



A Logistic Regression Analysis of Turkey's 15-year-olds' Scoring above the OECD Average on the PISA'09 Reading Assessment

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Abstract

This study aims to investigate which factors are associated with Turkey's 15-year-olds' scoring above the OECD average (493) on the PISA'09 reading assessment. Collected from a total of 4,996 15-year-old students from Turkey, data were analyzed by logistic regression analysis in order to model the data of students who were split into two: (1) those students who scored above the OECD average of 493 points on the PISA'09 reading assessment, and (2) those who scored below the average. Specifically, the results indicated that gender, age when first entering school, mother's level of education, the number of books present at home, students' attitudes toward reading, and the amount of time spent learning the test's language (Turkish) per week were those factors found to predict the probability of students' scoring above the OECD average (493) on the PISA'09 reading assessment. The findings of this study contribute to the existing literature within this field by identifying which sources play a role in 15-year-olds' success on the PISA'09 reading assessment in Turkey.

Key Words

Logistic Regression, PISA'09, Reading Assessment, Reading Performance, 15-year-olds of Turkey.

Worldwide, the effectiveness of education systems has aroused the interest of scholars within the field of education. Most countries receive feedback on how well their education systems prepare students for life (Organization for Economic Cooperation and Development [OECD], 2009a). The Program for International Student Assessment (PISA), triennially organized by the OECD since 2000, has been one of the most significant means which covers reading, mathematics, and science necessary for learners to solve real-life problems and to be prepared for real-life (Çobanoğlu & Kasapoğlu, 2010). As the major focus of the PISA'09 assessment is on reading literacy (OECD, 2009a), the following section provides an overview of reading literacy.

Reading literacy is defined as one's ability to understand, use, reflect on, and engage with written texts. It has been assessed in relation to text format, reading processes (aspects), and situations (OECD, 2009a). In order to assess *text format*, students' reading literacy is measured by taking into account the range of written material that students will encounter in their later lives, such as forms, application letters, advertisements, among others, by means of both continuous (narration, exposition, and argumentation) and non-continuous texts (lists, forms, graphs, or diagrams). Regarding *reading processes*, also known as *aspects*, students are assessed on whether they are able to display proficiency in accessing and retrieving knowledge, in their ability to form a broad understanding

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of the text, in interpreting it, and in reflecting on its contents, form, and features. *Situations*, which are defined by the actual use for which a specific text has been constructed, are clustered under four groups: (1) personal (*e.g.*, a novel or a biography); (2) public (*e.g.*, official documents or announcements); (3) occupational (*e.g.*, a manual or a report); and (4) educational (*e.g.*, a textbook or a worksheet). Since some students may perform better in one of the four groups, it is desirable to include a range of reading situations in the items to be measured (OECD, 2009a).

Regarding the results of the PISA'09 reading assessment, Turkey (464) scored below the OECD average (493) and ranked 41st among the 65 participant countries (OECD, 2010). Although Turkey scored higher in the PISA'09 reading assessment than it did in the PISA'03 reading assessment, Turkey has remained in the same level (Level 2) since 2003 (Turkish Foundation of Economic Policy Research, 2010).

Factors Affecting Reading Literacy/Performance

Within the field of education research, the possible reasons behind or the factors related to reading performance have been studied. A review of related international literature provides a great deal of insight into the factors that affect reading performance. As highlighted by Shiel and Eivers (2009), one of the factors related to reading performance according to the Progress in International Reading Literacy Study (PIRLS) and PISA is gender. Williams, Williams, Kastberg, and Jocelyn (2005) found that gender (in favor of girls) influences both reading affect and achievement. According to evidence-based content from the PISA or PIRLS data, Topping (2006) stressed that females outperform males in all countries tested; a finding also supported by the those of a study conducted by Smith, Smith, Gilmore, and Jameson (2011). However, Ma (2008) stated that, based on the PISA 2000 data, Romania was the only country without statistically significant gender differences in reading scores because it demonstrates only a small female advantage. Also, Linnakylä, Malin, and Taube (2004) found that male gender is significantly associated with a lower level of reading literacy achievement in both Finland and Sweden when investigating PISA 2000 results after controlling for the other factors. As a result, Bracey (2005) stated that reducing the gender gap in reading literacy is the biggest challenge for Finland because high-performing

Finnish girls outperform high-performing Finnish boys. A smaller gender gap in reading performance was found to be related to the positive effect of enrolment size (in Brazil and Macedonia) and to teacher behavior (in Brazil and the United States), percentage of computers (in Denmark), sense of belonging (in Greece), teacher participation (in Hungary), student-teacher relationship, and material resources (in Italy). On the other hand, the negative effect of student behavior (in Bulgaria and Latvia), material resources (in Chile), academic pressure (in Korea), percentage of girls (in New Zealand), teacher participation (in Portugal), and teacher behavior (in Thailand) were found to be associated with the existence of a larger gender gap in reading performance (Ma, 2008). Gender gaps in reading performance in secondary education were also found to be associated with a lower level of female participation in Science, Technology, Engineering, and Mathematics (STEM) in tertiary education and a lower level of a female economic activity (Van Langen, Bosker, & Dekkers, 2006). The same authors state that when girls surpass boys in reading performance, they participate more in STEM studies, thereby becoming more economically active in STEM careers.

Beyond the above factors, school-entry age also has an impact on reading performance. The most striking result related to school-entry age was found by Spruietsma (2007), where he concluded that relative school-entry age had a significant long-term impact on performance on the PISA'03 reading assessment, finding that the eldest pupils scored about 20% of a standard deviation higher than the youngest students. However, Suggate (2009) found no significant correlation between school-entry age and achievement in the PISA'06 reading assessment after having controlled for social and economic differences. Hence, possible correlations between school-entry age and reading performance found in the study will be interpreted with caution.

Yet another important factor requiring consideration is parents' level of education. For example, Hvistendahl and Roe (2004) concluded that, in Norway, there existed significant positive correlations between the level of education and occupation of minority students' parents and their level of reading literacy. Rasmussen (2003) determined which factors were most closely associated with students' level of reading literacy performance in Norway, concluding there to be a relation between students whose mothers had continued their education into the university

level and higher reading literacy performance in students. Geske and Ozola (2008) examined the reasons behind the low level of reading literacy among primary school students and concluded that parental education has a high impact on reading literacy. The same authors highlighted that high achievers are those who usually come from families in which parents themselves spend a significant portion of their time reading. Can, Türkyılmaz, and Karadeniz (2010) stated that the frequency of leisure reading of 8th through 12th graders significantly differs based on parents' level of education (in favor of parents holding a graduate degree). Myrberg and Rosén (2009) investigated the direct and indirect effects of parental education on the reading performance of third graders in Sweden, discovering that the total effect of parental education (34%) on reading performance is substantial and that almost half of this effect is mediated through the number of books present at home, early reading activities, and early reading abilities. The number of books at home was found to have a total effect of 22% on reading performance, of which 17% was a direct effect and 5% was mediated through early reading activities and early reading abilities. Early reading activities were also found to have a total effect of 11% on reading performance, of which 6% was a direct effect and 5% was mediated through early reading abilities. Finally, early reading abilities were found to have a direct effect of 35% on reading performance. Strikingly, Nonoyama-Tarumi and Willms (2010) investigated whether the effects of family background (parental education, parental occupation, and home educational resources) on reading performance are larger than those of school resources (school resources, teacher quality, and pupil-teacher ratio), and whether these effects are a function of the Gross Domestic Product (GDP) per capita of the countries participating in the PISA 2000 study. They concluded that there is a curvilinear relationship between family effects and the GDP per capita, but that there is no relationship between school effects and the GDP per capita. Furthermore, the risk related to having a substandard family background was found to be larger than that of low levels of school resources, regardless of the country's GDP per capita (Nonoyama-Tarumi & Willms, 2010).

The effects of which language(s) is/are spoken at home on reading performance have also been investigated. To give an example, Entorf and Minoiu (2005) studied the effect of which language(s) is/are spoken at home on the reading literacy of students

in European countries (France, Finland, Germany, the United Kingdom and Sweden) and in countries with high rates of immigration (Australia, Canada, New Zealand, and the United States). The authors stated that the language(s) spoken at home, for all countries, is a key factor for students whose families have migrated from a country whose language is different than the host country's in terms of their ability to attain the same level of reading literacy performance as their native speaking counterparts. Additionally, the migration gap due to language issues was found to be wider in Germany, Finland, and France and narrower in Australia and Canada. Thus, it was suggested that educational policies should focus on the integration of immigrant children into schools and preschools. It was also suggested that a particular emphasis be placed on learning language skills during the early stages of childhood due to inconsistencies and omissions in policies, early childhood curriculum, and primary school curriculum, as these are the factors behind weaker literacy performance of children in New Zealand over the previous two decades (McLahlan & Arrow, 2011). Meunier (2011) also investigated the effect of immigration on reading, mathematics, and science literacy as measured in the PISA 2000 for Switzerland, discovering that immigrant students performed less successfully than did native Swiss students (children with at least one parent born in Switzerland, regardless of where the pupil was born) just as Ma (2003) had found when he held constant the factors of individual characteristics, family background, and school characteristics. Speaking a different language than the test language at home was not more detrimental for immigrant students than for Swiss students (Meunier, 2011). Rather than languages differing from the test language, variations in the same language can influence reading performance. For instance, Zuzovsky (2010) found out that Arabic diglossia, a situation of having two variations for spoken and written language, accounts for the low performance of Arabic-speaking students in reading literacy measured in the Progress in International Reading Literacy Study (PIRLS) conducted in 2006, controlling for the impact of socioeconomic factors.

The number of books at home can be regarded as another factor that affects students' reading performance. Correspondingly, Smith and Barrett (2011) interpreted the impact of pupil background characteristics on reading achievement in six low-income countries (Group A countries, including Uganda, Kenya, Tanzania, Malawi, Mozambique, and Zambia, and having per capita GDPs between

600 and 1,200 USD) and four lower middle class small states (Group B countries, including Botswana, Namibia, Lesotho, and Swaziland, and having per capita GDPs usually between 4,500 and 7,200 USD) located in Southern and East Africa by means of a capability approach. The findings of their study demonstrated that students' reaching a higher level of reading performance is affected by having books present at home. Topping (2006) also concluded that students whose homes contain more than 100 children's books have a higher reading achievement than those whose homes have fewer than 10 children's books. With this being stated however, in Norway, the number of books at home is not significantly related to minority students' achievement in reading literacy (Hvistendahl & Roe, 2004). Hence, possible relationships between the number of books present at home and reading performance should be carefully interpreted.

Another factor deserving attention is attitude toward reading consistently related to reading achievement (Brozo, Shiel, & Topping, 2007-2008), and has, as such, been studied by many researchers. Hvistendahl and Roe (2004) found there to be a significant positive relationship between Norwegian minority students' attitudes toward reading and their reading literacy achievement. However, relationships between attitudes toward reading and reading achievement should be cautiously interpreted. For example, children in England were reported to display negative attitudes toward reading despite their high level of achievement in reading, a circumstance that was due to the data having been gathered through imprecise items of attitude scales as a result of its having been administered without piloting and revision (Twist, Gnaldi, Schagen, & Morrison, 2004).

Another important factor contributing to reading performance is the amount of time spent reading and learning. Specifically, the time spent reading was strongly correlated with the gap between high and low level readers (Topping, 2006). Hvistendahl and Roe (2004) found significant positive relationships between the amount of time Norwegian minority students spent reading and their level of reading literacy achievement, stating that it was lower than the calculated correlation between the amount of time the same students spent reading and level of scientific literacy achievement. In addition, the total amount of time spent on homework was found to have a significant positive correlation with the reading literacy achievement of Norwegian minority students (Hvistendahl &

Roe, 2004). Thorpe (2006) also highlighted that the amount of time spent on homework significantly contributes to all reading subscales, and even more so for reading for information, interpreting texts, and reflecting and evaluating. Brozo et al. (2007-2008) suggested that the amount of time spent on reading should be increased in order to boost engagement in reading in the United States, the United Kingdom, and the Republic of Ireland.

In Turkey, the effects of several variables, including a number of those above, on 15-year-olds' reading performance have recently been studied. For example, Yıldırım (2012) found 14 variables which significantly affect reading performance of Turkey's 15-year olds; these variables being: family wealth, family economic, social and cultural status, gender, the use of strategies for summarizing, understanding and remembering, the use of memorization and control strategies, reading for enjoyment, the use of libraries, disciplinary climate, teacher-student relations, student-teacher ratio, teacher shortage, and teacher responsibility for school policies and practices. Acar (2012) furthermore concluded that the following variables have a significant impact on Turkey's 15-year-olds' reading performance: student-teacher ratio and student-computer ratio at school, extracurricular activities offered by school, home educational resources, the use of strategies for summarizing, understanding and remembering, the use of memorization strategies, and the use of information and computer technologies. While Yalçın, Aslan, and Usta (2012) focused more on parent-related variables, examining the impact of parental education, parents' occupational status, and the amount of quality time spent with parents at home, Özer and Özberk (2011) investigated the effects of gender, school type, and geographical area on reading performance. Furthermore, the effects of the use of computers for entertainment and educational purposes (Gümüş & Atalmuş, 2011) were also examined. Bulut, Delen, and Kaya (2012) studied the effects of technology usage on reading, attitudes toward reading, and self-regulation. Using logistic regression, Gürsakar (2012) investigated the impact of pre-determined variables on the probability of Turkey's 15-year-olds' scoring above the national average of Turkey, on the PISA'09 reading, mathematics, and science assessments, and concluded that gender, parental education, school entry age, the number of books at home, learning styles, use of effective learning strategies, the frequency of computer use at home and at school, and attitudes toward computers significantly increase the likelihood of Turkey's

15-year-old students' scoring above the national average on the PISA'09 reading, mathematics, and science assessments.

Purpose of the Study

Different from previous studies, the present study helps to answer questions which have weighed on the minds of parents and educators for years by clarifying which factors are associated with Turkey's 15-year-olds' scoring above the OECD average (493) on the PISA'09 reading assessment. Furthermore, this study's significance lies in its being a study which helps to provide an idea to what the personal characteristics are of those rare Turkish 15-year-olds whose scores rank above the OECD average (493) on the PISA'09 reading assessment. The research questions addressed in this study were as follows: (i) What are the factors affecting Turkey's 15-year-olds' scoring above the OECD average of 493 on the PISA'09 reading assessment? (ii) How well do these factors predict Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment?

Method

Research Design

This study is based on correlational research design. The key characteristic of correlational research is to investigate relationships among variables (Fraenkel & Wallen, 2006). The current study aims to investigate the factors associated with Turkey's 15-year-olds' scoring above the OECD average on the PISA'09 reading assessment.

Sample

Data for the present study were collected from Turkey's PISA'09 sample which consisted of randomly selected 4,996 15-year-old students. In Turkey, a three-stage sampling procedure was followed to obtain a representative sample of 15-year-olds (Yılmaz-Fındık & Kavak, 2013): The first stage included selecting a sample based on 12 geographical areas. The second stage included a sample of 170 schools within each geographic area. The third stage included a sampling of students in those schools who were born in 1993. The characteristics of the sample related to the selected variables were as follows: Among all, 51.1% ($n = 2,551$) of Turkey's 15-year-olds were male while 48.9% of them were female ($n = 2,445$). Of the total,

71.7% ($n = 3,580$) were 7 years old when they started primary education, 20.1% ($n = 1,005$) were younger than 7, and 8.2% ($n = 411$) were older than 7 when they entered primary school. According to the International Standard Classification of Education (ISCED) used to classify parent's level of education (OECD, 1999 cited in OECD, 2012), ISCED 1 refers to primary education. While the highest level of schooling completed by mothers of 82.4% ($n = 4,116$) of the participants was ISCED 1 and above, mothers of 13.1% ($n = 655$) had not completed ISCED 1. The highest level of schooling completed by fathers of 91% ($n = 4,544$) was ISCED 1 and above whereas 4% ($n = 202$) had not completed ISCED 1. Among the total participants, 95.3% ($n = 4762$) spoke the test language (Turkish) most of the time at home whereas 4.1% of them ($n = 207$) spoke languages different from the test language at home most of the time. Furthermore, while 78.1% of participants possessed 0-100 books, 17.4% had 101-500 books and 3.1% had more than 501 books in their home. The majority of 15-year-old students in Turkey were found to be open to reading, as they agreed with the statements measuring attitudes toward reading ($M = 2.99$, $SD = .52$) according to the intervals determined by the researcher, as follows: 4-3.26 as "strongly agree," 3.25-2.51 as "agree," 2.50-1.76 as "disagree," and 1.75-1 as "strongly disagree." They were also found to spend between 30 minutes and 60 minutes a day reading for enjoyment ($M = 2.62$, $SD = 1.22$) according to the intervals determined by the researcher, as follows: 5-4.21 as "more than 2 hours a day," 4.20-3.41 as "1 to 2 hours a day," 3.40-2.61 as "more than 30 minutes to less than 60 minutes a day," 2.60-1.81 as "30 minutes or less a day," and 1.80-1 as "I do not read for enjoyment." In addition, participants were found not to attend out-of-school lessons in the test language ($M = 1.63$, $SD = 1.08$) according to the intervals determined by the researcher, as follows: 5-4.21 as "6 or more hours a week," 4.20-3.41 as "4 or more but less than 6 hours a week," 3.40-2.61 as "2 or more but less than 4 hours a week," 2.60-1.81 as "less than 2 hours a week," and 1.80-1 as "I do not attend out-of-school-time lessons in test language." Finally, 15-year-old students from Turkey were found to spend an average of 237.15 minutes for learning the test language per week with a standard deviation of 81.53.

Instruments

For the purposes of this study, the entire corpus of data from the PISA'09 database (OECD, 2011a) was limited by the researcher to include only the data

collected through the student questionnaire and the reading assessment. The student questionnaire administered after the reading assessment, which took approximately 30 minutes, covered the following nine aspects: (1) student characteristics, (2) family context and home resources, (3) individual engagement in reading, (4) instructional time, (5) learning and assessment, (6) classroom and school climate, (7) students' views on their test language lessons, (8) access to and use of libraries, and (9) strategies used by students' in reading and understanding texts (OECD, 2012). The reading assessment measured how students retrieve information, form broad understandings, develop interpretations, reflect on and evaluate the content and the form of a text (OECD, 2009a). It included tasks requiring students to construct their own responses as well as multiple-choice questions typically organized in units based on texts or figures that might be encountered in real-life (OECD, 2012). The reliability coefficient of the reading assessment used in Turkey was reported as .91, and use of (1) powerful quality assurance mechanisms for translation, sampling and test administration; (2) measures to promote cultural and linguistic diversity in the assessment tools through the involvement of countries in item production; and (3) advanced technology and methodology for data processing were factors that provide strong evidence for high-level validity and reliability (OECD, 2012).

Variables

Since scoring above the OECD average (493) was coded as 1 while scoring below it was coded as 0, the outcome variable can be labeled as discrete. Although a dichotomized continuous variable decreases the statistical power of a study (Schreiber, 2002), this concern was reduced due to this particular study's reasonably large sample size (N=4,996).

There were three groups of predictors; namely, (1) background variables, composed of gender (male, female), school-entry age, mother's highest schooling (none, ISCED 1 and above), father's highest schooling (none, ISCED 1 and above), language spoken at home (test language, other language), and the number of books at home, (2) affective variable (attitudes toward reading), (3) and time variables, composed of time spent on reading for joy, time spent on learning the test language per week, time spent on learning the test language outside of normal school hours. These three groups of predictors were run sequentially in three blocks. As a result, a binomial sequential logistic regression analysis was

conducted. Since school-entry age was a discrete variable divided into three categories (1 = younger than 7 years old, 2 = 7 years old, 3 = older than 7 years old), only two variables (Age_D1 and Age_D2) for school-entry age were created through dummy coding. Additionally, the number of books at home was a categorical variable with three categories (1 = 0-100 books, 2 = 101-500 books, 3 = 501+ books) that resulted in two dummy variables, Book_D1 and Book_D2, respectively. The dummy variables created in this study are presented in Table 1.

Table 1.
Dummy Variables Created for the Discrete Variables

School-entry age	Age_D1	Age_D2
1 = younger than 7 years old	1	0
2 = 7 years old	0	1
3 = older than 7 years old	0	0
Number of books at home	Book_D1	Book_D2
1 = 0-100 books	1	0
2 = 101-500 books	0	1
3 = 501+ books	0	0

Data Analysis

A binomial sequential logistic regression analysis was conducted to investigate whether the probability of 15-year-old students in Turkey who scored above the OECD average (493) on the PISA'09 reading assessment may be predicted by background variables (gender, school-entry age, mother's highest schooling, father's highest schooling, language spoken at home, and the number of books at home), an affective variable (attitudes toward reading), and time variables (time spent on reading for joy, time spent on learning the test language per week, and time spent on learning the test language outside of normal school hours). The predictors were entered into three blocks with the background variables being the first to be entered into the analysis. The second and third block included attitudes toward reading and time variables, respectively. The level of significance was set as .05, meaning that the researcher had a 5% margin of committing a Type I error. However, as there were five plausible values calculated for reading literacy, as assessed by the PISA'09 reading assessment, five separate binomial sequential logistic regression analyses were performed as suggested by the PISA Data Analysis Manual: SPSS® Second Edition published by OECD (2009b) at the .05/5 = .01 level using the Bonferroni method. Plausible values are defined as "random numbers drawn from the distribution of scores that could

be reasonably assigned to each individual” and as “better suited to describing the performance of the population” (OECD, 2012, p. 142).

As highlighted in the PISA Data Analysis Manual: SPSS® Second Edition published by OECD (2009b), population parameters should be estimated using each plausible value separately. The reported population parameter is therefore the average of each plausible value statistic. For example, if one is interested in the correlation coefficient between the social index and the reading performance in the PISA, then five correlation coefficients should be computed and subsequently averaged. In other words, plausible values should never be averaged at the student level since doing so would result in a bias (OECD, 2009b). Correspondingly, Beta values, standard errors, odds ratios with lower and upper values in the 95% confidence interval calculated for each plausible value have all been averaged.

Results

The results section begins with descriptive statistics describing the performance of Turkey's 15-year-old students' on the PISA'09 reading assessment. Next, the results of the data screening, presented in terms of the assumptions of binomial sequential logistic regression analysis, are provided. Finally, the findings of the five binomial sequential logistic regression analyses are reported. Means and standard deviations calculated for each plausible value in reading are provided in Table 2 below.

Table 2.
Means and Standard Deviations of Each Plausible Value in Reading (N = 4996)

	<i>M</i>	<i>SD</i>
Plausible values 1 in reading (PV1READ)	466.42	80.19
Plausible values 2 in reading (PV2READ)	465.30	80.38
Plausible values 3 in reading (PV3READ)	465.88	81.06
Plausible values 4 in reading (PV4READ)	465.39	80.66
Plausible values 5 in reading (PV5READ)	465.57	80.44

Before performing binomial sequential logistic regression analyses for each plausible value in reading, data were first screened to control for missing values, and no missing values were found. Next, the assumptions of the binomial sequential logistic regression analyses; namely, (1) the ratio of cases to variables, (2) adequacy of expected frequencies and power, (3) linearity in the logit, (4) absence of multicollinearity, (5) absence of outliers, and (6) independent observations, were all checked. All relevant predictors were included, with every

case being a member of one of the two categories of the outcome variable. Expected cell frequencies for all pairs of discrete variables, including the outcome variable, were checked with all expected frequencies being found to be greater than 1 and no more than 20% of cells were found to be less than 5. The assumption of a linear relationship between continuous predictors (attitudes toward reading, time spent on reading for joy, time spent on learning the test language per week, and time spent on learning the test language outside of normal school hours) and the logit transforms of the outcome variables were successfully verified by scatterplots. In order to check the assumption of an absence of multicollinearity; that is, extremely high correlations among predictor variables, only two variables (school-entry age and the number of books at home) were dummy-coded. Then, correlations among all predictors presented were checked and found to be less than .90 (Tabachnick & Fidell, 2007). The absence of outliers was also checked by Cook's D, leverage statistics, standardized residual, and DFBeta for its constant, whose results detected no serious outliers. Finally, since each response came from different, unrelated cases, the assumption of independent observations was also satisfied. Table 3 reports the strength of the relationship between predictors and students' scores above the OECD average of 493 on the PISA'09 reading assessment (PV1READ).

The results indicated that a significant amount of variability in the probability of Turkey's 15-year-olds' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) is accounted for by the combination of the following background variables: gender, Age_D1, Age_D2, mother's highest schooling, father's highest schooling, language spoken at home, and Book_D1, $R^2 = .11$ (Cox & Snell), .14 (Nagelkerke). According to the first model, which was found to be significant, $\chi^2(8) = 304.35, p < .01$, it can be inferred that gender ($B = .70, OR = 2.01, Wald\ statistic = 73.26, p < .01$), Age_D1 ($B = -.96, OR = .38, Wald\ statistic = 25.24, p < .01$), Age_D2 ($B = -.79, OR = .45, Wald\ statistic = 20.55, p < .01$), mother's highest level of schooling ($B = -.62, OR = .54, Wald\ statistic = 20.27, p < .01$), father's highest level of schooling ($B = -.90, OR = .41, Wald\ statistic = 9.53, p < .01$), language spoken at home ($B = .97, OR = 2.65, Wald\ statistic = 8.38, p < .01$), and Book_D1 ($B = .83, OR = 2.28, Wald\ statistic = 14.55, p < .01$) are all independent factors effective in increasing the probability of scoring above the OECD average of 493 (PV1READ). Since their odds ratios were greater than 1, gender,

language spoken at home, and Book_D1 were positively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ). In other words, the likelihood that a female 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are 2.01 times the likelihood of a male 15-year-old student of Turkey. Furthermore, the probability that a 15-year old student of Turkey who had spoken the test language (Turkish) at home most of the time would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are 2.65 times the probability of a 15-year-old student of Turkey who had spoken a language different from the test language at home most of the time. Furthermore, the likelihood that a 15-year old student of Turkey who had 0-100 books at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) is 2.28 times higher than that of 15-year-old student of Turkey who had more than 500 books at home. However, Age_D1, Age_D2, mother's highest level of schooling, father's highest level of schooling were negatively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ). The probability that a 15-year-old student of Turkey who had been younger than the age of 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are .38 times the odds of a 15-year-old student of Turkey who had been older than 7 when entering primary education. Furthermore, the odds that a 15-year-old student of Turkey who had been 7 years old when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are .45 times those of a 15-year-old student of Turkey who had been older than 7 when first entering primary education. The odds that a 15-year-old student of Turkey whose mother's highest level of schooling was ISCED 1 and above would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are .54 times those of a 15-year-old student of Turkey whose mother had not completed ISCED 1. Furthermore, the odds that a 15-year-old student of Turkey whose father's highest level of schooling was ISCED 1 and above would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are .41 times those of a 15-year-old student of Turkey whose father had not completed ISCED 1.

Table 3.
Summary of Logistic Regression Analysis for Variables Predicting Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (PV1READ) (N = 4996)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.70* (.08)	1.71	2.01	2.36
Age_D1	-.96* (.19)	.26	.38	.56
Age_D2	-.79* (.45)	.32	.45	.64
Mother's highest level of schooling	-.62* (.14)	.41	.54	.70
Father's highest level of schooling	-.90* (.29)	.23	.41	.72
Language spoken at home	.97* (.34)	1.37	2.65	5.12
Book_D1	.83* (.22)	1.49	2.28	3.49
Book_D2	-.20 (.23)	.52	.82	1.29
Model 2				
Attitudes toward reading	.57* (.09)	1.49	1.76	2.09
Model 3				
Time spent on reading for joy	-.01 (.04)	.91	.99	1.07
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00
Time spent on learning the test language outside of normal school hours	-.09 (.04)	.85	.92	.99

* $p < .01$

As the second model was found significant ($\chi^2(9) = 348.00, p < .01$), adding attitudes toward reading to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ). Specifically, attitudes toward reading were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) ($B = .57, OR = 1.76, Wald statistic = 42.54, p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are 1.76 times those of a Turkey's 15-year-old students' whose attitudes toward reading were one unit worse. As the odds ratio was greater than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) was positively correlated with students' attitudes toward reading.

As the last model was found to be significant, ($\chi^2(12) = 392.92, p < .01$), adding the amount of time spent reading for joy, learning the test language per week,

and learning the test language outside of normal school hours to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ). Specifically, only the amount of time spent learning the test language per week was found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) ($B = .00$, $OR = 1.00$, Wald statistic = 40.92, $p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) are equal to those of a 15-year-old student of Turkey who had spent one minute less for learning the test language per week. As the odds ratio was 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV1READ) was positively correlated with the amount of time spent on learning the test language per week. Table 4 reports the strength of the relationship between predictors and scoring above the OECD average (493) on the PISA'09 reading assessment (PV2READ).

Table 4.
Summary of Logistic Regression Analysis for Variables Predicting Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (PV2READ) ($N = 4996$)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.75* (.08)	1.81	2.12	2.49
Age_D1	-.86* (.19)	.29	.42	.61
Age_D2	-.69* (.17)	.36	.50	.70
Mother's highest level of schooling	-.76* (.14)	.36	.47	.62
Father's highest level of schooling	-.49 (.27)	.36	.61	1.04
Language spoken at home	.76 (.32)	1.14	2.14	4.02
Book_D1	1.10* (.23)	1.92	3.00	4.68
Book_D2	.11 (.24)	.70	1.12	1.80
Model 2				
Attitudes toward reading	.56* (.09)	1.48	1.75	2.08
Model 3				
Time spent on reading for joy	.03 (.04)	.95	1.03	1.12
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00
Time spent on learning the test language outside of normal school hours	-.13* (.04)	.81	.88	.95

* $p < .01$

The results indicated that a significant amount of variability in the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) may be accounted for by the combination of the following background variables: gender, Age_D1, Age_D2, mother's highest schooling, and Book_D1, $R^2 = .11$ (Cox & Snell), .14 (Nagelkerke). According to the first model, which was found to be significant ($\chi^2(8) = 307.17$, $p < .01$), it can be inferred that gender ($B = .75$, $OR = 2.12$, Wald statistic = 84.98, $p < .01$), Age_D1 ($B = -.86$, $OR = .42$, Wald statistic = 21.09, $p < .01$), Age_D2 ($B = -.69$, $OR = .50$, Wald statistic = 16.29, $p < .01$), mother's highest schooling ($B = -.76$, $OR = .47$, Wald statistic = 29.51, $p < .01$), and Book_D1 ($B = 1.10$, $OR = 3.00$, Wald statistic = 23.37, $p < .01$) are independent factors effective in determining the probability of scoring above the OECD average of 493 (PV2READ). Since their odds ratios were greater than 1, gender and Book_D1 were positively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ). In other words, the odds that a female 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are 2.12 times those of a male 15-year-old student of Turkey. Furthermore, the likelihood that a 15-year-old student of Turkey who had 0-100 books at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are 3.00 times that of a 15-year-old student of Turkey who had more than 500 books at home. However, Age_D1, Age_D2, and mother's highest level of schooling were negatively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ). The odds that a 15-year-old student of Turkey who had been younger than the age of 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are .42 times than those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. Furthermore, the odds that a 15-year-old student of Turkey who had been 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are .50 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. The odds of a 15-year-old student of Turkey whose mother's highest level of schooling was ISCED 1 and above

would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are .47 times those of a 15-year-old student of Turkey whose mother had not completed ISCED 1.

As the second model was found significant ($\chi^2(9) = 349.89, p < .01$), adding attitudes toward reading to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ). That is, attitudes toward reading were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) ($B = .56, OR = 1.75, Wald statistic = 41.65, p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are 1.75 times higher than those of a 15-year-old student of Turkey whose attitude toward reading was one unit worse. As the odds ratio was greater than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) was positively correlated with attitudes toward reading.

As the last model was found significant ($\chi^2(12) = 403.97, p < .01$), adding the amount of time spent reading for joy, learning the test language per week, and learning the test language outside of normal school hours to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ). Specifically, both the amount of time spent learning the test language per week ($B = .00, OR = 1.00, Wald statistic = 45.07, p < .01$) and learning the test language outside of normal school hours ($B = -.13, OR = .88, Wald statistic = 10.77, p < .01$) were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are equal to those of a 15-year-old student of Turkey who had spent one minute less learning the test language per week. As the odds ratio was 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) was positively correlated with the amount of time spent on learning the

test language per week. Moreover, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) are .88 times those of a 15-year-old student of Turkey who had spent one minute less learning the test language outside of normal school hours. As the odds ratio was less than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV2READ) was negatively correlated with the amount of time spent on learning the test language outside of normal school hours. Table 5 reports the strength of the relationship between predictors and scoring above the OECD average (493) on the PISA'09 reading assessment (PV3READ).

Table 5.
Summary of Logistic Regression Analysis for Variables Predicting Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (PV3READ) (N = 4996)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.75* (.08)	1.80	2.12	2.49
Age_D1	-.12* (.19)	.33	.42	.48
Age_D2	-.84* (.18)	.30	.43	.61
Mother's highest level of schooling	-.62* (.14)	.41	.54	.70
Father's highest level of schooling	-.79* (.29)	.26	.45	.80
Language spoken at home	1.22* (.36)	1.68	3.40	6.86
Book_D1	.95* (.22)	1.68	2.59	4.00
Book_D2	-.13 (.24)	.55	.88	1.39
Model 2				
Attitudes toward reading	.53* (.09)	1.43	1.70	2.01
Model 3				
Time spent on reading for joy	-.01 (.04)	.91	.99	1.07
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00
Time spent on learning the test language outside of normal school hours	-.09 (.04)	.85	.91	.99

* $p < .01$

The results indicated that a significant amount of variability in the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) may be accounted for by combining the following background variables: gender, Age_D1, Age_D2, mother's highest schooling, father's highest level of

schooling, language spoken at home, and Book_D1, $R^2 = .12$ (Cox & Snell), $.16$ (Nagelkerke). According to the first model, which was found to be significant ($\chi^2(8) = 337.20, p < .01$), it can be inferred that gender ($B = .75, OR = 2.12$, Wald statistic = 83.48, $p < .01$), Age_D1 ($B = -1.12, OR = .42$, Wald statistic = 33.23, $p < .01$), Age_D2 ($B = -.84, OR = .43$, Wald statistic = 22.55, $p < .01$), mother's highest schooling ($B = -.62, OR = .54$, Wald statistic = 20.01, $p < .01$), father's highest level of schooling ($B = -.79, OR = .45$, Wald statistic = 7.53, $p < .01$), language spoken at home ($B = 1.22, OR = 3.40$, Wald statistic = 11.67, $p < .01$), and Book_D1 ($B = .95, OR = 2.59$, Wald statistic = 18.61, $p < .01$) are independent factors effective for determining the probability of students' scoring above the OECD average of 493 (PV3READ). Since their odds ratios were greater than 1, gender, the language spoken at home, and Book_D1 were positively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ). In other words, the odds that a 15-year-old female student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are 2.12 times higher than those of a 15-year-old male student of Turkey. The odds that a 15-year-old student of Turkey who spoke the language of the test (Turkish) at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are 3.40 times those of a 15-year-old student of Turkey who spoke another language at home. Furthermore, the odds that a 15-year-old student of Turkey who had 0-100 books at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are 2.59 times those of a 15-year-old student of Turkey who had more than 500 books at home. However, Age_D1, Age_D2, mother's highest level of schooling, and father's highest level of schooling were negatively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ). The odds that a 15-year-old student of Turkey who had been younger than the age of 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are .42 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. Additionally, the odds that a 15-year-old student of Turkey who had been 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment

(PV3READ) are .43 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. The odds that a 15-year-old student of Turkey whose mother's highest level of schooling was ISCED 1 and above would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are .54 times those of a 15-year-old student of Turkey whose mother had not completed ISCED 1. Finally, the odds that a 15-year-old student of Turkey whose father's highest level of schooling was ISCED 1 and above would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are .45 times those of a 15-year-old student of Turkey whose father had not completed ISCED 1.

As the second model was found significant ($\chi^2(9) = 374.79, p < .01$), adding attitudes toward reading to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ). That is, attitudes toward reading were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) ($B = .53, OR = 1.70$, Wald statistic = 36.75, $p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are 1.70 times higher than those of a 15-year-old student of Turkey whose attitude toward reading was one unit worse. As the odds ratio was greater than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) was positively correlated with attitudes toward reading.

As the last model was found significant ($\chi^2(12) = 421.65, p < .01$), adding the amount of time spent on reading for joy, on learning the test language per week, and on learning the test language outside of normal school hours to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ). However, specifically, the amount of time spent learning the test language per week ($B = .00, OR = 1.00$, Wald statistic = 42.62, $p < .01$) was found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ). Thus, the odds that a 15-year-old student of Turkey

would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) are equal to those of a 15-year-old student of Turkey who had spent one minute less learning the test language per week. As the odds ratio was 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) was positively correlated with time spent on learning the test language per week. Table 6 reports the strength of the relationship between predictors and scoring above the OECD average (493) on the PISA'09 reading assessment (PV4READ).

Table 6.
Summary of Logistic Regression Analysis for Variables Predicting Average Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (PV4READ) (N = 4996)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.77* (.08)	1.83	2.15	2.52
Age_D1	-1.06* (.19)	.24	.35	.50
Age_D2	-.76* (.17)	.33	.47	.66
Mother's highest level of schooling	-.49* (.14)	.47	.61	.80
Father's highest level of schooling	-.50 (.27)	.36	.60	1.02
Language spoken at home	1.18* (.34)	1.65	3.25	6.39
Book_D1	1.11* (.23)	1.95	3.03	4.72
Book_D2	.06 (.24)	.66	1.07	1.71
Model 2				
Attitudes toward reading	.54* (.09)	1.45	1.71	2.03
Model 3				
Time spent on reading for joy	.03 (.04)	.95	1.03	1.12
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00
Time spent on learning the test language outside of normal school hours	-.16* (.04)	.85	.91	.92

* $p < .01$

The results indicated that a significant amount of variability in determining the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) may be accounted for by the combination of the following background variables: gender, Age_D1, Age_D2, mother's highest schooling, the language spoken at home, and Book_D1, $R^2 = .11$ (Cox & Snell), $.15$ (Nagelkerke). According to the first model, which was found to be

significant ($\chi^2(8) = 313.39, p < .01$), it can be inferred that gender ($B = .77, OR = 2.15, Wald\ statistic = 87.56, p < .01$), Age_D1 ($B = -1.06, OR = .35, Wald\ statistic = 30.68, p < .01$), Age_D2 ($B = -.76, OR = .47, Wald\ statistic = 18.80, p < .01$), mother's highest schooling ($B = -.49, OR = .61, Wald\ statistic = 12.73, p < .01$), the language spoken at home ($B = 1.18, OR = 3.25, Wald\ statistic = 11.68, p < .01$), and Book_D1 ($B = 1.11, OR = 3.03, Wald\ statistic = 24.15, p < .01$) are independent factors effective for determining the probability of scoring above the OECD average of 493 (PV4READ). Since their odds ratios were greater than 1, gender, language spoken at home, and Book_D1 were positively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ). In other words, the odds that a 15-year-old female student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are 2.15 times higher than those of a 15-year-old male student of Turkey. The odds that a 15-year-old student of Turkey who spoke the language of the test (Turkish) at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are 3.25 times those of a 15-year-old student of Turkey who spoke another language at home. Furthermore, the likelihood that a 15-year old student of Turkey who had 0-100 books at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV3READ) is 3.03 times higher than that of a 15-year-old student of Turkey who had more than 500 books at home. However, Age_D1, Age_D2, and mother's highest level of schooling were negatively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ). The odds that a 15-year-old student of Turkey who had been younger than the age of 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are .35 times those of a 15-year-old student who had been older than 7 when entering primary education. Furthermore, the odds that a 15-year-old student of Turkey who had been 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are .47 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. The odds that a 15-year-old student of Turkey whose mother's highest level of schooling was ISCED 1 and above would score above the OECD average of 493

on the PISA'09 reading assessment (PV4READ) are .61 times those of a 15-year-old student of Turkey whose mother had not completed ISCED 1.

As the second model was found significant, ($\chi^2(9) = 352.76, p < .01$), adding attitudes toward reading to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ). That is, attitudes toward reading were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) ($B = .54, OR = 1.71, Wald statistic = 38.46, p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are 1.71 times higher than those of a 15-year-old student of Turkey whose attitudes toward reading was one unit worse. As the odds ratio was greater than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) was positively correlated with attitudes toward reading.

As the last model was found significant, ($\chi^2(12) = 423.86, p < .01$), adding the amount of time spent on reading for joy, on learning the test language per week, and on learning the test language outside of normal school hours to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ). Specifically, the amount of time spent learning the test language per week ($B = .00, OR = 1.00, Wald statistic = 57.38, p < .01$) was found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) are equal to those of a 15-year-old student of Turkey who had spent one minute less learning the test language per week. As the odds ratio was 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) was positively correlated with the amount of time spent learning the test language per week. Furthermore, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading

assessment (PV4READ) are .91 times those of a 15-year-old student of Turkey who had spent one minute less learning the test language outside of normal school hours. As the odds ratio was less than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV4READ) was negatively correlated with the amount of time spent learning the test language outside of normal school hours. Table 7 reports the strength of the relationship between the predictors and students' scoring above the OECD average (493) on the PISA'09 reading assessment (PV5READ).

Table 7.
Summary of Logistic Regression Analysis for Variables Predicting Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (PV5READ) (N = 4996)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.71* (.08)	1.74	2.04	2.39
Age_D1	-.88* (.19)	.29	.42	.60
Age_D2	-.71* (.17)	.35	.49	.69
Mother's highest level of schooling	-.75* (.14)	.36	.47	.62
Father's highest level of schooling	-.55 (.27)	.34	.58	.99
Language spoken at home	.56 (.31)	.95	1.75	3.21
Book_D1	1.23* (.23)	2.17	3.42	5.38
Book_D2	.15 (.25)	.72	1.16	1.88
Model 2				
Attitudes toward reading	.52* (.09)	1.42	1.68	2.00
Model 3				
Time spent on reading for joy	.00 (.04)	.92	1.00	1.08
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00
Time spent on learning the test language outside of normal school hours	-.14* (.04)	.80	.86	.94

* $p < .01$

The results indicated that a significant amount of variability in the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) may be accounted for by the combination of the following background variables: Gender, Age_D1, Age_D2, mother's highest level of schooling, and Book_D1, $R^2 = .11$ (Cox & Snell), .15 (Nagelkerke). According to the first model, which was found to be significant ($\chi^2(8) = 318.28, p < .01$), it can be inferred that gender ($B = .71, OR = 2.04, Wald statistic = 75.47,$

$p < .01$), Age_D1 ($B = -.88$, $OR = .42$, Wald statistic = 21.49, $p < .01$), Age_D2 ($B = -.71$, $OR = .49$, Wald statistic = 16.97, $p < .01$), mother's highest level of schooling ($B = -.75$, $OR = .47$, Wald statistic = 29.17, $p < .01$), and Book_D1 ($B = 1.23$, $OR = 3.42$, Wald statistic = 28.30, $p < .01$) are independent factors effective in determining the probability of scoring above the OECD average of 493 (PV5READ). Since their odds ratios were greater than 1, gender, and Book_D1 were positively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ). In other words, the odds that a 15-year-old female student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are 2.04 times those of a 15-year-old male student of Turkey. Furthermore, the odds that a 15-year old student of Turkey who had 0-100 books at home would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are 3.42 times those of a 15-year-old student of Turkey who had more than 500 books at home. However, Age_D1, Age_D2, and mother's highest level of schooling were negatively correlated with the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ). The odds that a 15-year-old student of Turkey who had been younger than the age of 7 when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are .42 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. Furthermore, the odds that a 15-year-old student of Turkey who had been 7 years old when entering primary education would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are .49 times those of a 15-year-old student of Turkey who had been older than 7 when entering primary education. The odds that a 15-year-old student of Turkey whose mother's highest level of schooling was ISCED 1 and above would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are .47 times those of a 15-year-old student of Turkey whose mother had not completed ISCED 1.

As the second model was found to be significant ($\chi^2(9) = 355.09$, $p < .01$), adding students' attitudes toward reading to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ). That

is, attitudes toward reading were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) ($B = .52$, $OR = 1.68$, Wald statistic = 35.99, $p < .01$). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are 1.68 times those of a 15-year-old student of Turkey whose attitudes toward reading was one unit worse. As the odds ratio was greater than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) was positively correlated with attitudes toward reading.

As the last model was found significant ($\chi^2(12) = 414.72$, $p < .01$), adding the amount of time spent reading for joy, learning the test language per week, and learning the test language outside of normal school hours to the logistic regression model improved the ability to predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ). Specifically, the amount of time spent learning the test language per week ($B = .00$, $OR = 1.00$, Wald statistic = 49.08, $p < .01$) and the amount of time spent learning the test language outside of normal school hours ($B = -.14$, $OR = .86$, Wald statistic = 13.01, $p < .01$) were found to significantly predict the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ). Thus, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are the same as those of a 15-year-old student of Turkey who had spent one minute less learning the test language per week. As the odds ratio was 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) was positively correlated with the amount of time spent learning the test language per week. Furthermore, the odds that a 15-year-old student of Turkey would score above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) are .86 times those of a 15-year-old student of Turkey who had spent one minute less learning the test language outside of normal school hours. As the odds ratio was less than 1, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment (PV5READ) was negatively correlated with the amount of time spent learning the test language outside of normal school hours.

Considering the results of these five binomial sequential logistic regression analyses, it can be concluded that five of the background variables (gender, Age_D1, Age_D2, mother's highest level of schooling, Book_D1), one affective variable (attitudes toward reading), and one time variable (time spent on learning the test language per week) are effective in predicting the probability of scoring above the OECD average of 493 on the PISA'09 reading assessment. Regarding the common predictors of all plausible values, Beta values, standard errors, and odds ratios with lower and upper values in the 95% confidence interval calculated for each plausible value have been averaged as suggested in the PISA Data Analysis Manual: SPSS® Second Edition published by OECD (2009b) and presented in Table 8 below.

Table 8.
Summary of Logistic Regression Analysis for Variables Predicting Scoring above the OECD Average (493) on the PISA'09 Reading Assessment (N = 4996)

Variable	B (SE)	95% CI for Odds Ratio		
		Lower	Odds Ratio	Upper
Model 1				
Gender	.74* (.08)	1.78	2.09	2.45
Age_D1	-.98* (.19)	.28	.40	.55
Age_D2	-.76* (.23)	.33	.47	.66
Mother's highest level of schooling	-.65* (.14)	.40	.53	.69
Book_D1	1.04* (.23)	1.84	2.86	4.45
Model 2				
Attitudes toward reading	.54* (.09)	1.45	1.72	2.04
Model 3				
Time spent on learning the test language per week	.00* (.00)	1.00	1.00	1.00

* $p < .01$

According to the findings in Table 8, the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment was positively correlated with gender, Book_D1, attitudes toward reading, and time spent on learning the test language per week, but negatively related to Age_D1, Age_D2, and mother's highest level of schooling. In other words, 15-year-old female students of Turkey were 2.09 times; those who were younger than the age of 7 when entering primary education were .40 times; those who were 7 years old when entering primary education were .47 times; those whose mother's highest level of schooling was ISCED 1 and above were .53 times;

those who possessed 0-100 books at home were 2.86 times; those who had positive attitudes toward reading were 1.72 times; and those who had spent a certain amount of time learning the test language per week were equally likely to score above the OECD average of 493 on the PISA'09 reading assessment.

Conclusions and Discussion

Overall, five of the background variables [gender (in favor of girls), school-entry age (in favor of those who had been older than 7 while entering primary school), mother's highest level of schooling (in favor of those whose mothers had not completed ISCED 1), the number of books present at home (in favor of those who had 0-100 books at home)], an affective variable [attitudes toward reading (in favor of those who had positive attitudes toward reading)], and one time variable [amount of time spent learning the test language per week (in favor of those who had spent any amount of time learning the test language per week)] were found to predict the probability of scoring above the OECD average of 493 on the PISA'09 reading assessment. Regarding these findings, this study can contribute to the literature on this topic by identifying which factors contributed to 15-year-old students' success on the PISA'09 reading assessment in Turkey.

The OECD (2011b) reported that not only have girls continually outperformed boys in reading since the first PISA study was conducted in 2000, but that this gap has widened more than 20% since 2000. Although the effect of gender on reading performance in favor of girls has been cited by many, White (2007) has suggested that any observed differences may be of little practical consequence, and that boys' lower level of achievement in reading has been greatly overstated through the media; a situation which has contributed to the adoption of an unexamined and unsophisticated approach rather than a more specific approach of asking "which boys" and "which girls" perform better (Alloway, 2007). Furthermore, the appearance of higher reading literacy performance in girls was reported to be biased since in reality less talented boys often feel a higher level of overconfidence than less talented girls due to being praised more frequently by their teachers (Mechtenberg, 2009). As such, a more in-depth investigation of the gender gap (through more contextualized longitudinal studies from a pluralistic perspective) is needed.

The results indicated positive relationships between the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment and starting school at an older age. Although an earlier start was found to be an advantage when achievement scores were adjusted for economic and social differences (Elley, 1992), Ponzo and Scoppa (2011) concluded that younger children score substantially lower than their older peers do beginning in tenth grade and that the advantage of older students did not dissipate as they continued to grow older. Moreover, secondary school students were found more likely to be tracked in schools focusing more on academics than vocational schools if they are born during the early months of a year (Ponzo & Scoppa, 2011). Jürges and Schneider (2006; 2007) concluded that younger pupils are less often recommended to the German Gymnasium which is both the most academic and the most attractive track in terms of later life outcomes in Germany.

The existence of negative association between the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment and their mothers' highest level of schooling might arouse feelings of wonder since Turkey's 15-year-old students' whose mothers had not completed ISCED 1 were more likely to score above the OECD average of 493 on the PISA'09 reading assessment than those whose mothers had completed ISCED 1 and above. A possible explanation might be that the mothers of such exceptional students might have missed the opportunity to pursue their own education despite their willingness to do so. The outstanding reading performance of Turkey's 15-year-old students' whose mothers had not completed ISCED 1 might be accounted for by the fact that their mothers had high expectations, believing that their children could, and should, do their absolute best, thereby working to intrinsically motivate their children toward literacy.

The results indicated positive relationships between the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment and their possession of 0-100 books at home. At first, this result may be surprising for those who expect that more books at home indicate increased reading achievement. However, the result is expected since the number of books at home is strongly related to maternal educational level (Chiu & McBride-Chang, 2006). Thus, exceptional Turkey's 15-year-old students' whose mothers had not completed ISCED 1 might

be expected to have no more than 100 books at home. The results related to the number of books at home might also indicate again that less is more. In other words, it might be quality rather than quantity that matters. The aforementioned correlation should be interpreted with caution as Kanyongo, Certo, and Launcelot (2006) found a weaker relationship between number of books at home and reading achievement, explaining it by the way the data itself were collected. That is, students might not be specifically asked for the number of 'reading books' at home, but the number of books in general, which might only indicate the total amount of books at home, including those they would never read.

Positive relationships between attitudes toward reading and the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment as expected were also supported by Petscher (2010) who performed a meta-analysis of 32 studies in total, examining the relationship between attitudes toward reading and achievement in reading, in which he concluded that the attitudes of elementary and secondary school students toward reading and their level of achievement in reading were positively correlated. As highlighted above, the intrinsic motivation of 15-year-olds of Turkey might be behind their higher level of achievement, as measured by standardized tests (Gottfried, 1990 cited in Kush, Watkins, & Brookhart, 2005).

The results also indicated that the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment is positively related to the amount of time spent learning the test language per week. In other words, the probability of students' scoring above the OECD average of 493 on the PISA'09 reading assessment increases as they study longer. This might be due to the characteristics of those exceptional 15-year-olds of Turkey who had spent approximately four hours per week learning the test language at average. As they might have been learning the test language for intrinsic reasons, it is assumed that they would spend long hours in individual study. Hence, this might increase the probability of their scoring above the OECD average on the PISA'09 reading assessment. The results of a study conducted by Liu, Maddux, and Johnson (2004) also suggested that although motivation certainly does have an impact on achievement mediated by the amount of time spent learning, spending long hours in individual study does not necessarily bring about better performance (OECD, 2011c).

As the probability of Turkey's 15-year-old students' scoring above the OECD average of 493 on the PISA'09 reading assessment may be accounted for by their intrinsic motivation to read and learn the test language, intrinsically motivating instruction based on challenge, curiosity, and fantasy might be designed, as proposed by Malone (1981). According to Árnason (2006), teachers can help students' master literary skills by asking them to offer a poem which they had not seen before or to find the main idea of a story analyzed and the reasons behind the story. To help stimulate their curiosity, teachers can present information about a particular topic in fragments, with important details missing or relate the topic to their personal lives. Teachers can also encourage self-expression in students by giving them choices between different assignments, minimizing supervision over group projects, and letting them monitor and evaluate their own learning. In order to encourage students to create and foster good peer relationships, they can be provided with tasks and activities requiring each other's knowledge.

By doing so, it becomes possible to encourage less motivated students to become lifelong learners who continue to educate themselves outside of school long after external motivators, such as grades and diplomas, have been removed (Kohn, 1993 cited in Brewster & Fager, 2000).

Parallel to Schreiber's (2002) final remarks, this study also shows that logistic regression can be used to investigate factors related to academic success based on a pre-determined criterion. However, as Schreiber (2002) did, it also seems important to state that it will be better to consider previous PISA studies and other research to interpret the findings of this study as it is limited to the data from a very select group of students.

Acknowledgement

Special thanks go to the English Language Support Unit at Afyon Kocatepe University for having volunteered their time and expertise to proofread and correct the English edition of this study.

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