematics Achievement	0.005	0.001	0.232	7.021	.000*
	Parents' Attitudes	0.064	0.034	0.071	1.860	.063
	Parents' Education	-0.124	0.059	-0.090	-2.103	.036*
	Parents' Expectations	0.000	0.047	0.000	0.006	.995
Chinese Taipei	(Constant)	5.093	0.547		9.304	.000*
R^2 = .076	Early Numeracy Activities	0.051	0.029	0.057	1.772	.076
	Gender (Dummy)	0.180	0.752	0.047	0.239	.811
	Gender * Achievement	-0.003	0.001	-0.470	-2.604	.009*
	Gender * Attitudes	0.028	0.033	0.072	0.863	.388
	Gender * Education	0.056	0.082	0.060	0.684	.494
	Gender * Expectations	0.129	0.089	0.181	1.451	.147
	Gender * Numeracy	-0.001	0.032	-0.002	-0.021	.983
	Mathematics Achievement	0.008	0.001	0.282	10.142	.000*
	Parents' Attitudes	0.021	0.024	0.023	0.892	.373
	Parents' Education	-0.191	0.066	-0.100	-2.910	.004*
	Parents' Expectations	-0.099	0.053	-0.047	-1.859	.063
Croatia	(Constant)	6.962	0.517		13.470	.000*
R^2 = .031	Early Numeracy Activities	0.042	0.027	0.042	1.573	.116
	Gender (Dummy)	0.518	0.668	0.152	0.776	.438
	Gender * Achievement	0.000	0.001	-0.048	-0.309	.757
	Gender * Attitudes	-0.054	0.043	-0.132	-1.262	.207
	Gender * Education	0.097	0.102	0.116	0.946	.344
	Gender * Expectations	-0.094	0.085	-0.127	-1.101	.271
	Gender * Numeracy	0.000	0.038	0.001	0.009	.993
	Mathematics Achievement	0.004	0.001	0.157	4.925	.000*
	Parents' Attitudes	0.067	0.030	0.062	2.243	.025*

	Parents' Education	-0.237	0.085	-0.103	-2.789	.005*
	Parents' Expectations	0.064	0.065	0.036	0.977	.328
Cyprus	(Constant)	7.417	0.578		12.831	.000*
R^2 = .040	Early Numeracy Activities	0.018	0.030	0.018	0.615	.538
	Gender (Dummy)	0.150	0.731	0.037	0.205	.838
	Gender * Achievement	-0.001	0.001	-0.167	-1.432	.152
	Gender * Attitudes	0.048	0.047	0.124	1.005	.315
	Gender * Education	-0.021	0.087	-0.022	-0.243	.808
	Gender * Expectations	0.086	0.083	0.117	1.039	.299
	Gender * Numeracy	-0.032	0.042	-0.085	-0.761	.447
	Mathematics Achievement	0.006	0.001	0.214	7.663	.000*
	Parents' Attitudes	0.018	0.033	0.015	0.550	.583
	Parents' Education	-0.144	0.057	-0.070	-2.514	.012*
	Parents' Expectations	0.023	0.056	0.012	0.416	.677
Czech Republic	(Constant)	6.004	0.500		12.018	.000*
R^2 = .042	Early Numeracy Activities	0.082	0.027	0.074	3.014	.003*
	Gender (Dummy)	0.658	0.737	0.185	0.892	.373
	Gender * Achievement	-0.002	0.001	-0.231	-1.189	.235
	Gender * Attitudes	0.070	0.041	0.186	1.683	.093
	Gender * Education	0.064	0.082	0.070	0.775	.438
	Gender * Expectations	-0.043	0.044	-0.054	-0.975	.330
	Gender * Numeracy	-0.067	0.039	-0.209	-1.702	.089
	Mathematics Achievement	0.006	0.001	0.216	6.579	.000*
	Parents' Attitudes	0.020	0.028	0.020	0.722	.470
	Parents' Education	-0.136	0.063	-0.072	-2.175	.030*
	Parents' Expectations	0.008	0.035	0.008	0.218	.828
Denmark	(Constant)	6.979	0.575		12.130	.000*
R^2 = .040	Early Numeracy Activities	0.048	0.028	0.046	1.694	.090
	Gender (Dummy)	0.043	0.920	0.013	0.046	.963
	Gender * Achievement	0.000	0.001	0.032	0.158	.875
	Gender * Attitudes	-0.030	0.043	-0.094	-0.712	.477
	Gender * Education	0.021	0.102	0.029	0.208	.835
	Gender * Expectations	0.017	0.070	0.025	0.237	.813
	Gender * Numeracy	-0.008	0.039	-0.023	-0.200	.841
	Mathematics Achievement	0.004	0.001	0.158	4.135	.000*
	Parents' Attitudes	0.053	0.027	0.054	2.004	.045*
	Parents' Education	-0.137	0.072	-0.063	-1.903	.057
	Parents' Expectations	0.069	0.053	0.048	1.317	.188
Finland	(Constant)	5.925	0.445		13.318	.000*
R^2 = .064	Early Numeracy Activities	0.073	0.032	0.064	2.296	.022*
	Gender (Dummy)	-0.070	0.606	-0.021	-0.115	.909
	Gender * Achievement	0.000	0.001	0.045	0.270	.787
	Gender * Attitudes	0.010	0.031	0.031	0.342	.733
	Gender * Education	0.009	0.091	0.011	0.097	.922
	Gender * Expectations	-0.084	0.042	-0.121	-2.022	.043*
	Gender * Numeracy	-0.020	0.037	-0.057	-0.535	.593
	Mathematics Achievement	0.005	0.001	0.204	6.550	.000*
	Parents' Attitudes	0.023	0.025	0.026	0.909	.363
	Parents' Education	-0.174	0.061	-0.093	-2.872	.004*
	Parents' Expectations	0.098	0.031	0.096	3.202	.001*
France	(Constant)	6.994	0.428		16.335	.000*
R^2 = .092	Early Numeracy Activities	0.068	0.025	0.069	2.778	.005*
	Gender (Dummy)	0.794	0.650	0.234	1.222	.222
	Gender * Achievement	-0.002	0.001	-0.223	-1.402	.161
	Gender * Attitudes	0.006	0.046	0.018	0.137	.891
	Gender * Education	-0.107	0.075	-0.130	-1.433	.152
	Gender * Expectations	-0.014	0.066	-0.021	-0.215	.830
	Gender * Numeracy	-0.023	0.036	-0.070	-0.630	.529
	Mathematics Achievement	0.006	0.001	0.244	7.656	.000*
	Parents' Attitudes	0.048	0.035	0.053	1.368	.171
	Parents' Education	-0.170	0.057	-0.100	-2.969	.003*
	Parents' Expectations	0.028	0.045	0.026	0.614	.540
Georgia	(Constant)	8.130	0.434		18.741	.000*
R^2 = .058	Early Numeracy Activities	0.011	0.025	0.013	0.436	.663
	Gender (Dummy)	-0.281	0.479	-0.092	-0.586	.558
	Gender * Achievement	-0.001	0.001	-0.173	-1.296	.195
	Gender * Attitudes	0.005	0.034	0.017	0.146	.884
	Gender * Education	-0.174	0.112	-0.247	-1.558	.119
	Gender * Expectations	0.181	0.079	0.307	2.282	.023*
	Gender * Numeracy	0.051	0.040	0.175	1.283	.199

	Mathematics Achievement	0.004	0.001	0.232	6.512	.000*
	Parents' Attitudes	0.027	0.028	0.032	0.981	.326
	Parents' Education	0.102	0.076	0.059	1.353	.176
	Parents' Expectations	-0.075	0.063	-0.072	-1.197	.231
Hong Kong, SAR	(Constant)	5.685	0.612		9.288	.000*
R^2 = .078	Early Numeracy Activities	0.027	0.031	0.026	0.862	.389
	Gender (Dummy)	-0.310	0.845	-0.082	-0.367	.713
	Gender * Achievement	0.001	0.001	0.120	0.510	.610
	Gender * Attitudes	-0.037	0.035	-0.099	-1.073	.283
	Gender * Education	-0.038	0.063	-0.040	-0.596	.551
	Gender * Expectations	-0.064	0.086	-0.089	-0.742	.458
	Gender * Numeracy	0.016	0.049	0.040	0.316	.752
	Mathematics Achievement	0.006	0.001	0.219	5.734	.000*
	Parents' Attitudes	0.043	0.025	0.044	1.742	.082
	Parents' Education	-0.124	0.049	-0.084	-2.566	.010*
	Parents' Expectations	-0.010	0.058	-0.005	-0.179	.858
Hungary	(Constant)	6.086	0.685		8.890	.000*
R^2 = .073	Early Numeracy Activities	0.041	0.035	0.037	1.180	.238
	Gender (Dummy)	1.286	0.728	0.351	1.767	.077
	Gender * Achievement	-0.003	0.001	-0.402	-3.164	.002*
	Gender * Attitudes	-0.024	0.040	-0.065	-0.599	.549
	Gender * Education	0.067	0.095	0.072	0.702	.483
	Gender * Expectations	-0.026	0.089	-0.033	-0.292	.770
	Gender * Numeracy	-0.004	0.045	-0.012	-0.086	.931
	Mathematics Achievement	0.007	0.001	0.319	8.492	.000*
	Parents' Attitudes	0.067	0.031	0.066	2.148	.032*
	Parents' Education	-0.312	0.076	-0.181	-4.115	.000*
	Parents' Expectations	0.031	0.065	0.026	0.483	.629
Indonesia	(Constant)	8.477	0.488		17.385	.000*
R^2 = .058	Early Numeracy Activities	0.008	0.022	0.011	0.369	.712
	Gender (Dummy)	-0.046	0.675	-0.016	-0.068	.946
	Gender * Achievement	0.000	0.001	-0.039	-0.313	.754
	Gender * Attitudes	0.025	0.050	0.100	0.495	.621
	Gender * Education	0.059	0.055	0.061	1.077	.282
	Gender * Expectations	-0.029	0.044	-0.049	-0.649	.516
	Gender * Numeracy	0.001	0.035	0.002	0.021	.983
	Mathematics Achievement	0.004	0.001	0.224	5.071	.000*
	Parents' Attitudes	0.068	0.034	0.077	2.010	.044*
	Parents' Education	-0.078	0.043	-0.072	-1.826	.068
	Parents' Expectations	0.025	0.037	0.027	0.687	.492
Iran, Islamic Republic of	(Constant)	7.823	0.484		16.162	.000*
R^2 = .068	Early Numeracy Activities	-0.019	0.030	-0.023	-0.610	.542
	Gender (Dummy)	1.263	0.728	0.386	1.734	.083
	Gender * Achievement	-0.002	0.001	-0.287	-1.861	.063
	Gender * Attitudes	-0.070	0.050	-0.240	-1.401	.161
	Gender * Education	-0.071	0.081	-0.073	-0.870	.385
	Gender * Expectations	-0.037	0.088	-0.063	-0.417	.677
	Gender * Numeracy	0.084	|	0.255	2.095	.036*
	Mathematics Achievement	0.005	0.001	0.293	6.595	.000*
	Parents' Attitudes	0.081	0.038	0.084	2.152	.031*
	Parents' Education	-0.093	0.058	-0.078	-1.600	.110
	Parents' Expectations	0.080	0.070	0.060	1.144	.253
Ireland	(Constant)	6.911	0.579		11.930	.000*
R^2 = .034	Early Numeracy Activities	0.027	0.026	0.029	1.035	.301
	Gender (Dummy)	-0.489	0.932	-0.135	-0.525	.600
	Gender * Achievement	0.000	0.001	0.053	0.296	.768
	Gender * Attitudes	0.007	0.056	0.019	0.117	.907
	Gender * Education	0.025	0.078	0.030	0.323	.746
	Gender * Expectations	0.032	0.082	0.045	0.383	.702
	Gender * Numeracy	0.002	0.038	0.007	0.060	.952
	Mathematics Achievement	0.004	0.001	0.167	5.253	.000*
	Parents' Attitudes	0.042	0.037	0.041	1.144	.253
	Parents' Education	-0.069	0.054	-0.038	-1.273	.203
	Parents' Expectations	-0.024	0.054	-0.013	-0.440	.660
Italy	(Constant)	7.678	0.540		14.225	.000*
R^2 = .050	Early Numeracy Activities	0.077	0.031	0.074	2.475	.013*
	Gender (Dummy)	-0.468	0.694	-0.126	-0.675	.500
	Gender * Achievement	0.000	0.001	0.036	0.223	.824
	Gender * Attitudes	0.073	0.045	0.192	1.617	.106
	Gender * Education	0.019	0.106	0.019	0.183	.854

	Gender * Expectations	-0.134	0.074	-0.167	-1.811	.070
	Gender * Numeracy	-0.025	0.047	-0.071	-0.525	.600
	Mathematics Achievement	0.003	0.001	0.101	3.195	.001*
	Parents' Attitudes	0.023	0.029	0.022	0.793	.428
	Parents' Education	-0.166	0.058	-0.092	-2.878	.004*
	Parents' Expectations	0.175	0.045	0.134	3.856	.000*
Japan	(Constant)	4.550	0.435		10.456	.000*
R^2 = .106	Early Numeracy Activities	0.039	0.023	0.044	1.742	.082
	Gender (Dummy)	-0.004	0.549	-0.001	-0.007	.995
	Gender * Achievement	0.000	0.001	0.018	0.107	.915
	Gender * Attitudes	0.048	0.034	0.116	1.422	.155
	Gender * Education	0.010	0.075	0.013	0.134	.894
	Gender * Expectations	-0.116	0.051	-0.163	-2.300	.021*
	Gender * Numeracy	-0.020	0.030	-0.059	-0.657	.511
	Mathematics Achievement	0.006	0.001	0.272	11.401	.000*
	Parents' Attitudes	0.005	0.027	0.006	0.204	.838
	Parents' Education	-0.016	0.048	-0.008	-0.332	.740
	Parents' Expectations	0.145	0.034	0.099	4.200	.000*
Kazakhstan	(Constant)	8.228	0.543		15.143	.000*
R^2 = .036	Early Numeracy Activities	0.052	0.023	0.063	2.251	.024*
	Gender (Dummy)	0.286	0.645	0.095	0.443	.658
	Gender * Achievement	0.000	0.001	0.008	0.062	.950
	Gender * Attitudes	-0.017	0.041	-0.067	-0.429	.668
	Gender * Education	-0.071	0.056	-0.101	-1.270	.204
	Gender * Expectations	0.079	0.059	0.138	1.335	.182
	Gender * Numeracy	-0.014	0.039	-0.051	-0.352	.725
	Mathematics Achievement	0.003	0.000	0.157	6.239	.000*
	Parents' Attitudes	0.049	0.031	0.049	1.566	.117
	Parents' Education	-0.020	0.045	-0.012	-0.439	.661
	Parents' Expectations	0.021	0.034	0.016	0.629	.530
Korea, Republic of	(Constant)	3.568	0.402		8.870	.000*
R^2 = .126	Early Numeracy Activities	0.045	0.022	0.058	2.033	.042*
	Gender (Dummy)	0.786	0.577	0.252	1.363	.173
	Gender * Achievement	-0.001	0.001	-0.151	-0.877	.381
	Gender * Attitudes	-0.065	0.030	-0.187	-2.163	.031*
	Gender * Education	0.058	0.065	0.082	0.901	.368
	Gender * Expectations	-0.007	0.094	-0.013	-0.078	.938
	Gender * Numeracy	-0.022	0.028	-0.076	-0.802	.423
	Mathematics Achievement	0.008	0.001	0.343	11.889	.000*
	Parents' Attitudes	0.047	0.023	0.057	2.019	.044*
	Parents' Education	-0.163	0.049	-0.091	-3.334	.001*
	Parents' Expectations	0.088	0.074	0.039	1.183	.237
Lithuania	(Constant)	6.486	0.630		10.296	.000*
R^2 = .060	Early Numeracy Activities	0.098	0.034	0.095	2.905	.004*
	Gender (Dummy)	1.184	0.827	0.352	1.431	.152
	Gender * Achievement	0.000	0.001	0.071	0.344	.731
	Gender * Attitudes	-0.021	0.049	-0.065	-0.426	.670
	Gender * Education	-0.173	0.125	-0.227	-1.386	.166
	Gender * Expectations	-0.121	0.069	-0.183	-1.742	.082
	Gender * Numeracy	-0.026	0.048	-0.083	-0.550	.582
	Mathematics Achievement	0.004	0.001	0.183	4.559	.000*
	Parents' Attitudes	0.058	0.036	0.057	1.634	.102
	Parents' Education	-0.052	0.071	-0.026	-0.732	.464
	Parents' Expectations	0.036	0.051	0.026	0.710	.478
Morocco	(Constant)	8.481	0.528		16.050	.000*
R^2 = .091	Early Numeracy Activities	0.003	0.024	0.005	0.138	.891
	Gender (Dummy)	0.719	0.584	0.230	1.232	.218
	Gender * Achievement	0.000	0.001	-0.061	-0.540	.589
	Gender * Attitudes	-0.048	0.047	-0.168	-1.023	.306
	Gender * Education	0.003	0.062	0.002	0.041	.968
	Gender * Expectations	-0.004	0.046	-0.006	-0.088	.930
	Gender * Numeracy	0.019	0.032	0.054	0.595	.552
	Mathematics Achievement	0.004	0.001	0.254	5.373	.000*
	Parents' Attitudes	0.022	0.036	0.028	0.610	.542
	Parents' Education	0.052	0.052	0.044	0.999	.318
	Parents' Expectations	0.075	0.037	0.087	2.003	.045*
Oman	(Constant)	8.914	0.386		23.109	.000*
R^2 = .080	Early Numeracy Activities	-0.001	0.022	-0.001	-0.024	.981
	Gender (Dummy)	0.269	0.451	0.086	0.597	.551
	Gender * Achievement	0.000	0.001	-0.043	-0.534	.593

	Gender * Attitudes	-0.015	0.038	-0.052	-0.394	.693
	Gender * Education	-0.015	0.036	-0.019	-0.415	.678
	Gender * Expectations	0.039	0.041	0.068	0.950	.342
	Gender * Numeracy	0.025	0.030	0.079	0.828	.408
	Mathematics Achievement	0.004	0.000	0.251	9.293	.000*
	Parents' Attitudes	0.035	0.024	0.037	1.461	.144
	Parents' Education	-0.034	0.028	-0.033	-1.198	.231
	Parents' Expectations	-0.007	0.032	-0.006	-0.223	.824
Poland	(Constant)	6.585	0.444		14.835	.000*
R^2 = .034	Early Numeracy Activities	0.074	0.023	0.074	3.277	.001*
	Gender (Dummy)	0.211	0.574	0.062	0.368	.713
	Gender * Achievement	0.000	0.001	0.015	0.083	.934
	Gender * Attitudes	0.009	0.033	0.028	0.276	.783
	Gender * Education	-0.031	0.068	-0.037	-0.454	.650
	Gender * Expectations	-0.023	0.054	-0.037	-0.431	.666
	Gender * Numeracy	-0.021	0.031	-0.070	-0.683	.495
	Mathematics Achievement	0.004	0.001	0.170	4.823	.000*
	Parents' Attitudes	0.032	0.024	0.035	1.334	.182
	Parents' Education	-0.087	0.050	-0.063	-1.745	.081
	Parents' Expectations	-0.026	0.041	-0.023	-0.625	.532
Portugal	(Constant)	5.965	0.500		11.934	.000*
R^2 = .108	Early Numeracy Activities	0.066	0.023	0.067	2.891	.004*
	Gender (Dummy)	0.578	0.677	0.165	0.854	.393
	Gender * Achievement	-0.001	0.001	-0.101	-0.666	.505
	Gender * Attitudes	-0.033	0.039	-0.106	-0.860	.390
	Gender * Education	-0.095	0.052	-0.103	-1.840	.066
	Gender * Expectations	0.032	0.051	0.050	0.625	.532
	Gender * Numeracy	-0.015	0.032	-0.046	-0.481	.630
	Mathematics Achievement	0.007	0.001	0.302	10.102	.000*
	Parents' Attitudes	0.050	0.025	0.046	2.006	.045*
	Parents' Education	-0.077	0.031	-0.060	-2.508	.012*
	Parents' Expectations	-0.025	0.031	-0.020	-0.795	.427
Russian Federation	(Constant)	6.624	0.462		14.331	.000*
R^2 = .070	Early Numeracy Activities	-0.001	0.026	-0.002	-0.056	.955
	Gender (Dummy)	0.659	0.571	0.207	1.155	.248
	Gender * Achievement	0.000	0.001	-0.071	-0.425	.671
	Gender * Attitudes	0.044	0.031	0.142	1.397	.163
	Gender * Education	-0.344	0.114	-0.486	-3.006	.003*
	Gender * Expectations	0.059	0.062	0.097	0.941	.347
	Gender * Numeracy	0.013	0.032	0.047	0.409	.682
	Mathematics Achievement	0.005	0.001	0.247	8.836	.000*
	Parents' Attitudes	0.050	0.028	0.057	1.794	.073
	Parents' Education	0.026	0.070	0.014	0.369	.712
	Parents' Expectations	-0.002	0.045	-0.002	-0.040	.968
Saudi Arabia	(Constant)	8.220	0.450		18.279	.000*
R^2 = .077	Early Numeracy Activities	-0.035	0.031	-0.039	-1.119	.263
	Gender (Dummy)	0.309	0.651	0.084	0.475	.635
	Gender * Achievement	0.000	0.001	-0.052	-0.396	.692
	Gender * Attitudes	-0.032	0.056	-0.092	-0.563	.573
	Gender * Education	-0.142	0.066	-0.164	-2.151	.032*
	Gender * Expectations	0.094	0.073	0.139	1.282	.200
	Gender * Numeracy	0.089	0.052	0.257	1.726	.084
	Mathematics Achievement	0.003	0.001	0.163	4.220	.000*
	Parents' Attitudes	0.051	0.038	0.055	1.344	.179
	Parents' Education	0.032	0.037	0.025	0.880	.379
	Parents' Expectations	0.041	0.051	0.026	0.794	.427
Serbia	(Constant)	8.356	1.764		4.737	.000*
R^2 = .048	Early Numeracy Activities	0.014	0.055	0.013	0.257	.797
	Gender (Dummy)	-1.308	1.944	-0.336	-0.673	.501
	Gender * Achievement	0.002	0.002	0.281	1.205	.228
	Gender * Attitudes	0.022	0.070	0.061	0.322	.748
	Gender * Education	0.044	0.117	0.040	0.377	.706
	Gender * Expectations	-0.103	0.073	-0.131	-1.416	.157
	Gender * Numeracy	0.041	0.070	0.116	0.582	.560
	Mathematics Achievement	0.003	0.002	0.127	1.738	.082
	Parents' Attitudes	0.100	0.050	0.104	1.995	.046*
	Parents' Education	-0.345	0.098	-0.151	-3.522	.000*
	Parents' Expectations	0.025	0.060	0.017	0.419	.675
Singapore	(Constant)	5.357	0.380		14.083	.000*
R^2 = .070	Early Numeracy Activities	0.005	0.019	0.006	0.267	.790

	Gender (Dummy)	1.341	0.527	0.379	2.543	.011*
	Gender * Achievement	-0.001	0.001	-0.243	-2.335	.020*
	Gender * Attitudes	0.004	0.027	0.013	0.152	.879
	Gender * Education	-0.073	0.049	-0.091	-1.506	.132
	Gender * Expectations	-0.146	0.062	-0.215	-2.344	.019*
	Gender * Numeracy	0.019	0.025	0.055	0.734	.463
	Mathematics Achievement	0.005	0.000	0.261	11.788	.000*
	Parents' Attitudes	0.054	0.018	0.057	3.050	.002*
	Parents' Education	-0.066	0.038	-0.038	-1.740	.082
	Parents' Expectations	0.141	0.042	0.064	3.350	.001*
Slovak Republic	(Constant)	7.436	0.635		11.703	.000*
R^2 = .028	Early Numeracy Activities	0.049	0.030	0.048	1.644	.100
	Gender (Dummy)	1.001	0.802	0.276	1.249	.212
	Gender * Achievement	0.000	0.001	-0.048	-0.333	.739
	Gender * Attitudes	-0.026	0.044	-0.070	-0.603	.546
	Gender * Education	-0.009	0.074	-0.009	-0.117	.907
	Gender * Expectations	-0.070	0.046	-0.099	-1.527	.127
	Gender * Numeracy	-0.042	0.036	-0.131	-1.164	.245
	Mathematics Achievement	0.003	0.001	0.137	4.113	.000*
	Parents' Attitudes	0.080	0.025	0.080	3.180	.001*
	Parents' Education	-0.145	0.058	-0.081	-2.489	.013*
	Parents' Expectations	0.012	0.032	0.013	0.384	.701
Turkey	(Constant)	8.361	0.271		30.801	.000*
R^2 = .088	Early Numeracy Activities	0.017	0.015	0.025	1.132	.258
	Gender (Dummy)	-0.012	0.385	-0.004	-0.032	.975
	Gender * Achievement	0.000	0.001	0.056	0.472	.637
	Gender * Attitudes	0.070	0.029	0.255	2.428	.015*
	Gender * Education	0.019	0.038	0.019	0.498	.619
	Gender * Expectations	-0.097	0.059	-0.181	-1.639	.101
	Gender * Numeracy	-0.037	0.024	-0.118	-1.529	.126
	Mathematics Achievement	0.005	0.000	0.293	11.097	.000*
	Parents' Attitudes	0.020	0.022	0.024	0.895	.371
	Parents' Education	-0.152	0.029	-0.142	-5.193	.000*
	Parents' Expectations	0.113	0.036	0.069	3.145	.002*
United Arab Emirates	(Constant)	8.079	0.299		27.018	.000*
R^2 = .038	Early Numeracy Activities	0.009	0.015	0.010	0.569	.569
	Gender (Dummy)	0.556	0.468	0.159	1.189	.234
	Gender * Achievement	-0.001	0.001	-0.121	-1.546	.122
	Gender * Attitudes	-0.012	0.031	-0.035	-0.373	.709
	Gender * Education	-0.037	0.058	-0.048	-0.637	.524
	Gender * Expectations	-0.020	0.064	-0.032	-0.315	.753
	Gender * Numeracy	0.035	0.022	0.105	1.545	.122
	Mathematics Achievement	0.003	0.000	0.186	7.913	.000*
	Parents' Attitudes	0.067	0.020	0.073	3.372	.001*
	Parents' Education	-0.061	0.037	-0.039	-1.662	.097
	Parents' Expectations	0.060	0.035	0.033	1.728	.084
Table Average	(Constant)	6.974	0.104		67.218	
R^2 = .064	Early Numeracy Activities	0.034	0.005	0.035	6.894	
	Gender (Dummy)	0.304	0.133	0.091	2.296	
	Gender * Achievement	0.000	0.000	-0.073	-2.675	
	Gender * Attitudes	0.005	0.008	0.012	0.613	
	Gender * Education	-0.043	0.015	-0.056	-2.945	
	Gender * Expectations	-0.010	0.012	-0.012	-0.837	
	Gender * Numeracy	0.000	0.007	0.001	0.064	
	Mathematics Achievement	0.005	0.000	0.216	33.145	
	Parents' Attitudes	0.046	0.005	0.048	8.561	
	Parents' Education	-0.101	0.011	-0.059	-9.612	
	Parents' Expectations	0.038	0.009	0.027	4.445	

*p < .05, two-tailed.

Table F2

Regression analysis results with gender interactions for science intrinsic motivation

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	6.128	0.497		12.343	.000*
R^2 = .146	Early Numeracy Activities	0.020	0.045	0.018	0.437	.662
	Gender (Dummy)	1.225	1.160	0.301	1.055	.291
	Gender * Achievement	0.001	0.001	0.071	0.543	.587
	Gender * Attitudes	-0.038	0.066	-0.101	-0.570	.569
	Gender * Education	-0.212	0.105	-0.221	-2.017	.044*
	Gender * Expectations	0.004	0.109	0.006	0.038	.970
	Gender * Numeracy	0.006	0.066	0.015	0.085	.933
	Parents' Attitudes	0.071	0.032	0.061	2.174	.030*
	Parents' Education	0.010	0.069	0.006	0.149	.882
	Parents' Expectations	0.093	0.063	0.056	1.472	.141
	Science Achievement	0.006	0.001	0.319	9.029	.000*
Belgium (Flemish)	(Constant)	7.556	0.643		11.759	.000*
R^2 = .021	Early Numeracy Activities	-0.041	0.031	-0.035	-1.339	.181
	Gender (Dummy)	0.476	0.843	0.117	0.565	.572
	Gender * Achievement	-0.002	0.001	-0.223	-1.235	.217
	Gender * Attitudes	-0.013	0.046	-0.029	-0.274	.784
	Gender * Education	-0.067	0.076	-0.074	-0.888	.375
	Gender * Expectations	-0.001	0.076	-0.002	-0.016	.987
	Gender * Numeracy	0.058	0.038	0.143	1.535	.125
	Parents' Attitudes	0.009	0.031	0.008	0.288	.773
	Parents' Education	-0.080	0.058	-0.040	-1.388	.165
	Parents' Expectations	0.020	0.053	0.013	0.368	.713
	Science Achievement	0.005	0.001	0.157	4.653	.000*
Bulgaria	(Constant)	6.128	0.444		13.797	.000*
R^2 = .094	Early Numeracy Activities	0.079	0.029	0.099	2.732	.006*
	Gender (Dummy)	1.402	0.557	0.375	2.517	.012*
	Gender * Achievement	-0.002	0.001	-0.319	-2.645	.008*
	Gender * Attitudes	-0.014	0.035	-0.040	-0.406	.685
	Gender * Education	-0.124	0.070	-0.132	-1.768	.077
	Gender * Expectations	0.234	0.071	0.320	3.288	.001*
	Gender * Numeracy	-0.054	0.036	-0.149	-1.474	.141
	Parents' Attitudes	0.089	0.028	0.097	3.138	.002*
	Parents' Education	0.007	0.056	0.005	0.119	.905
	Parents' Expectations	-0.038	0.055	-0.035	-0.685	.493
	Science Achievement	0.005	0.001	0.263	7.328	.000*
Chinese Taipei	(Constant)	7.632	0.581		13.132	.000*
R^2 = .037	Early Numeracy Activities	0.037	0.024	0.037	1.548	.122
	Gender (Dummy)	-0.795	0.854	-0.189	-0.932	.351
	Gender * Achievement	-0.001	0.001	-0.068	-0.378	.705
	Gender * Attitudes	0.063	0.040	0.143	1.559	.119
	Gender * Education	-0.043	0.085	-0.041	-0.506	.613
	Gender * Expectations	0.042	0.099	0.053	0.423	.673
	Gender * Numeracy	0.003	0.037	0.008	0.090	.929
	Parents' Attitudes	-0.001	0.027	-0.001	-0.048	.962
	Parents' Education	-0.094	0.068	-0.045	-1.386	.166
	Parents' Expectations	0.018	0.067	0.008	0.263	.793
	Science Achievement	0.005	0.001	0.153	4.738	.000*
Croatia	(Constant)	7.064	0.618		11.424	.000*
R^2 = .016	Early Numeracy Activities	0.050	0.032	0.045	1.577	.115
	Gender (Dummy)	1.013	0.770	0.267	1.315	.189
	Gender * Achievement	-0.001	0.001	-0.210	-1.074	.283
	Gender * Attitudes	0.016	0.045	0.036	0.367	.714
	Gender * Education	0.054	0.133	0.058	0.406	.685
	Gender * Expectations	-0.169	0.099	-0.204	-1.715	.086
	Gender * Numeracy	0.015	0.042	0.044	0.366	.715
	Parents' Attitudes	0.007	0.030	0.005	0.215	.830
	Parents' Education	-0.016	0.089	-0.006	-0.178	.859
	Parents' Expectations	0.132	0.071	0.066	1.867	.062
	Science Achievement	0.003	0.001	0.098	2.990	.003*
Cyprus	(Constant)	8.044	0.606		13.264	.000*
R^2 = .014	Early Numeracy Activities	-0.025	0.030	-0.023	-0.839	.402
	Gender (Dummy)	-0.692	0.838	-0.152	-0.825	.409
	Gender * Achievement	0.000	0.001	0.043	0.336	.737

	Gender * Attitudes	0.054	0.050	0.126	1.086	.278
	Gender * Education	-0.083	0.113	-0.078	-0.736	.462
	Gender * Expectations	0.009	0.095	0.011	0.096	.923
	Gender * Numeracy	0.030	0.046	0.071	0.652	.514
	Parents' Attitudes	0.022	0.030	0.016	0.719	.472
	Parents' Education	-0.027	0.066	-0.012	-0.412	.681
	Parents' Expectations	-0.029	0.063	-0.013	-0.458	.647
	Science Achievement	0.003	0.001	0.110	3.539	.000*
Czech Republic	(Constant)	8.169	0.718		11.385	.000*
R^2 = .019	Early Numeracy Activities	0.010	0.036	0.008	0.284	.776
	Gender (Dummy)	0.213	0.900	0.052	0.237	.813
	Gender * Achievement	-0.001	0.001	-0.166	-1.111	.267
	Gender * Attitudes	0.070	0.038	0.160	1.851	.064
	Gender * Education	0.054	0.091	0.051	0.591	.555
	Gender * Expectations	0.007	0.050	0.008	0.146	.884
	Gender * Numeracy	0.001	0.054	0.002	0.014	.989
	Parents' Attitudes	-0.019	0.031	-0.016	-0.606	.544
	Parents' Education	-0.122	0.072	-0.055	-1.688	.092
	Parents' Expectations	-0.075	0.038	-0.066	-2.008	.045*
	Science Achievement	0.003	0.001	0.116	3.524	.000*
Denmark	(Constant)	8.028	0.752		10.675	.000*
R^2 = .026	Early Numeracy Activities	-0.060	0.040	-0.047	-1.493	.135
	Gender (Dummy)	1.033	0.964	0.253	1.071	.284
	Gender * Achievement	-0.002	0.001	-0.317	-2.000	.046*
	Gender * Attitudes	-0.069	0.054	-0.176	-1.268	.205
	Gender * Education	-0.096	0.129	-0.109	-0.744	.457
	Gender * Expectations	-0.087	0.085	-0.109	-1.020	.308
	Gender * Numeracy	0.134	0.057	0.331	2.344	.019*
	Parents' Attitudes	0.046	0.039	0.039	1.188	.235
	Parents' Education	-0.046	0.093	-0.017	-0.498	.618
	Parents' Expectations	0.121	0.058	0.069	2.098	.036*
	Science Achievement	0.003	0.001	0.088	2.698	.007*
Finland	(Constant)	6.987	0.613		11.404	.000*
R^2 = .015	Early Numeracy Activities	0.037	0.040	0.029	0.930	.352
	Gender (Dummy)	1.682	0.832	0.441	2.021	.043*
	Gender * Achievement	-0.001	0.001	-0.091	-0.457	.648
	Gender * Attitudes	-0.032	0.039	-0.084	-0.813	.416
	Gender * Education	-0.132	0.076	-0.151	-1.732	.083
	Gender * Expectations	0.025	0.049	0.032	0.506	.613
	Gender * Numeracy	-0.071	0.053	-0.182	-1.332	.183
	Parents' Attitudes	0.050	0.027	0.050	1.882	.060
	Parents' Education	-0.036	0.051	-0.017	-0.704	.481
	Parents' Expectations	-0.068	0.033	-0.059	-2.030	.042*
	Science Achievement	0.003	0.001	0.111	3.531	.000*
France	(Constant)	7.623	0.619		12.312	.000*
R^2 = .025	Early Numeracy Activities	-0.014	0.036	-0.012	-0.395	.693
	Gender (Dummy)	0.456	0.853	0.109	0.535	.593
	Gender * Achievement	-0.002	0.002	-0.190	-0.942	.346
	Gender * Attitudes	0.013	0.060	0.031	0.224	.823
	Gender * Education	-0.105	0.108	-0.103	-0.974	.330
	Gender * Expectations	0.018	0.079	0.021	0.225	.822
	Gender * Numeracy	0.019	0.042	0.046	0.440	.660
	Parents' Attitudes	0.037	0.043	0.033	0.868	.385
	Parents' Education	-0.075	0.076	-0.036	-0.987	.324
	Parents' Expectations	0.037	0.058	0.029	0.645	.519
	Science Achievement	0.004	0.001	0.145	3.556	.000*
Georgia	(Constant)	7.710	0.614		12.551	.000*
R^2 = .046	Early Numeracy Activities	0.025	0.034	0.026	0.759	.448
	Gender (Dummy)	0.291	0.736	0.081	0.395	.693
	Gender * Achievement	-0.002	0.001	-0.294	-1.807	.071
	Gender * Attitudes	0.026	0.041	0.078	0.637	.524
	Gender * Education	-0.059	0.145	-0.071	-0.405	.685
	Gender * Expectations	0.142	0.081	0.207	1.761	.078
	Gender * Numeracy	-0.008	0.047	-0.022	-0.160	.873
	Parents' Attitudes	-0.006	0.033	-0.006	-0.193	.847
	Parents' Education	-0.005	0.092	-0.002	-0.054	.957
	Parents' Expectations	0.006	0.065	0.005	0.097	.923
	Science Achievement	0.005	0.001	0.224	5.686	.000*
Hong Kong, SAR	(Constant)	6.136	0.496		12.364	.000*
R^2 = .060	Early Numeracy Activities	0.062	0.029	0.053	2.134	.033*

	Gender (Dummy)	0.170	0.782	0.040	0.217	.828
	Gender * Achievement	-0.001	0.001	-0.155	-0.789	.430
	Gender * Attitudes	0.062	0.046	0.144	1.350	.177
	Gender * Education	0.016	0.083	0.015	0.193	.847
	Gender * Expectations	-0.009	0.087	-0.011	-0.106	.916
	Gender * Numeracy	-0.053	0.050	-0.119	-1.072	.284
	Parents' Attitudes	-0.011	0.035	-0.010	-0.304	.761
	Parents' Education	-0.142	0.052	-0.084	-2.713	.007*
	Parents' Expectations	0.052	0.072	0.022	0.720	.472
	Science Achievement	0.007	0.001	0.230	8.181	.000*
Hungary	(Constant)	7.154	0.588		12.159	.000*
R^2 = .029	Early Numeracy Activities	0.010	0.030	0.009	0.337	.736
	Gender (Dummy)	-0.244	0.762	-0.063	-0.320	.749
	Gender * Achievement	-0.002	0.001	-0.216	-1.235	.217
	Gender * Attitudes	-0.028	0.036	-0.072	-0.771	.441
	Gender * Education	0.084	0.094	0.086	0.897	.370
	Gender * Expectations	0.008	0.069	0.010	0.121	.904
	Gender * Numeracy	0.081	0.039	0.234	2.097	.036*
	Parents' Attitudes	0.047	0.031	0.044	1.529	.126
	Parents' Education	-0.110	0.072	-0.060	-1.522	.128
	Parents' Expectations	0.015	0.052	0.012	0.296	.767
	Science Achievement	0.004	0.001	0.181	4.472	.000*
Indonesia	(Constant)	7.351	0.441		16.665	.000*
R^2 = .090	Early Numeracy Activities	0.024	0.025	0.027	0.960	.337
	Gender (Dummy)	0.762	0.604	0.224	1.261	.207
	Gender * Achievement	-0.001	0.001	-0.088	-0.774	.439
	Gender * Attitudes	-0.020	0.041	-0.069	-0.492	.623
	Gender * Education	0.035	0.061	0.030	0.564	.572
	Gender * Expectations	0.047	0.052	0.069	0.913	.361
	Gender * Numeracy	-0.029	0.039	-0.080	-0.746	.455
	Parents' Attitudes	0.092	0.029	0.089	3.211	.001*
	Parents' Education	-0.012	0.046	-0.009	-0.257	.797
	Parents' Expectations	-0.023	0.039	-0.021	-0.604	.546
	Science Achievement	0.005	0.001	0.285	7.599	.000*
Iran, Islamic Republic of	(Constant)	7.286	0.556		13.104	.000*
R^2 = .103	Early Numeracy Activities	-0.051	0.040	-0.056	-1.261	.208
	Gender (Dummy)	1.290	0.748	0.358	1.724	.085
	Gender * Achievement	-0.003	0.001	-0.317	-2.459	.014*
	Gender * Attitudes	-0.030	0.059	-0.092	-0.501	.616
	Gender * Education	-0.017	0.086	-0.016	-0.194	.846
	Gender * Expectations	-0.106	0.105	-0.164	-1.012	.312
	Gender * Numeracy	0.100	0.050	0.277	2.007	.045*
	Parents' Attitudes	0.069	0.034	0.065	1.998	.046*
	Parents' Education	-0.032	0.054	-0.024	-0.585	.559
	Parents' Expectations	0.158	0.070	0.108	2.271	.023*
	Science Achievement	0.006	0.001	0.334	7.958	.000*
Ireland	(Constant)	5.948	0.693		8.583	.000*
R^2 = .047	Early Numeracy Activities	0.001	0.036	0.001	0.031	.975
	Gender (Dummy)	2.623	0.997	0.641	2.630	.009*
	Gender * Achievement	-0.004	0.001	-0.484	-2.759	.006*
	Gender * Attitudes	-0.002	0.052	-0.006	-0.042	.966
	Gender * Education	0.038	0.103	0.040	0.371	.710
	Gender * Expectations	-0.151	0.090	-0.192	-1.677	.094
	Gender * Numeracy	-0.018	0.048	-0.050	-0.373	.709
	Parents' Attitudes	0.011	0.038	0.010	0.299	.765
	Parents' Education	-0.077	0.089	-0.038	-0.867	.386
	Parents' Expectations	0.082	0.057	0.041	1.450	.147
	Science Achievement	0.008	0.001	0.255	7.219	.000*
Italy	(Constant)	7.764	0.609		12.752	.000*
R^2 = .016	Early Numeracy Activities	0.025	0.033	0.024	0.738	.461
	Gender (Dummy)	0.431	0.809	0.118	0.533	.594
	Gender * Achievement	-0.001	0.001	-0.136	-0.747	.455
	Gender * Attitudes	0.035	0.042	0.093	0.845	.398
	Gender * Education	0.025	0.082	0.025	0.310	.757
	Gender * Expectations	-0.024	0.068	-0.031	-0.354	.723
	Gender * Numeracy	-0.020	0.048	-0.060	-0.428	.669
	Parents' Attitudes	0.043	0.034	0.041	1.277	.202
	Parents' Education	0.006	0.055	0.003	0.112	.911
	Parents' Expectations	0.050	0.041	0.039	1.215	.224
	Science Achievement	0.003	0.001	0.100	2.799	.005*

Japan	(Constant)	6.969	0.545		12.795	.000*
R^2 = .042	Early Numeracy Activities	-0.005	0.025	-0.004	-0.187	.852
	Gender (Dummy)	0.093	0.690	0.023	0.134	.893
	Gender * Achievement	-0.001	0.001	-0.209	-1.286	.199
	Gender * Attitudes	0.054	0.038	0.107	1.415	.157
	Gender * Education	0.083	0.099	0.090	0.831	.406
	Gender * Expectations	-0.097	0.077	-0.111	-1.249	.212
	Gender * Numeracy	-0.001	0.036	-0.002	-0.018	.986
	Parents' Attitudes	-0.008	0.027	-0.007	-0.295	.768
	Parents' Education	-0.054	0.066	-0.023	-0.813	.416
	Parents' Expectations	0.097	0.047	0.054	2.066	.039*
	Science Achievement	0.005	0.001	0.177	5.840	.000*
Kazakhstan	(Constant)	7.738	0.645		11.991	.000*
R^2 = .038	Early Numeracy Activities	0.032	0.031	0.033	1.043	.297
	Gender (Dummy)	0.163	0.950	0.046	0.172	.864
	Gender * Achievement	-0.001	0.001	-0.183	-1.493	.136
	Gender * Attitudes	0.022	0.051	0.073	0.439	.661
	Gender * Education	0.069	0.075	0.084	0.921	.357
	Gender * Expectations	-0.005	0.072	-0.007	-0.063	.950
	Gender * Numeracy	0.015	0.042	0.046	0.343	.732
	Parents' Attitudes	0.045	0.032	0.039	1.399	.162
	Parents' Education	-0.127	0.067	-0.068	-1.905	.057
	Parents' Expectations	0.028	0.040	0.018	0.717	.474
	Science Achievement	0.004	0.001	0.189	7.059	.000*
Korea, Republic of	(Constant)	4.168	0.598		6.974	.000*
R^2 = .080	Early Numeracy Activities	0.003	0.023	0.003	0.130	.897
	Gender (Dummy)	0.657	0.928	0.167	0.708	.479
	Gender * Achievement	-0.002	0.001	-0.308	-1.568	.117
	Gender * Attitudes	-0.020	0.038	-0.046	-0.537	.591
	Gender * Education	0.170	0.097	0.189	1.749	.080
	Gender * Expectations	-0.123	0.124	-0.166	-0.993	.321
	Gender * Numeracy	0.030	0.035	0.080	0.858	.391
	Parents' Attitudes	0.061	0.027	0.059	2.270	.023*
	Parents' Education	-0.177	0.068	-0.078	-2.622	.009*
	Parents' Expectations	0.105	0.084	0.036	1.250	.211
	Science Achievement	0.009	0.001	0.275	10.557	.000*
Lithuania	(Constant)	6.954	0.745		9.334	.000*
R^2 = .038	Early Numeracy Activities	0.024	0.038	0.021	0.642	.521
	Gender (Dummy)	0.121	0.969	0.032	0.125	.901
	Gender * Achievement	-0.001	0.001	-0.152	-0.750	.453
	Gender * Attitudes	0.057	0.043	0.156	1.325	.185
	Gender * Education	0.064	0.150	0.074	0.430	.667
	Gender * Expectations	-0.101	0.089	-0.134	-1.139	.255
	Gender * Numeracy	0.020	0.051	0.054	0.381	.703
	Parents' Attitudes	0.005	0.033	0.005	0.166	.868
	Parents' Education	-0.036	0.085	-0.016	-0.421	.674
	Parents' Expectations	0.000	0.062	0.000	0.008	.994
	Science Achievement	0.006	0.001	0.209	5.674	.000*
Morocco	(Constant)	8.004	0.447		17.910	.000*
R^2 = .130	Early Numeracy Activities	0.002	0.034	0.003	0.058	.954
	Gender (Dummy)	0.974	0.496	0.260	1.965	.049*
	Gender * Achievement	0.001	0.001	0.074	0.923	.356
	Gender * Attitudes	-0.103	0.048	-0.301	-2.162	.031*
	Gender * Education	-0.048	0.076	-0.034	-0.624	.533
	Gender * Expectations	0.067	0.066	0.090	1.022	.307
	Gender * Numeracy	-0.006	0.039	-0.015	-0.164	.870
	Parents' Attitudes	0.065	0.034	0.070	1.923	.055
	Parents' Education	0.037	0.052	0.026	0.705	.481
	Parents' Expectations	0.046	0.053	0.045	0.869	.385
	Science Achievement	0.005	0.001	0.290	6.923	.000*
Oman	(Constant)	7.947	0.332		23.916	.000*
R^2 = .121	Early Numeracy Activities	0.010	0.024	0.011	0.439	.661
	Gender (Dummy)	0.415	0.483	0.115	0.859	.390
	Gender * Achievement	-0.001	0.000	-0.069	-1.201	.230
	Gender * Attitudes	-0.020	0.041	-0.059	-0.478	.633
	Gender * Education	0.035	0.045	0.038	0.777	.437
	Gender * Expectations	-0.013	0.047	-0.019	-0.274	.784
	Gender * Numeracy	0.023	0.034	0.063	0.667	.505
	Parents' Attitudes	0.063	0.027	0.058	2.352	.019*
	Parents' Education	-0.060	0.036	-0.051	-1.673	.094

	Parents' Expectations	0.003	0.034	0.002	0.084	.933
	Science Achievement	0.005	0.000	0.341	15.743	.000*
Poland	(Constant)	8.293	0.574		14.438	.000*
R^2 = .009	Early Numeracy Activities	0.000	0.027	0.000	0.008	.994
	Gender (Dummy)	-0.195	0.758	-0.052	-0.258	.797
	Gender * Achievement	-0.001	0.001	-0.190	-0.942	.346
	Gender * Attitudes	-0.003	0.040	-0.009	-0.080	.936
	Gender * Education	0.072	0.055	0.078	1.311	.190
	Gender * Expectations	0.018	0.052	0.026	0.345	.730
	Gender * Numeracy	0.062	0.041	0.187	1.538	.124
	Parents' Attitudes	0.025	0.028	0.025	0.893	.372
	Parents' Education	-0.092	0.045	-0.060	-2.053	.040*
	Parents' Expectations	-0.003	0.039	-0.002	-0.073	.942
	Science Achievement	0.003	0.001	0.090	2.630	.009*
Portugal	(Constant)	8.848	0.513		17.231	.000*
R^2 = .025	Early Numeracy Activities	0.038	0.024	0.039	1.581	.114
	Gender (Dummy)	0.049	0.705	0.014	0.069	.945
	Gender * Achievement	0.000	0.001	0.017	0.104	.917
	Gender * Attitudes	0.026	0.042	0.085	0.621	.535
	Gender * Education	0.026	0.054	0.028	0.475	.635
	Gender * Expectations	0.019	0.052	0.030	0.370	.711
	Gender * Numeracy	-0.068	0.040	-0.206	-1.702	.089
	Parents' Attitudes	0.033	0.027	0.031	1.242	.214
	Parents' Education	-0.071	0.035	-0.057	-2.017	.044*
	Parents' Expectations	-0.008	0.033	-0.006	-0.225	.822
	Science Achievement	0.004	0.001	0.141	4.520	.000*
Russian Federation	(Constant)	7.880	0.600		13.142	.000*
R^2 = .011	Early Numeracy Activities	0.048	0.023	0.050	2.060	.039*
	Gender (Dummy)	1.044	0.903	0.289	1.155	.248
	Gender * Achievement	0.000	0.001	-0.079	-0.375	.707
	Gender * Attitudes	-0.005	0.040	-0.013	-0.115	.908
	Gender * Education	-0.177	0.124	-0.221	-1.422	.155
	Gender * Expectations	0.002	0.067	0.003	0.033	.973
	Gender * Numeracy	0.001	0.030	0.002	0.020	.984
	Parents' Attitudes	0.046	0.027	0.047	1.700	.089
	Parents' Education	0.017	0.063	0.008	0.277	.782
	Parents' Expectations	-0.022	0.052	-0.017	-0.419	.675
	Science Achievement	0.002	0.001	0.080	2.338	.019*
Saudi Arabia	(Constant)	7.869	0.473		16.639	.000*
R^2 = .112	Early Numeracy Activities	-0.055	0.038	-0.053	-1.458	.145
	Gender (Dummy)	0.088	0.787	0.021	0.112	.911
	Gender * Achievement	0.000	0.001	0.036	0.363	.717
	Gender * Attitudes	-0.062	0.075	-0.156	-0.834	.404
	Gender * Education	-0.250	0.078	-0.250	-3.219	.001*
	Gender * Expectations	0.204	0.093	0.260	2.187	.029*
	Gender * Numeracy	0.112	0.054	0.279	2.053	.040*
	Parents' Attitudes	0.084	0.043	0.078	1.953	.051
	Parents' Education	0.113	0.044	0.076	2.556	.011*
	Parents' Expectations	-0.052	0.065	-0.029	-0.793	.428
	Science Achievement	0.004	0.001	0.188	4.860	.000*
Serbia	(Constant)	9.864	1.732		5.696	.000*
R^2 = .032	Early Numeracy Activities	0.052	0.051	0.047	1.022	.307
	Gender (Dummy)	-1.246	1.774	-0.307	-0.702	.483
	Gender * Achievement	0.001	0.002	0.133	0.523	.601
	Gender * Attitudes	0.097	0.051	0.255	1.917	.055
	Gender * Education	-0.011	0.104	-0.010	-0.107	.915
	Gender * Expectations	0.051	0.082	0.062	0.614	.539
	Gender * Numeracy	-0.025	0.064	-0.067	-0.388	.698
	Parents' Attitudes	0.017	0.039	0.017	0.446	.655
	Parents' Education	-0.368	0.093	-0.154	-3.944	.000*
	Parents' Expectations	-0.010	0.061	-0.007	-0.171	.864
	Science Achievement	0.001	0.002	0.044	0.630	.529
Singapore	(Constant)	7.488	0.423		17.703	.000*
R^2 = .031	Early Numeracy Activities	0.017	0.019	0.018	0.942	.346
	Gender (Dummy)	-0.416	0.635	-0.101	-0.655	.513
	Gender * Achievement	-0.001	0.001	-0.133	-1.064	.287
	Gender * Attitudes	-0.008	0.026	-0.021	-0.296	.767
	Gender * Education	0.005	0.067	0.005	0.073	.942
	Gender * Expectations	0.113	0.090	0.142	1.261	.208
	Gender * Numeracy	0.011	0.026	0.028	0.443	.658

	Parents' Attitudes	0.061	0.020	0.056	3.061	.002*
	Parents' Education	-0.066	0.048	-0.033	-1.396	.163
	Parents' Expectations	0.003	0.054	0.001	0.062	.951
	Science Achievement	0.004	0.001	0.149	6.727	.000*
Slovak Republic	(Constant)	8.124	0.723		11.232	.000*
R^2 = .007	Early Numeracy Activities	0.052	0.032	0.046	1.612	.107
	Gender (Dummy)	0.273	0.883	0.067	0.310	.757
	Gender * Achievement	0.000	0.001	-0.033	-0.220	.826
	Gender * Attitudes	0.037	0.047	0.085	0.780	.436
	Gender * Education	-0.027	0.099	-0.026	-0.270	.787
	Gender * Expectations	0.030	0.055	0.038	0.546	.585
	Gender * Numeracy	-0.033	0.040	-0.091	-0.828	.408
	Parents' Attitudes	-0.006	0.028	-0.005	-0.220	.826
	Parents' Education	-0.002	0.090	-0.001	-0.025	.980
	Parents' Expectations	-0.053	0.044	-0.048	-1.219	.223
	Science Achievement	0.002	0.001	0.081	2.185	.029*
Turkey	(Constant)	7.046	0.310		22.734	.000*
R^2 = .116	Early Numeracy Activities	0.008	0.018	0.010	0.414	.679
	Gender (Dummy)	0.681	0.421	0.206	1.618	.106
	Gender * Achievement	0.000	0.001	-0.067	-0.579	.563
	Gender * Attitudes	0.017	0.037	0.056	0.458	.647
	Gender * Education	0.043	0.038	0.040	1.126	.260
	Gender * Expectations	-0.094	0.073	-0.159	-1.285	.199
	Gender * Numeracy	0.007	0.024	0.020	0.279	.780
	Parents' Attitudes	0.044	0.026	0.048	1.726	.084
	Parents' Education	-0.020	0.033	-0.017	-0.607	.544
	Parents' Expectations	0.141	0.047	0.079	3.005	.003*
	Science Achievement	0.006	0.001	0.301	8.673	.000*
United Arab Emirates	(Constant)	6.572	0.336		19.533	.000*
R^2 = .111	Early Numeracy Activities	0.023	0.018	0.023	1.253	.210
	Gender (Dummy)	0.915	0.494	0.230	1.852	.064
	Gender * Achievement	0.000	0.001	-0.039	-0.611	.541
	Gender * Attitudes	-0.033	0.030	-0.088	-1.088	.277
	Gender * Education	-0.054	0.065	-0.062	-0.837	.403
	Gender * Expectations	-0.010	0.079	-0.015	-0.131	.895
	Gender * Numeracy	0.005	0.024	0.015	0.228	.820
	Parents' Attitudes	0.081	0.021	0.077	3.803	.000*
	Parents' Education	-0.001	0.047	-0.001	-0.025	.980
	Parents' Expectations	0.095	0.050	0.046	1.888	.059
	Science Achievement	0.005	0.000	0.300	12.996	.000*
Table Average	(Constant)	7.390	0.113		65.258	
R^2 = .053	Early Numeracy Activities	0.014	0.006	0.014	2.419	
	Gender (Dummy)	0.467	0.149	0.124	3.133	
	Gender * Achievement	-0.001	0.000	-0.136	-4.652	
	Gender * Attitudes	0.005	0.008	0.008	0.583	
	Gender * Education	-0.020	0.017	-0.021	-1.191	
	Gender * Expectations	0.002	0.014	0.002	0.118	
	Gender * Numeracy	0.011	0.008	0.028	1.392	
	Parents' Attitudes	0.037	0.006	0.035	6.608	
	Parents' Education	-0.055	0.012	-0.027	-4.720	
	Parents' Expectations	0.029	0.010	0.014	2.957	
	Science Achievement	0.004	0.000	0.188	27.724	

*p < .05, two-tailed.

Table F3

Regression analysis results with gender interactions for mathematics self-concept

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	6.040	0.435		13.895	.000*
R^2 = .126	Early Numeracy Activities	0.025	0.032	0.024	0.783	.434
	Gender (Dummy)	-0.237	0.732	-0.061	-0.324	.746
	Gender * Achievement	0.000	0.001	0.021	0.203	.839
	Gender * Attitudes	0.092	0.053	0.258	1.745	.081
	Gender * Education	-0.047	0.117	-0.051	-0.400	.689
	Gender * Expectations	-0.069	0.069	-0.096	-1.000	.318
	Gender * Numeracy	-0.009	0.041	-0.023	-0.212	.832
	Mathematics Achievement	0.007	0.001	0.313	12.005	.000*
	Parents' Attitudes	0.009	0.033	0.008	0.275	.783
	Parents' Education	-0.053	0.079	-0.030	-0.677	.499
	Parents' Expectations	0.132	0.053	0.083	2.487	.013*
Belgium (Flemish)	(Constant)	3.391	0.558		6.077	.000*
R^2 = .215	Early Numeracy Activities	0.018	0.024	0.017	0.757	.449
	Gender (Dummy)	-0.758	0.730	-0.202	-1.038	.299
	Gender * Achievement	0.000	0.001	-0.052	-0.291	.771
	Gender * Attitudes	-0.015	0.034	-0.038	-0.446	.656
	Gender * Education	-0.067	0.068	-0.080	-0.982	.326
	Gender * Expectations	0.083	0.058	0.112	1.432	.152
	Gender * Numeracy	0.016	0.033	0.043	0.487	.627
	Mathematics Achievement	0.011	0.001	0.369	11.248	.000*
	Parents' Attitudes	0.060	0.024	0.059	2.476	.013*
	Parents' Education	-0.142	0.050	-0.077	-2.823	.005*
	Parents' Expectations	0.088	0.043	0.065	2.061	.039*
Bulgaria	(Constant)	3.841	0.515		7.460	.000*
R^2 = .199	Early Numeracy Activities	0.077	0.033	0.083	2.297	.022*
	Gender (Dummy)	-0.633	0.575	-0.144	-1.100	.272
	Gender * Achievement	0.001	0.001	0.157	1.125	.261
	Gender * Attitudes	0.000	0.036	0.001	0.013	.990
	Gender * Education	-0.162	0.114	-0.146	-1.423	.155
	Gender * Expectations	0.059	0.100	0.069	0.593	.553
	Gender * Numeracy	0.007	0.050	0.016	0.134	.893
	Mathematics Achievement	0.008	0.001	0.306	10.805	.000*
	Parents' Attitudes	0.078	0.032	0.072	2.451	.014*
	Parents' Education	-0.093	0.078	-0.057	-1.186	.236
	Parents' Expectations	0.233	0.068	0.181	3.434	.001*
Chinese Taipei	(Constant)	1.793	0.392		4.571	.000*
R^2 = .219	Early Numeracy Activities	0.045	0.023	0.052	1.991	.047*
	Gender (Dummy)	0.102	0.591	0.028	0.172	.863
	Gender * Achievement	-0.001	0.001	-0.197	-1.258	.209
	Gender * Attitudes	0.005	0.029	0.013	0.160	.873
	Gender * Education	0.009	0.066	0.010	0.135	.893
	Gender * Expectations	0.066	0.065	0.098	1.012	.312
	Gender * Numeracy	-0.038	0.030	-0.102	-1.253	.210
	Mathematics Achievement	0.012	0.001	0.453	18.711	.000*
	Parents' Attitudes	0.027	0.020	0.031	1.388	.165
	Parents' Education	-0.097	0.051	-0.054	-1.913	.056
	Parents' Expectations	0.004	0.038	0.002	0.108	.914
Croatia	(Constant)	2.935	0.490		5.983	.000*
R^2 = .209	Early Numeracy Activities	0.075	0.026	0.068	2.921	.004*
	Gender (Dummy)	0.363	0.670	0.097	0.542	.588
	Gender * Achievement	-0.001	0.001	-0.068	-0.468	.640
	Gender * Attitudes	-0.021	0.047	-0.047	-0.444	.657
	Gender * Education	0.090	0.101	0.099	0.895	.371
	Gender * Expectations	-0.106	0.089	-0.130	-1.183	.237
	Gender * Numeracy	0.002	0.037	0.005	0.047	.962
	Mathematics Achievement	0.012	0.001	0.432	15.288	.000*
	Parents' Attitudes	0.016	0.030	0.013	0.516	.606
	Parents' Education	-0.163	0.082	-0.065	-1.996	.046*
	Parents' Expectations	0.163	0.060	0.084	2.737	.006*
Cyprus	(Constant)	3.528	0.546		6.456	.000*
R^2 = .205	Early Numeracy Activities	0.064	0.025	0.061	2.582	.010*
	Gender (Dummy)	0.052	0.754	0.012	0.069	.945
	Gender * Achievement	-0.001	0.001	-0.142	-1.315	.188

	Gender * Attitudes	0.025	0.050	0.062	0.514	.608
	Gender * Education	0.009	0.088	0.009	0.100	.920
	Gender * Expectations	0.040	0.079	0.051	0.506	.613
	Gender * Numeracy	-0.036	0.036	-0.090	-0.988	.323
	Mathematics Achievement	0.012	0.001	0.441	18.566	.000*
	Parents' Attitudes	0.017	0.036	0.013	0.456	.648
	Parents' Education	-0.148	0.056	-0.068	-2.659	.008*
	Parents' Expectations	0.106	0.055	0.050	1.926	.054
Czech Republic	(Constant)	3.503	0.527		6.648	.000*
R^2 = .199	Early Numeracy Activities	0.063	0.025	0.057	2.519	.012*
	Gender (Dummy)	-0.610	0.598	-0.171	-1.020	.308
	Gender * Achievement	0.000	0.001	0.025	0.184	.854
	Gender * Attitudes	0.039	0.036	0.104	1.082	.280
	Gender * Education	0.007	0.072	0.007	0.095	.924
	Gender * Expectations	-0.039	0.041	-0.049	-0.953	.341
	Gender * Numeracy	-0.013	0.033	-0.040	-0.399	.690
	Mathematics Achievement	0.010	0.001	0.396	14.566	.000*
	Parents' Attitudes	0.030	0.026	0.030	1.125	.260
	Parents' Education	-0.116	0.065	-0.061	-1.796	.073
	Parents' Expectations	0.086	0.033	0.086	2.567	.010*
Denmark	(Constant)	4.841	0.538		8.998	.000*
R^2 = .202	Early Numeracy Activities	0.046	0.033	0.042	1.401	.161
	Gender (Dummy)	-1.152	0.754	-0.329	-1.529	.126
	Gender * Achievement	0.000	0.001	0.013	0.079	.937
	Gender * Attitudes	-0.004	0.041	-0.013	-0.103	.918
	Gender * Education	0.155	0.098	0.204	1.583	.113
	Gender * Expectations	0.011	0.065	0.017	0.177	.859
	Gender * Numeracy	-0.005	0.045	-0.015	-0.117	.907
	Mathematics Achievement	0.009	0.001	0.382	12.355	.000*
	Parents' Attitudes	0.014	0.028	0.014	0.496	.620
	Parents' Education	-0.153	0.063	-0.067	-2.439	.015*
	Parents' Expectations	0.143	0.046	0.096	3.121	.002*
Finland	(Constant)	2.727	0.473		5.763	.000*
R^2 = .231	Early Numeracy Activities	0.105	0.027	0.090	3.924	.000*
	Gender (Dummy)	0.335	0.773	0.099	0.434	.664
	Gender * Achievement	0.000	0.001	0.003	0.020	.984
	Gender * Attitudes	-0.035	0.033	-0.103	-1.044	.297
	Gender * Education	-0.061	0.087	-0.078	-0.696	.486
	Gender * Expectations	-0.016	0.036	-0.023	-0.442	.658
	Gender * Numeracy	-0.025	0.048	-0.072	-0.517	.605
	Mathematics Achievement	0.011	0.001	0.417	14.153	.000*
	Parents' Attitudes	0.015	0.025	0.017	0.626	.531
	Parents' Education	0.014	0.065	0.007	0.212	.832
	Parents' Expectations	0.092	0.026	0.090	3.490	.000*
France	(Constant)	5.139	0.490		10.489	.000*
R^2 = .208	Early Numeracy Activities	0.006	0.033	0.005	0.174	.862
	Gender (Dummy)	-0.454	0.656	-0.120	-0.692	.489
	Gender * Achievement	-0.001	0.001	-0.112	-0.785	.432
	Gender * Attitudes	-0.026	0.045	-0.068	-0.582	.561
	Gender * Education	-0.005	0.075	-0.005	-0.067	.946
	Gender * Expectations	-0.012	0.075	-0.016	-0.159	.874
	Gender * Numeracy	0.038	0.037	0.107	1.032	.302
	Mathematics Achievement	0.010	0.001	0.407	13.377	.000*
	Parents' Attitudes	0.050	0.032	0.050	1.579	.114
	Parents' Education	-0.174	0.058	-0.092	-3.020	.003*
	Parents' Expectations	0.060	0.050	0.051	1.204	.229
Georgia	(Constant)	5.231	0.506		10.347	.000*
R^2 = .148	Early Numeracy Activities	0.037	0.029	0.037	1.255	.210
	Gender (Dummy)	0.998	0.613	0.279	1.629	.103
	Gender * Achievement	-0.001	0.001	-0.175	-1.373	.170
	Gender * Attitudes	-0.026	0.036	-0.078	-0.719	.472
	Gender * Education	-0.052	0.157	-0.063	-0.330	.742
	Gender * Expectations	-0.037	0.089	-0.054	-0.416	.677
	Gender * Numeracy	0.017	0.046	0.051	0.377	.706
	Mathematics Achievement	0.007	0.001	0.350	10.934	.000*
	Parents' Attitudes	0.055	0.030	0.054	1.825	.068
	Parents' Education	-0.003	0.091	-0.002	-0.036	.971
	Parents' Expectations	0.145	0.055	0.118	2.631	.009*
Hong Kong, SAR	(Constant)	1.911	0.636		3.005	.003*
R^2 = .198	Early Numeracy Activities	0.003	0.031	0.003	0.086	.932

	Gender (Dummy)	0.031	0.667	0.008	0.047	.962
	Gender * Achievement	-0.001	0.001	-0.097	-0.472	.637
	Gender * Attitudes	-0.034	0.036	-0.092	-0.949	.343
	Gender * Education	0.044	0.057	0.047	0.766	.444
	Gender * Expectations	-0.089	0.069	-0.124	-1.279	.201
	Gender * Numeracy	0.045	0.038	0.117	1.170	.242
	Mathematics Achievement	0.012	0.001	0.426	10.619	.000*
	Parents' Attitudes	0.049	0.027	0.051	1.804	.071
	Parents' Education	-0.134	0.044	-0.092	-3.060	.002*
	Parents' Expectations	0.030	0.055	0.015	0.535	.593
Hungary	(Constant)	3.420	0.813		4.206	.000*
R^2 = .271	Early Numeracy Activities	0.055	0.039	0.043	1.416	.157
	Gender (Dummy)	0.059	0.712	0.014	0.083	.934
	Gender * Achievement	-0.001	0.001	-0.131	-1.080	.280
	Gender * Attitudes	0.000	0.040	-0.001	-0.010	.992
	Gender * Education	0.093	0.130	0.088	0.715	.475
	Gender * Expectations	-0.033	0.084	-0.037	-0.395	.693
	Gender * Numeracy	-0.019	0.042	-0.050	-0.441	.659
	Mathematics Achievement	0.013	0.001	0.519	14.940	.000*
	Parents' Attitudes	0.023	0.029	0.020	0.798	.425
	Parents' Education	-0.338	0.090	-0.171	-3.765	.000*
	Parents' Expectations	0.149	0.053	0.109	2.817	.005*
Indonesia	(Constant)	6.558	0.371		17.665	.000*
R^2 = .079	Early Numeracy Activities	0.022	0.023	0.026	0.984	.325
	Gender (Dummy)	0.633	0.556	0.190	1.138	.255
	Gender * Achievement	-0.002	0.001	-0.196	-1.948	.052
	Gender * Attitudes	0.016	0.040	0.055	0.395	.693
	Gender * Education	-0.005	0.061	-0.005	-0.085	.932
	Gender * Expectations	-0.028	0.044	-0.041	-0.638	.523
	Gender * Numeracy	0.007	0.038	0.020	0.188	.851
	Mathematics Achievement	0.005	0.001	0.291	8.368	.000*
	Parents' Attitudes	0.052	0.027	0.051	1.924	.054
	Parents' Education	0.008	0.035	0.006	0.221	.825
	Parents' Expectations	0.035	0.030	0.032	1.163	.245
Iran, Islamic Republic of	(Constant)	6.214	0.509		12.213	.000*
R^2 = .095	Early Numeracy Activities	0.000	0.048	0.000	-0.001	.999
	Gender (Dummy)	0.952	0.969	0.249	0.983	.326
	Gender * Achievement	-0.001	0.001	-0.080	-0.549	.583
	Gender * Attitudes	-0.105	0.068	-0.306	-1.535	.125
	Gender * Education	0.078	0.104	0.069	0.749	.454
	Gender * Expectations	-0.029	0.121	-0.043	-0.240	.810
	Gender * Numeracy	0.049	0.067	0.128	0.729	.466
	Mathematics Achievement	0.006	0.001	0.302	6.873	.000*
	Parents' Attitudes	0.141	0.041	0.124	3.428	.001*
	Parents' Education	-0.102	0.059	-0.073	-1.739	.082
	Parents' Expectations	0.041	0.081	0.026	0.504	.614
Ireland	(Constant)	3.936	0.504		7.807	.000*
R^2 = .189	Early Numeracy Activities	0.029	0.026	0.030	1.077	.282
	Gender (Dummy)	-0.300	0.806	-0.080	-0.372	.710
	Gender * Achievement	0.001	0.001	0.108	0.729	.466
	Gender * Attitudes	-0.012	0.048	-0.034	-0.249	.804
	Gender * Education	0.067	0.088	0.077	0.759	.448
	Gender * Expectations	-0.055	0.081	-0.076	-0.675	.500
	Gender * Numeracy	-0.023	0.042	-0.070	-0.552	.581
	Mathematics Achievement	0.011	0.001	0.413	13.617	.000*
	Parents' Attitudes	0.033	0.034	0.031	0.972	.331
	Parents' Education	-0.069	0.048	-0.037	-1.443	.149
	Parents' Expectations	0.014	0.054	0.008	0.254	.800
Italy	(Constant)	4.988	0.496		10.067	.000*
R^2 = .136	Early Numeracy Activities	0.077	0.030	0.073	2.591	.010*
	Gender (Dummy)	-0.370	0.597	-0.099	-0.620	.535
	Gender * Achievement	0.000	0.001	0.064	0.406	.684
	Gender * Attitudes	0.041	0.044	0.107	0.938	.348
	Gender * Education	0.000	0.094	0.000	0.000	1.000
	Gender * Expectations	-0.101	0.073	-0.124	-1.384	.166
	Gender * Numeracy	-0.021	0.040	-0.061	-0.530	.596
	Mathematics Achievement	0.007	0.001	0.268	9.586	.000*
	Parents' Attitudes	0.041	0.032	0.039	1.294	.196
	Parents' Education	-0.123	0.047	-0.068	-2.596	.009*
	Parents' Expectations	0.220	0.042	0.166	5.256	.000*

Japan	(Constant)	2.735	0.376		7.284	.000*
R^2 = .221	Early Numeracy Activities	0.050	0.019	0.060	2.627	.009*
	Gender (Dummy)	-0.280	0.460	-0.091	-0.609	.542
	Gender * Achievement	0.000	0.001	-0.009	-0.059	.953
	Gender * Attitudes	0.022	0.028	0.056	0.785	.432
	Gender * Education	0.087	0.067	0.122	1.307	.191
	Gender * Expectations	-0.095	0.049	-0.140	-1.946	.052
	Gender * Numeracy	-0.013	0.024	-0.042	-0.552	.581
	Mathematics Achievement	0.009	0.001	0.418	17.320	.000*
	Parents' Attitudes	0.013	0.022	0.015	0.612	.540
	Parents' Education	-0.064	0.046	-0.036	-1.385	.166
	Parents' Expectations	0.135	0.035	0.097	3.851	.000*
Kazakhstan	(Constant)	5.461	0.647		8.434	.000*
R^2 = .068	Early Numeracy Activities	0.035	0.033	0.032	1.046	.296
	Gender (Dummy)	0.843	0.757	0.213	1.114	.266
	Gender * Achievement	-0.001	0.001	-0.085	-0.689	.491
	Gender * Attitudes	-0.022	0.052	-0.065	-0.430	.668
	Gender * Education	-0.175	0.082	-0.191	-2.132	.033*
	Gender * Expectations	0.117	0.074	0.157	1.578	.115
	Gender * Numeracy	0.002	0.044	0.006	0.046	.963
	Mathematics Achievement	0.006	0.001	0.233	8.902	.000*
	Parents' Attitudes	0.100	0.037	0.078	2.712	.007*
	Parents' Education	0.029	0.065	0.014	0.455	.649
	Parents' Expectations	0.068	0.051	0.039	1.342	.180
Korea, Republic of	(Constant)	1.226	0.358		3.427	.001*
R^2 = .305	Early Numeracy Activities	0.041	0.016	0.056	2.495	.013*
	Gender (Dummy)	0.057	0.618	0.019	0.093	.926
	Gender * Achievement	0.000	0.001	-0.074	-0.425	.671
	Gender * Attitudes	-0.031	0.021	-0.095	-1.497	.135
	Gender * Education	0.079	0.061	0.117	1.279	.201
	Gender * Expectations	-0.015	0.085	-0.027	-0.178	.859
	Gender * Numeracy	-0.001	0.021	-0.002	-0.024	.981
	Mathematics Achievement	0.012	0.001	0.527	21.728	.000*
	Parents' Attitudes	0.019	0.015	0.024	1.246	.213
	Parents' Education	-0.097	0.046	-0.057	-2.125	.034*
	Parents' Expectations	0.129	0.053	0.060	2.424	.015*
Lithuania	(Constant)	2.691	0.587		4.587	.000*
R^2 = .240	Early Numeracy Activities	0.056	0.028	0.052	1.977	.048*
	Gender (Dummy)	0.567	0.758	0.164	0.748	.455
	Gender * Achievement	0.000	0.001	0.014	0.088	.930
	Gender * Attitudes	-0.056	0.045	-0.171	-1.256	.209
	Gender * Education	-0.089	0.111	-0.114	-0.803	.422
	Gender * Expectations	-0.045	0.059	-0.067	-0.764	.445
	Gender * Numeracy	0.018	0.042	0.057	0.439	.661
	Mathematics Achievement	0.011	0.001	0.454	12.885	.000*
	Parents' Attitudes	0.076	0.032	0.073	2.399	.016*
	Parents' Education	-0.068	0.063	-0.033	-1.068	.285
	Parents' Expectations	0.092	0.044	0.064	2.088	.037*
Morocco	(Constant)	6.857	0.552		12.433	.000*
R^2 = .116	Early Numeracy Activities	0.024	0.025	0.033	0.959	.338
	Gender (Dummy)	0.552	0.510	0.151	1.082	.279
	Gender * Achievement	0.000	0.001	0.036	0.369	.712
	Gender * Attitudes	-0.073	0.048	-0.218	-1.509	.131
	Gender * Education	-0.089	0.076	-0.064	-1.177	.239
	Gender * Expectations	0.071	0.062	0.098	1.153	.249
	Gender * Numeracy	0.004	0.037	0.010	0.117	.907
	Mathematics Achievement	0.004	0.001	0.216	5.057	.000*
	Parents' Attitudes	0.051	0.036	0.056	1.416	.157
	Parents' Education	0.163	0.057	0.117	2.856	.004*
	Parents' Expectations	0.100	0.042	0.100	2.387	.017*
Oman	(Constant)	6.658	0.373		17.834	.000*
R^2 = .109	Early Numeracy Activities	0.067	0.023	0.067	2.955	.003*
	Gender (Dummy)	0.524	0.568	0.145	0.923	.356
	Gender * Achievement	0.001	0.001	0.066	0.870	.384
	Gender * Attitudes	-0.001	0.049	-0.004	-0.028	.978
	Gender * Education	0.007	0.043	0.008	0.174	.862
	Gender * Expectations	-0.011	0.045	-0.017	-0.252	.801
	Gender * Numeracy	-0.048	0.038	-0.133	-1.268	.205
	Mathematics Achievement	0.005	0.000	0.282	13.361	.000*
	Parents' Attitudes	0.040	0.029	0.037	1.406	.160

	Parents' Education	-0.014	0.031	-0.012	-0.453	.651
	Parents' Expectations	0.035	0.027	0.027	1.314	.189
Poland	(Constant)	1.875	0.441		4.256	.000*
R^2 = .242	Early Numeracy Activities	0.067	0.026	0.061	2.569	.010*
	Gender (Dummy)	0.361	0.577	0.096	0.626	.531
	Gender * Achievement	0.000	0.001	0.027	0.184	.854
	Gender * Attitudes	-0.059	0.044	-0.165	-1.354	.176
	Gender * Education	-0.058	0.063	-0.063	-0.922	.357
	Gender * Expectations	-0.014	0.057	-0.020	-0.247	.805
	Gender * Numeracy	0.009	0.038	0.028	0.251	.802
	Mathematics Achievement	0.013	0.001	0.479	17.935	.000*
	Parents' Attitudes	0.064	0.028	0.062	2.253	.024*
	Parents' Education	-0.098	0.048	-0.064	-2.038	.042*
	Parents' Expectations	0.035	0.036	0.029	0.987	.324
Portugal	(Constant)	1.564	0.546		2.862	.004*
R^2 = .272	Early Numeracy Activities	0.093	0.028	0.086	3.285	.001*
	Gender (Dummy)	0.611	0.646	0.159	0.946	.344
	Gender * Achievement	-0.002	0.001	-0.315	-2.578	.010*
	Gender * Attitudes	0.019	0.036	0.054	0.522	.601
	Gender * Education	-0.033	0.041	-0.033	-0.801	.423
	Gender * Expectations	0.012	0.044	0.017	0.280	.779
	Gender * Numeracy	-0.011	0.041	-0.030	-0.269	.788
	Mathematics Achievement	0.014	0.001	0.510	17.963	.000*
	Parents' Attitudes	-0.007	0.027	-0.006	-0.267	.790
	Parents' Education	-0.020	0.034	-0.014	-0.590	.555
	Parents' Expectations	0.011	0.032	0.008	0.354	.724
Russian Federation	(Constant)	3.286	0.562		5.843	.000*
R^2 = .178	Early Numeracy Activities	0.035	0.025	0.034	1.412	.158
	Gender (Dummy)	-0.918	0.660	-0.240	-1.391	.164
	Gender * Achievement	0.000	0.001	-0.062	-0.401	.688
	Gender * Attitudes	0.092	0.037	0.250	2.463	.014*
	Gender * Education	-0.041	0.124	-0.049	-0.332	.740
	Gender * Expectations	0.015	0.060	0.021	0.259	.796
	Gender * Numeracy	-0.008	0.029	-0.025	-0.284	.776
	Mathematics Achievement	0.010	0.001	0.365	13.971	.000*
	Parents' Attitudes	0.021	0.028	0.020	0.741	.459
	Parents' Education	-0.012	0.066	-0.005	-0.182	.855
	Parents' Expectations	0.129	0.037	0.095	3.464	.001*
Saudi Arabia	(Constant)	6.900	0.489		14.122	.000*
R^2 = .107	Early Numeracy Activities	-0.038	0.031	-0.039	-1.251	.211
	Gender (Dummy)	0.916	0.784	0.233	1.169	.242
	Gender * Achievement	0.000	0.001	-0.043	-0.323	.747
	Gender * Attitudes	-0.051	0.067	-0.139	-0.769	.442
	Gender * Education	-0.096	0.076	-0.104	-1.253	.210
	Gender * Expectations	0.028	0.085	0.039	0.333	.739
	Gender * Numeracy	0.067	0.055	0.180	1.215	.225
	Mathematics Achievement	0.005	0.001	0.219	5.757	.000*
	Parents' Attitudes	0.058	0.038	0.059	1.525	.127
	Parents' Education	0.144	0.047	0.105	3.071	.002*
	Parents' Expectations	0.048	0.049	0.029	0.978	.328
Serbia	(Constant)	5.219	1.819		2.870	.004*
R^2 = .210	Early Numeracy Activities	-0.015	0.051	-0.013	-0.304	.761
	Gender (Dummy)	-3.540	2.020	-0.801	-1.753	.080
	Gender * Achievement	0.003	0.002	0.410	1.860	.063
	Gender * Attitudes	0.074	0.074	0.178	0.998	.318
	Gender * Education	0.175	0.127	0.140	1.380	.168
	Gender * Expectations	-0.176	0.082	-0.197	-2.152	.031*
	Gender * Numeracy	0.102	0.067	0.256	1.533	.125
	Mathematics Achievement	0.010	0.002	0.365	5.693	.000*
	Parents' Attitudes	0.048	0.052	0.044	0.939	.348
	Parents' Education	-0.225	0.103	-0.087	-2.186	.029*
	Parents' Expectations	0.178	0.059	0.107	3.027	.002*
Singapore	(Constant)	2.018	0.343		5.881	.000*
R^2 = .256	Early Numeracy Activities	-0.008	0.014	-0.009	-0.562	.574
	Gender (Dummy)	0.544	0.445	0.151	1.222	.222
	Gender * Achievement	-0.001	0.000	-0.180	-2.103	.036
	Gender * Attitudes	0.009	0.024	0.029	0.400	.689
	Gender * Education	-0.111	0.054	-0.135	-2.036	.042*
	Gender * Expectations	-0.076	0.057	-0.110	-1.343	.179
	Gender * Numeracy	0.023	0.019	0.066	1.216	.224

	Mathematics Achievement	0.010	0.000	0.470	23.296	.000*
	Parents' Attitudes	0.019	0.017	0.020	1.111	.267
	Parents' Education	0.072	0.036	0.041	2.000	.046*
	Parents' Expectations	0.164	0.040	0.073	4.094	.000*
Slovak Republic	(Constant)	3.904	0.628		6.218	.000*
R^2 = .173	Early Numeracy Activities	0.087	0.035	0.080	2.452	.014*
	Gender (Dummy)	1.152	0.749	0.296	1.538	.124
	Gender * Achievement	-0.001	0.001	-0.117	-0.787	.431
	Gender * Attitudes	0.020	0.043	0.048	0.462	.644
	Gender * Education	0.018	0.071	0.019	0.260	.795
	Gender * Expectations	-0.093	0.044	-0.122	-2.084	.037*
	Gender * Numeracy	-0.080	0.033	-0.230	-2.411	.016*
	Mathematics Achievement	0.010	0.001	0.398	14.265	.000*
	Parents' Attitudes	0.024	0.024	0.022	0.985	.324
	Parents' Education	-0.125	0.061	-0.065	-2.062	.039*
	Parents' Expectations	0.110	0.028	0.104	3.907	.000*
Turkey	(Constant)	4.789	0.379		12.623	.000*
R^2 = .231	Early Numeracy Activities	0.013	0.021	0.014	0.639	.523
	Gender (Dummy)	-0.307	0.504	-0.074	-0.609	.543
	Gender * Achievement	0.000	0.001	0.045	0.386	.700
	Gender * Attitudes	0.029	0.034	0.076	0.840	.401
	Gender * Education	-0.111	0.052	-0.082	-2.148	.032*
	Gender * Expectations	0.003	0.078	0.005	0.045	.964
	Gender * Numeracy	0.004	0.029	0.010	0.156	.876
	Mathematics Achievement	0.011	0.001	0.477	15.857	.000*
	Parents' Attitudes	0.031	0.023	0.027	1.376	.169
	Parents' Education	0.000	0.039	0.000	0.000	1.000
	Parents' Expectations	0.001	0.048	0.000	0.019	.984
United Arab Emirates	(Constant)	6.177	0.206		29.999	.000*
R^2 = .113	Early Numeracy Activities	0.058	0.016	0.064	3.708	.000*
	Gender (Dummy)	0.690	0.344	0.189	2.009	.045*
	Gender * Achievement	-0.001	0.000	-0.087	-1.397	.163
	Gender * Attitudes	0.004	0.028	0.012	0.139	.889
	Gender * Education	-0.071	0.056	-0.088	-1.274	.203
	Gender * Expectations	-0.012	0.058	-0.019	-0.212	.832
	Gender * Numeracy	-0.004	0.017	-0.012	-0.252	.801
	Mathematics Achievement	0.006	0.000	0.328	19.453	.000*
	Parents' Attitudes	0.033	0.017	0.035	1.977	.048*
	Parents' Education	-0.049	0.034	-0.030	-1.451	.147
	Parents' Expectations	0.098	0.029	0.051	3.321	.001*
Table Average	(Constant)	4.105	0.105		39.186	
R^2 = .187	Early Numeracy Activities	0.041	0.005	0.040	7.953	
	Gender (Dummy)	0.024	0.131	0.012	0.187	
	Gender * Achievement	0.000	0.000	-0.039	-1.394	
	Gender * Attitudes	-0.003	0.008	-0.010	-0.346	
	Gender * Education	-0.011	0.016	-0.010	-0.711	
	Gender * Expectations	-0.020	0.012	-0.027	-1.613	
	Gender * Numeracy	0.002	0.007	0.003	0.257	
	Mathematics Achievement	0.009	0.000	0.382	67.959	
	Parents' Attitudes	0.041	0.005	0.039	7.668	
	Parents' Education	-0.070	0.011	-0.035	-6.627	
	Parents' Expectations	0.096	0.008	0.067	11.540	

*p < .05, two-tailed.

Table F4

Regression analysis results with gender interactions for science self-concept

Country	Model	*b*	*SE b*	*β*	*t*	Sig.
Bahrain	(Constant)	5.853	0.364		16.079	.000*
R^2 = .156	Early Numeracy Activities	0.075	0.041	0.072	1.835	.067
	Gender (Dummy)	0.969	0.694	0.248	1.396	.163
	Gender * Achievement	0.003	0.001	0.343	2.874	.004*
	Gender * Attitudes	-0.012	0.045	-0.034	-0.269	.788
	Gender * Education	-0.068	0.112	-0.074	-0.609	.543
	Gender * Expectations	-0.188	0.093	-0.263	-2.018	.044*
	Gender * Numeracy	-0.056	0.055	-0.152	-1.019	.308
	Parents' Attitudes	0.030	0.031	0.027	0.980	.327
	Parents' Education	-0.062	0.077	-0.035	-0.806	.420
	Parents' Expectations	0.191	0.067	0.121	2.858	.004*
	Science Achievement	0.005	0.001	0.279	7.792	.000*
Belgium (Flemish)	(Constant)	6.101	0.488		12.492	.000*
R^2 = .064	Early Numeracy Activities	-0.039	0.027	-0.038	-1.468	.142
	Gender (Dummy)	0.741	0.749	0.208	0.988	.323
	Gender * Achievement	-0.003	0.001	-0.402	-2.353	.019*
	Gender * Attitudes	-0.033	0.039	-0.087	-0.862	.389
	Gender * Education	0.035	0.081	0.044	0.433	.665
	Gender * Expectations	0.056	0.053	0.079	1.057	.291
	Gender * Numeracy	0.046	0.037	0.130	1.259	.208
	Parents' Attitudes	0.011	0.027	0.011	0.403	.687
	Parents' Education	-0.055	0.056	-0.031	-0.977	.329
	Parents' Expectations	0.028	0.037	0.022	0.764	.445
	Science Achievement	0.008	0.001	0.281	9.472	.000*
Bulgaria	(Constant)	5.203	0.399		13.050	.000*
R^2 = .197	Early Numeracy Activities	0.048	0.031	0.057	1.554	.120
	Gender (Dummy)	0.738	0.528	0.185	1.398	.162
	Gender * Achievement	-0.002	0.001	-0.338	-2.450	.014*
	Gender * Attitudes	0.004	0.036	0.010	0.110	.912
	Gender * Education	0.030	0.092	0.029	0.322	.748
	Gender * Expectations	0.139	0.076	0.178	1.827	.068
	Gender * Numeracy	-0.012	0.050	-0.032	-0.242	.809
	Parents' Attitudes	0.026	0.021	0.026	1.188	.235
	Parents' Education	-0.045	0.070	-0.030	-0.637	.524
	Parents' Expectations	0.122	0.062	0.104	1.954	.051
	Science Achievement	0.008	0.001	0.376	13.445	.000*
Chinese Taipei	(Constant)	4.946	0.456		10.846	.000*
R^2 = .105	Early Numeracy Activities	0.046	0.022	0.056	2.126	.034*
	Gender (Dummy)	0.178	0.690	0.052	0.258	.796
	Gender * Achievement	-0.001	0.001	-0.177	-1.012	.312
	Gender * Attitudes	-0.009	0.029	-0.026	-0.313	.754
	Gender * Education	-0.002	0.068	-0.002	-0.029	.977
	Gender * Expectations	0.032	0.080	0.050	0.401	.688
	Gender * Numeracy	0.003	0.032	0.007	0.081	.935
	Parents' Attitudes	0.029	0.020	0.035	1.497	.135
	Parents' Education	-0.037	0.053	-0.021	-0.691	.489
	Parents' Expectations	0.031	0.052	0.016	0.601	.548
	Science Achievement	0.008	0.001	0.301	10.185	.000*
Croatia	(Constant)	4.763	0.647		7.358	.000*
R^2 = .078	Early Numeracy Activities	0.087	0.034	0.080	2.546	.011*
	Gender (Dummy)	1.318	0.875	0.355	1.507	.132
	Gender * Achievement	-0.001	0.001	-0.123	-0.571	.568
	Gender * Attitudes	-0.006	0.051	-0.014	-0.127	.899
	Gender * Education	0.042	0.123	0.047	0.344	.731
	Gender * Expectations	-0.175	0.087	-0.216	-2.010	.044*
	Gender * Numeracy	-0.020	0.045	-0.060	-0.446	.656
	Parents' Attitudes	0.011	0.030	0.009	0.369	.712
	Parents' Education	0.079	0.084	0.032	0.942	.346
	Parents' Expectations	0.243	0.057	0.125	4.270	.000*
	Science Achievement	0.006	0.001	0.201	6.340	.000*
Cyprus	(Constant)	6.686	0.571		11.705	.000*
R^2 = .044	Early Numeracy Activities	0.006	0.030	0.005	0.189	.850
	Gender (Dummy)	-0.176	0.787	-0.041	-0.224	.823
	Gender * Achievement	-0.001	0.001	-0.098	-0.833	.405

	Gender * Attitudes	0.008	0.048	0.020	0.166	.868
	Gender * Education	-0.040	0.102	-0.040	-0.389	.697
	Gender * Expectations	-0.005	0.089	-0.006	-0.051	.959
	Gender * Numeracy	0.058	0.042	0.144	1.380	.168
	Parents' Attitudes	0.001	0.031	0.000	0.018	.985
	Parents' Education	-0.035	0.071	-0.016	-0.486	.627
	Parents' Expectations	0.007	0.060	0.003	0.117	.907
	Science Achievement	0.006	0.001	0.217	8.429	.000*
Czech Republic	(Constant)	6.323	0.707		8.939	.000*
R^2 = .042	Early Numeracy Activities	0.017	0.035	0.015	0.479	.632
	Gender (Dummy)	0.358	0.908	0.098	0.394	.693
	Gender * Achievement	-0.001	0.001	-0.107	-0.570	.569
	Gender * Attitudes	0.046	0.033	0.121	1.424	.155
	Gender * Education	0.009	0.092	0.010	0.098	.922
	Gender * Expectations	-0.012	0.044	-0.015	-0.271	.787
	Gender * Numeracy	-0.017	0.046	-0.053	-0.379	.704
	Parents' Attitudes	0.000	0.023	0.000	0.004	.997
	Parents' Education	-0.009	0.067	-0.005	-0.141	.888
	Parents' Expectations	0.005	0.036	0.005	0.145	.885
	Science Achievement	0.006	0.001	0.211	6.365	.000*
Denmark	(Constant)	7.903	0.621		12.733	.000*
R^2 = .047	Early Numeracy Activities	-0.049	0.036	-0.045	-1.386	.166
	Gender (Dummy)	-0.890	0.786	-0.253	-1.132	.258
	Gender * Achievement	-0.001	0.001	-0.090	-0.507	.612
	Gender * Attitudes	-0.015	0.040	-0.046	-0.383	.702
	Gender * Education	0.002	0.109	0.002	0.015	.988
	Gender * Expectations	-0.042	0.082	-0.061	-0.512	.609
	Gender * Numeracy	0.118	0.042	0.338	2.813	.005*
	Parents' Attitudes	-0.002	0.032	-0.002	-0.065	.948
	Parents' Education	-0.051	0.068	-0.022	-0.746	.456
	Parents' Expectations	0.105	0.054	0.070	1.932	.053
	Science Achievement	0.004	0.001	0.167	4.519	.000*
Finland	(Constant)	5.687	0.479		11.884	.000*
R^2 = .067	Early Numeracy Activities	0.021	0.026	0.021	0.833	.405
	Gender (Dummy)	0.822	0.610	0.274	1.347	.178
	Gender * Achievement	0.000	0.001	0.006	0.029	.977
	Gender * Attitudes	-0.029	0.034	-0.097	-0.844	.399
	Gender * Education	-0.187	0.073	-0.273	-2.581	.010*
	Gender * Expectations	0.029	0.039	0.048	0.760	.447
	Gender * Numeracy	0.006	0.033	0.019	0.175	.861
	Parents' Attitudes	0.044	0.023	0.056	1.893	.058
	Parents' Education	0.058	0.047	0.035	1.239	.215
	Parents' Expectations	-0.017	0.026	-0.018	-0.643	.520
	Science Achievement	0.006	0.001	0.246	7.844	.000*
France	(Constant)	6.001	0.418		14.349	.000*
R^2 = .072	Early Numeracy Activities	0.032	0.025	0.030	1.259	.208
	Gender (Dummy)	0.041	0.682	0.011	0.060	.952
	Gender * Achievement	-0.001	0.001	-0.107	-0.565	.572
	Gender * Attitudes	0.006	0.044	0.016	0.139	.889
	Gender * Education	-0.020	0.089	-0.022	-0.223	.824
	Gender * Expectations	-0.034	0.062	-0.045	-0.546	.585
	Gender * Numeracy	0.012	0.033	0.035	0.365	.715
	Parents' Attitudes	0.021	0.032	0.021	0.666	.505
	Parents' Education	-0.049	0.065	-0.027	-0.766	.444
	Parents' Expectations	0.078	0.047	0.069	1.655	.098
	Science Achievement	0.006	0.001	0.234	7.199	.000*
Georgia	(Constant)	6.395	0.516		12.391	.000*
R^2 = .097	Early Numeracy Activities	0.018	0.030	0.018	0.604	.546
	Gender (Dummy)	0.755	0.710	0.211	1.064	.287
	Gender * Achievement	-0.001	0.001	-0.068	-0.483	.629
	Gender * Attitudes	-0.010	0.040	-0.030	-0.252	.801
	Gender * Education	-0.077	0.143	-0.093	-0.538	.591
	Gender * Expectations	-0.044	0.079	-0.064	-0.561	.575
	Gender * Numeracy	0.016	0.049	0.048	0.335	.738
	Parents' Attitudes	0.015	0.029	0.015	0.527	.598
	Parents' Education	0.039	0.088	0.019	0.441	.660
	Parents' Expectations	0.176	0.059	0.143	2.976	.003*
	Science Achievement	0.005	0.001	0.241	7.055	.000*
Hong Kong, SAR	(Constant)	4.481	0.467		9.596	.000*
R^2 = .099	Early Numeracy Activities	0.074	0.024	0.079	3.131	.002*

	Gender (Dummy)	-0.209	0.571	-0.061	-0.365	.715
	Gender * Achievement	0.000	0.001	-0.073	-0.412	.681
	Gender * Attitudes	0.084	0.038	0.241	2.227	.026*
	Gender * Education	-0.012	0.057	-0.014	-0.210	.833
	Gender * Expectations	-0.057	0.068	-0.086	-0.830	.406
	Gender * Numeracy	-0.012	0.035	-0.033	-0.337	.736
	Parents' Attitudes	0.008	0.024	0.009	0.324	.746
	Parents' Education	0.001	0.045	0.001	0.017	.986
	Parents' Expectations	0.068	0.048	0.036	1.422	.155
	Science Achievement	0.007	0.001	0.272	7.326	.000*
Hungary	(Constant)	5.840	0.665		8.776	.000*
R^2 = .120	Early Numeracy Activities	0.029	0.027	0.024	1.057	.291
	Gender (Dummy)	-0.597	0.723	-0.150	-0.827	.408
	Gender * Achievement	-0.001	0.001	-0.090	-0.558	.577
	Gender * Attitudes	-0.015	0.038	-0.036	-0.383	.701
	Gender * Education	0.117	0.096	0.116	1.213	.225
	Gender * Expectations	0.022	0.069	0.025	0.320	.749
	Gender * Numeracy	0.051	0.035	0.143	1.434	.152
	Parents' Attitudes	0.008	0.031	0.007	0.267	.790
	Parents' Education	-0.094	0.070	-0.050	-1.353	.176
	Parents' Expectations	0.164	0.048	0.126	3.391	.001*
	Science Achievement	0.007	0.001	0.265	6.707	.000*
Indonesia	(Constant)	6.752	0.486		13.897	.000*
R^2 = .099	Early Numeracy Activities	0.033	0.034	0.035	0.968	.333
	Gender (Dummy)	0.012	0.710	0.003	0.017	.986
	Gender * Achievement	0.000	0.001	-0.037	-0.355	.723
	Gender * Attitudes	0.029	0.050	0.094	0.574	.566
	Gender * Education	0.142	0.071	0.118	2.004	.045*
	Gender * Expectations	0.028	0.052	0.039	0.548	.584
	Gender * Numeracy	-0.039	0.045	-0.103	-0.868	.385
	Parents' Attitudes	0.070	0.031	0.063	2.222	.026*
	Parents' Education	-0.032	0.044	-0.024	-0.738	.461
	Parents' Expectations	-0.025	0.045	-0.022	-0.561	.575
	Science Achievement	0.005	0.001	0.279	8.550	.000*
Iran, Islamic Republic of	(Constant)	6.868	0.584		11.769	.000*
R^2 = .137	Early Numeracy Activities	0.032	0.045	0.032	0.708	.479
	Gender (Dummy)	0.447	0.964	0.111	0.464	.643
	Gender * Achievement	-0.001	0.001	-0.165	-1.047	.295
	Gender * Attitudes	0.010	0.066	0.029	0.157	.875
	Gender * Education	0.109	0.103	0.092	1.053	.292
	Gender * Expectations	0.013	0.113	0.019	0.119	.905
	Gender * Numeracy	0.005	0.067	0.013	0.078	.938
	Parents' Attitudes	0.006	0.044	0.005	0.126	.899
	Parents' Education	-0.047	0.070	-0.032	-0.674	.500
	Parents' Expectations	0.077	0.076	0.047	1.017	.309
	Science Achievement	0.007	0.001	0.350	8.474	.000*
Ireland	(Constant)	5.447	0.520		10.472	.000*
R^2 = .065	Early Numeracy Activities	0.013	0.024	0.015	0.544	.587
	Gender (Dummy)	2.298	0.836	0.675	2.750	.006*
	Gender * Achievement	-0.001	0.001	-0.215	-1.377	.168
	Gender * Attitudes	-0.072	0.053	-0.226	-1.357	.175
	Gender * Education	0.146	0.080	0.184	1.826	.068
	Gender * Expectations	-0.173	0.073	-0.265	-2.383	.017*
	Gender * Numeracy	-0.051	0.036	-0.169	-1.407	.159
	Parents' Attitudes	0.062	0.035	0.065	1.740	.082
	Parents' Education	-0.090	0.062	-0.053	-1.439	.150
	Parents' Expectations	0.107	0.052	0.064	2.073	.038*
	Science Achievement	0.006	0.001	0.258	8.103	.000*
Italy	(Constant)	6.278	0.525		11.969	.000*
R^2 = .056	Early Numeracy Activities	0.031	0.026	0.032	1.160	.246
	Gender (Dummy)	0.161	0.712	0.047	0.226	.821
	Gender * Achievement	0.000	0.001	0.072	0.432	.665
	Gender * Attitudes	-0.016	0.037	-0.044	-0.416	.677
	Gender * Education	-0.100	0.078	-0.104	-1.287	.198
	Gender * Expectations	0.003	0.069	0.004	0.040	.968
	Gender * Numeracy	0.014	0.039	0.044	0.362	.717
	Parents' Attitudes	0.051	0.029	0.053	1.786	.074
	Parents' Education	0.023	0.054	0.014	0.420	.675
	Parents' Expectations	0.126	0.040	0.105	3.168	.002*
	Science Achievement	0.004	0.001	0.163	4.743	.000*

Japan	(Constant)	6.705	0.319		21.016	.000*
R^2 = .054	Early Numeracy Activities	0.017	0.016	0.023	1.020	.308
	Gender (Dummy)	-0.443	0.428	-0.164	-1.035	.301
	Gender * Achievement	0.000	0.001	0.005	0.031	.975
	Gender * Attitudes	0.030	0.029	0.088	1.048	.295
	Gender * Education	0.119	0.059	0.190	2.018	.044*
	Gender * Expectations	-0.087	0.050	-0.147	-1.757	.079
	Gender * Numeracy	-0.004	0.026	-0.013	-0.136	.892
	Parents' Attitudes	0.001	0.019	0.001	0.058	.954
	Parents' Education	-0.056	0.042	-0.036	-1.321	.186
	Parents' Expectations	0.101	0.032	0.083	3.144	.002*
	Science Achievement	0.004	0.001	0.192	7.211	.000*
Kazakhstan	(Constant)	6.537	0.633		10.326	.000*
R^2 = .064	Early Numeracy Activities	0.049	0.031	0.048	1.577	.115
	Gender (Dummy)	0.640	1.009	0.171	0.634	.526
	Gender * Achievement	-0.001	0.001	-0.160	-1.136	.256
	Gender * Attitudes	0.017	0.055	0.052	0.307	.759
	Gender * Education	-0.020	0.089	-0.023	-0.222	.825
	Gender * Expectations	0.015	0.083	0.021	0.181	.856
	Gender * Numeracy	0.011	0.041	0.034	0.271	.787
	Parents' Attitudes	0.018	0.032	0.014	0.550	.583
	Parents' Education	-0.034	0.065	-0.017	-0.531	.596
	Parents' Expectations	0.090	0.043	0.054	2.109	.035*
	Science Achievement	0.005	0.001	0.224	7.799	.000*
Korea, Republic of	(Constant)	3.238	0.366		8.855	.000*
R^2 = .143	Early Numeracy Activities	0.058	0.016	0.083	3.619	.000*
	Gender (Dummy)	0.860	0.519	0.303	1.657	.097
	Gender * Achievement	-0.001	0.001	-0.222	-1.280	.201
	Gender * Attitudes	-0.001	0.024	-0.003	-0.042	.966
	Gender * Education	0.173	0.060	0.268	2.876	.004*
	Gender * Expectations	-0.145	0.062	-0.272	-2.336	.020*
	Gender * Numeracy	-0.034	0.021	-0.128	-1.612	.107
	Parents' Attitudes	0.024	0.019	0.033	1.275	.202
	Parents' Education	-0.133	0.045	-0.081	-2.953	.003*
	Parents' Expectations	0.198	0.044	0.096	4.498	.000*
	Science Achievement	0.008	0.001	0.348	13.608	.000*
Lithuania	(Constant)	4.685	0.542		8.638	.000*
R^2 = .118	Early Numeracy Activities	0.058	0.030	0.055	1.956	.051
	Gender (Dummy)	0.174	0.803	0.050	0.217	.829
	Gender * Achievement	0.000	0.001	-0.032	-0.198	.843
	Gender * Attitudes	-0.025	0.042	-0.077	-0.600	.548
	Gender * Education	-0.124	0.101	-0.158	-1.220	.222
	Gender * Expectations	0.043	0.069	0.063	0.620	.535
	Gender * Numeracy	0.068	0.043	0.209	1.585	.113
	Parents' Attitudes	0.028	0.033	0.027	0.853	.394
	Parents' Education	0.037	0.061	0.018	0.606	.544
	Parents' Expectations	0.037	0.050	0.026	0.739	.460
	Science Achievement	0.008	0.001	0.305	9.159	.000*
Morocco	(Constant)	6.790	0.336		20.197	.000*
R^2 = .157	Early Numeracy Activities	0.042	0.028	0.056	1.495	.135
	Gender (Dummy)	0.701	0.485	0.182	1.447	.148
	Gender * Achievement	0.000	0.001	0.041	0.497	.619
	Gender * Attitudes	-0.085	0.043	-0.242	-1.994	.046*
	Gender * Education	0.076	0.078	0.052	0.978	.328
	Gender * Expectations	0.036	0.062	0.047	0.586	.558
	Gender * Numeracy	-0.004	0.037	-0.008	-0.096	.923
	Parents' Attitudes	0.067	0.030	0.070	2.228	.026*
	Parents' Education	0.107	0.062	0.073	1.719	.086
	Parents' Expectations	0.070	0.045	0.067	1.572	.116
	Science Achievement	0.004	0.001	0.274	7.357	.000*
Oman	(Constant)	7.321	0.363		20.194	.000*
R^2 = .109	Early Numeracy Activities	0.022	0.022	0.020	0.973	.331
	Gender (Dummy)	-0.106	0.499	-0.027	-0.213	.831
	Gender * Achievement	0.001	0.000	0.076	1.365	.172
	Gender * Attitudes	-0.004	0.046	-0.010	-0.077	.939
	Gender * Education	-0.063	0.052	-0.064	-1.218	.223
	Gender * Expectations	0.030	0.047	0.042	0.634	.526
	Gender * Numeracy	0.010	0.035	0.025	0.279	.781
	Parents' Attitudes	0.055	0.028	0.047	1.950	.051
	Parents' Education	-0.002	0.038	-0.002	-0.057	.954

	Parents' Expectations	0.011	0.025	0.008	0.434	.665
	Science Achievement	0.005	0.000	0.291	13.766	.000*
Poland	(Constant)	6.736	0.526		12.814	.000*
R^2 = .066	Early Numeracy Activities	-0.019	0.027	-0.019	-0.721	.471
	Gender (Dummy)	-1.024	0.718	-0.294	-1.426	.154
	Gender * Achievement	0.000	0.001	-0.062	-0.312	.755
	Gender * Attitudes	0.011	0.037	0.033	0.296	.767
	Gender * Education	-0.017	0.053	-0.020	-0.318	.751
	Gender * Expectations	0.054	0.060	0.085	0.900	.368
	Gender * Numeracy	0.091	0.039	0.297	2.360	.018*
	Parents' Attitudes	0.013	0.025	0.013	0.505	.614
	Parents' Education	-0.045	0.038	-0.032	-1.178	.239
	Parents' Expectations	0.068	0.036	0.061	1.901	.057
	Science Achievement	0.006	0.001	0.219	7.085	.000*
Portugal	(Constant)	5.315	0.492		10.791	.000*
R^2 = .076	Early Numeracy Activities	0.079	0.024	0.080	3.305	.001*
	Gender (Dummy)	0.933	0.688	0.268	1.356	.175
	Gender * Achievement	-0.002	0.001	-0.277	-1.638	.101
	Gender * Attitudes	0.041	0.042	0.130	0.968	.333
	Gender * Education	0.073	0.053	0.079	1.372	.170
	Gender * Expectations	0.011	0.051	0.017	0.219	.827
	Gender * Numeracy	-0.078	0.036	-0.232	-2.169	.030*
	Parents' Attitudes	0.007	0.028	0.006	0.248	.805
	Parents' Education	-0.026	0.035	-0.020	-0.724	.469
	Parents' Expectations	0.064	0.033	0.051	1.929	.054
	Science Achievement	0.008	0.001	0.257	8.461	.000*
Russian Federation	(Constant)	5.857	0.518		11.317	.000*
R^2 = .051	Early Numeracy Activities	0.067	0.022	0.067	2.990	.003*
	Gender (Dummy)	-0.201	0.775	-0.053	-0.260	.795
	Gender * Achievement	0.000	0.001	0.012	0.058	.953
	Gender * Attitudes	0.035	0.037	0.095	0.924	.355
	Gender * Education	-0.084	0.160	-0.100	-0.525	.600
	Gender * Expectations	0.005	0.062	0.007	0.081	.936
	Gender * Numeracy	0.016	0.038	0.049	0.424	.671
	Parents' Attitudes	0.009	0.030	0.009	0.308	.758
	Parents' Education	-0.004	0.084	-0.002	-0.043	.966
	Parents' Expectations	0.080	0.052	0.060	1.525	.127
	Science Achievement	0.005	0.001	0.176	6.095	.000*
Saudi Arabia	(Constant)	7.905	0.383		20.658	.000*
R^2 = .132	Early Numeracy Activities	-0.052	0.026	-0.053	-2.016	.044*
	Gender (Dummy)	-0.464	0.684	-0.116	-0.677	.498
	Gender * Achievement	0.000	0.001	0.046	0.448	.654
	Gender * Attitudes	0.054	0.071	0.145	0.761	.447
	Gender * Education	-0.204	0.063	-0.218	-3.240	.001*
	Gender * Expectations	0.103	0.082	0.140	1.268	.205
	Gender * Numeracy	0.066	0.055	0.176	1.202	.229
	Parents' Attitudes	0.009	0.041	0.009	0.215	.830
	Parents' Education	0.115	0.037	0.083	3.116	.002*
	Parents' Expectations	0.005	0.043	0.003	0.117	.907
	Science Achievement	0.004	0.001	0.240	6.926	.000*
Serbia	(Constant)	7.495	2.326		3.222	.001*
R^2 = .102	Early Numeracy Activities	0.021	0.059	0.018	0.352	.725
	Gender (Dummy)	-2.516	2.278	-0.616	-1.105	.269
	Gender * Achievement	0.001	0.002	0.143	0.470	.638
	Gender * Attitudes	0.079	0.059	0.206	1.338	.181
	Gender * Education	0.184	0.113	0.160	1.639	.101
	Gender * Expectations	0.063	0.085	0.076	0.736	.462
	Gender * Numeracy	0.050	0.074	0.136	0.679	.497
	Parents' Attitudes	-0.003	0.048	-0.003	-0.065	.949
	Parents' Education	-0.243	0.104	-0.101	-2.337	.019*
	Parents' Expectations	0.183	0.063	0.119	2.889	.004*
	Science Achievement	0.005	0.002	0.197	2.167	.030*
Singapore	(Constant)	4.862	0.390		12.454	.000*
R^2 = .086	Early Numeracy Activities	0.030	0.016	0.035	1.861	.063
	Gender (Dummy)	0.452	0.444	0.126	1.017	.309
	Gender * Achievement	-0.001	0.001	-0.158	-1.572	.116
	Gender * Attitudes	-0.027	0.024	-0.084	-1.126	.260
	Gender * Education	-0.045	0.052	-0.055	-0.866	.387
	Gender * Expectations	0.059	0.079	0.085	0.742	.458
	Gender * Numeracy	-0.013	0.022	-0.038	-0.600	.548

	Parents' Attitudes	0.050	0.018	0.052	2.689	.007*
	Parents' Education	0.037	0.042	0.021	0.892	.372
	Parents' Expectations	0.075	0.051	0.034	1.488	.137
	Science Achievement	0.005	0.000	0.248	11.093	.000*
Slovak Republic	(Constant)	6.247	0.610		10.245	.000*
R^2 = .081	Early Numeracy Activities	0.040	0.029	0.037	1.342	.180
	Gender (Dummy)	0.466	0.869	0.122	0.536	.592
	Gender * Achievement	0.000	0.001	-0.039	-0.313	.755
	Gender * Attitudes	0.005	0.054	0.012	0.093	.926
	Gender * Education	-0.007	0.105	-0.007	-0.062	.950
	Gender * Expectations	0.013	0.057	0.018	0.231	.817
	Gender * Numeracy	-0.025	0.041	-0.072	-0.608	.543
	Parents' Attitudes	-0.020	0.030	-0.019	-0.663	.507
	Parents' Education	-0.057	0.079	-0.030	-0.724	.469
	Parents' Expectations	0.078	0.037	0.075	2.109	.035*
	Science Achievement	0.006	0.001	0.252	8.203	.000*
Turkey	(Constant)	5.093	0.331		15.400	.000*
R^2 = .197	Early Numeracy Activities	0.001	0.018	0.001	0.045	.964
	Gender (Dummy)	1.175	0.485	0.303	2.421	.016*
	Gender * Achievement	-0.001	0.001	-0.115	-1.054	.292
	Gender * Attitudes	-0.032	0.036	-0.090	-0.879	.379
	Gender * Education	0.007	0.053	0.006	0.131	.896
	Gender * Expectations	-0.057	0.065	-0.082	-0.872	.383
	Gender * Numeracy	0.029	0.027	0.072	1.095	.273
	Parents' Attitudes	0.038	0.022	0.035	1.724	.085
	Parents' Education	0.018	0.038	0.013	0.481	.631
	Parents' Expectations	0.144	0.047	0.068	3.086	.002*
	Science Achievement	0.009	0.001	0.412	15.490	.000*
United Arab Emirates	(Constant)	6.324	0.268		23.620	.000*
R^2 = .135	Early Numeracy Activities	0.026	0.019	0.029	1.394	.163
	Gender (Dummy)	0.627	0.381	0.168	1.644	.100
	Gender * Achievement	0.000	0.000	-0.052	-0.909	.364
	Gender * Attitudes	-0.014	0.028	-0.041	-0.521	.602
	Gender * Education	-0.047	0.054	-0.057	-0.877	.381
	Gender * Expectations	0.040	0.065	0.059	0.613	.540
	Gender * Numeracy	-0.015	0.023	-0.044	-0.666	.505
	Parents' Attitudes	0.059	0.018	0.061	3.372	.001*
	Parents' Education	-0.007	0.034	-0.004	-0.211	.833
	Parents' Expectations	0.060	0.036	0.031	1.658	.097
	Science Achievement	0.005	0.000	0.346	16.500	.000*
Table Average	(Constant)	6.020	0.113		53.333	
R^2 = .097	Early Numeracy Activities	0.028	0.005	0.030	5.456	
	Gender (Dummy)	0.257	0.142	0.075	1.814	
	Gender * Achievement	-0.001	0.000	-0.077	-2.576	
	Gender * Attitudes	0.002	0.008	0.003	0.217	
	Gender * Education	0.005	0.016	0.002	0.291	
	Gender * Expectations	-0.007	0.013	-0.013	-0.556	
	Gender * Numeracy	0.009	0.007	0.024	1.232	
	Parents' Attitudes	0.023	0.005	0.024	4.481	
	Parents' Education	-0.022	0.011	-0.011	-1.997	
	Parents' Expectations	0.086	0.009	0.058	10.053	
	Science Achievement	0.006	0.000	0.260	40.118	

*p < .05, two-tailed.