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An Investigation of Variables Predicting the Reading Literacy in PISA 2018

Savaş Pamuk, Ph.D. Researcher, Akdeniz University, Türkiye, savaspamuk@gmail.com
0000-0001-8661-4262

Devrim Alıcı, Prof. Dr., Mersin University, Türkiye, devrimozdemir@mersin.edu.tr
0000-0001-5542-0609

Mehtap Aktaş, Assist. Prof. Dr., Kafkas University, Türkiye, mhtpaktas@gmail.com
0000-0002-3192-7445

Hüseyin Selvi, Assoc. Prof. Dr., Mersin University, Türkiye, hsyn_selvi@yahoo.com.tr
0000-0002-3513-0003

N. Bilge Uzun, Assoc. Prof. Dr., Mersin University, Türkiye, n.bilgeuzun@gmail.com
0000-0003-2293-4536

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Abstract

This study aims to determine variables predicting students' reading literacy in the PISA application. Turkey's PISA 2018 sample data that consisted of 186 schools and 6890, representing 12 regions from Turkey were analyzed by conducting a two-level hierarchical linear modeling to examine students' reading literacy at the student and school levels. The results indicated that, according to the student-level predictors, female students had higher reading literacy and the reading literacy was positively influenced by an increase in predictors of father's education level, predictors showing metacognition levels, socioeconomic levels, parents' emotional support to the students, reading pleasure levels, and reading attitudes. Considering the school-level predictors, deficiencies in educational materials and student behaviors hindering learning reduced achievement, whereas teacher behaviors hindering learning had a positive effect on achievement. Offering extracurricular creative activities in the school environment reduced the negative impact of the educational status of the mother to a certain extent. The sub-dimension of the metacognitive level assessment had an increased impact on reading literacy, but student behaviors hindering learning had a negative effect on it. Considering the findings, the reasons for the low level of reading literacy of students and how it can be increased were discussed.

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INTRODUCTION

The Program for International Student Assessment (PISA), developed in 1997, is a follow-up study projected by the Organization for Economic Cooperation and Development (OECD), targeting the evaluation of the utilization level of knowledge and skills of 15 years old students in daily life in member and participating countries. The PISA application aims at determining the mathematic literacy, scientific literacy, and reading literacy of 15 years old students. In the light of the findings obtained from the PISA application, countries are expected to direct their education policies and increase the quality of their education systems by making them more functional.

The concept of literacy highlighted in PISA is an important concept that supports the individual, social and economic development of people in today's society. According to Hauser, Eley, Koening, and Elliott (2005, 23-24),

> Literacy is important for all aspects of an individual's life, from handling personal affairs, to raising children, to engaging in the workforce, to participating in a democratic society. … In the home, individuals use their literacy skills for a wide range of activities, such as reading mail, paying bills, handling contracts and leases, and helping children with school matters. Regardless of one's occupation, literacy skills are needed in a variety of work contexts—applying for a job, traveling to and from work, choosing a benefits package, and understanding and handling paychecks. Literacy skills are also needed for adults to participate in a democratic society. Such activities as keeping apprised of local and national issues, understanding one's rights and responsibilities, reading ballots, and voting all require literacy skills.

The concepts of reading literacy in PISA are defined clearly by the OECD (2019). Accordingly, "reading literacy is understanding, using, reflecting on and engaging with written texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society. This definition acknowledges the diversity and complexity of the processes involved in daily reading activities" (OECD, 2019, 27).

In the OECD (2020) PISA 2018 Turkey report, students in Turkey are stated to have scored below the OECD average in reading where the proportion of students achieving proficiency levels of five or six in at least one field was lower than the OECD average. Yet, a small proportion of students reached the minimum level of proficiency (2 and above) in at least one domain. In the same report, it was stated that 74% of the students in Turkey achieved at least a second-level reading proficiency (OECD average: 77%) in the findings related to reading literacy. As per this finding, these students can identify the main idea of a medium-length text, find information based on clear, but sometimes complex criteria, and reflect on the aim and form of the texts when clearly guided. Yet, about 3% (OECD average 9%) of the students in Turkey's sample demonstrated the best performance, achieving level five or six in the PISA reading test. At these levels, students can comprehend long texts, deal with abstract or counterintuitive concepts, and make distinctions between facts and opinions based on implicit clues to the content or source of information.

Compared to reading literacy tests conducted in the past years, PISA 2018 Turkey average (466 points) was below the OECD average, but higher than in 2003 (441 points) and 2006 (447 points). According to the results in 2009, there was no significant difference (466 points). The 2012 average (457 points) also remained below the desired score. Despite experiencing a serious decline in all three areas compared to all years, it was quite high compared to the 2015 (428 points) average. Noting that the decline in PISA 2015 results was negligible, OECD (2020) declared that the decline between 2012 and 2015 or the revival between 2015 and 2018 does not reflect the long-term trajectory. These findings revealed that there are significant problems in our country regarding the literacy competency of students of age 15. Thus, identifying factors affecting reading literacy is important in terms of supporting individual, social, and economic development.

There are plenty of studies examining the PISA reading literacy level in the literature. For instance, these studies cover different predictors such as gender (Batyra, 2017), socioeconomic status and in-school predictors (teaching strategy, assessment and evaluation strategy, classroom climate, teacher-student communication, the reading strategy used by the student) (Güzle Kayır, 2012), school location, reading habits, learning strategies (Arıcı & Altıntaş, 2014), parents' educational status, cultural opportunities, and education resources in the home (Gülleroğlu, Bilican Demir, & Demirtaşlı, 2014), familial factors (Avşar & Yalçın, 2015), financial assets, cultural assets, education resources in the home, information communication technology resources, parents' profession, and the number of books in the home (Urfalı Dadandı, Dadandı, & Koca, 2018).

There are also studies in the literature examining PISA reading literacy at both student and school levels with hierarchical linear modeling. For instance, Arı and Keskin (2021) examined factors affecting Turkish students' perceptions of the reading task difficulty in PISA 2018 using a two-level HLM. The study findings revealed that the between-school differences predict around 9.8% of the difference in students' perception of the reading literacy task difficulty in PISA, while the rest were due to the between-student differences. Koyuncu and Fırat (2020) determined the most important factors affecting students' reading literacy in all three countries as economic, social, cultural status index, and metacognition.

Tavşancıl, Yıldırım and Bilican-Demir (2019) investigated the prediction power of students' learning strategies and reading enjoyment predictors in predicting their PISA 2009 reading achievement, and the mediating effect of reading enjoyment predictor on the relationship between reading achievement and learning strategies. The findings of the study revealed that the frequency of using control and recall strategies was significant in predicting students' reading performance, while the use of elaboration strategy was a non-significant predictor. Using two-level HLM, Erdoğan (2018) examined the relationship between students' socioeconomic characteristics and reading skills. The findings revealed an association between the reading skills and mother's education level, father's education level and home opportunities, lack of qualified teachers, residential area, number of activities organized at school, student-teacher ratio, and school size. Yıldırım (2012) conducted a study to determine student and school-level factors affecting the reading comprehension skills of the students in the sample of The Netherlands, Korea, and Turkey in the PISA 2009 application, and to reveal the similarities and differences between countries. When the student-level predictors were examined in terms of reading skills, the predictor variables of enjoying learning, the frequency of using understanding-remembering-summarizing strategies during reading, sociocultural characteristics, and economy were impactful on the reading skills of students in all three countries and there were differences in reading skills between countries in terms of these predictors. At the same time, the predictor variables of school size, teacher qualification, school management, and the education of teachers and responsibility in-school tasks were also influential.

While the student-level predictors of reading enjoyment and parents' emotional support as well as the school-level predictors of the shortage of educational materials, student behavior hindering learning and teacher behavior hindering learning given in Ertem's (2021) study are the same in the present study, other predictors are different in both studies. In this context, the present study may make a significant contribution to literature in terms of addressing different other predictors that will affect the PISA 2018 reading literacy. Although Koyuncu and Fırat's (2020) study also includes similar predictors, it differs from the current study in terms of purpose and the statistical techniques employed. Also, though Arı and Keskin's (2021) study was conducted based on the PISA 2018 data, the researchers did not study the factors affecting reading literacy, but examined the factors affecting students' perception of reading task difficulty. In this respect, the present study differs from the study conducted by Arı and Keskin (2021). This study is expected to identify both the student and school-level predictors affecting the reading of students in Turkey and to contribute to all stakeholders as

regards inquiring, researching, and implementing activities, regulations, and changes that can be fulfilled to increase reading literacy.

METHOD

This research is a relational study, which examines the relationships between student and school characteristics and reading literacy based on the PISA 2018 Turkey sample.

POPULATION AND SAMPLE

The population of the study consists of 15-year-old students in Turkey in the year 2018. According to Level-1 Nomenclature of Territorial Units for Statistics (İBBS) in Turkey, 186 schools and 6890 students representing 12 regions participated in the PISA 2018 (Ministry of National Education [MoNE], 2019).

Of the 15-year-old students represented in the PISA 2018 application, 43.7% attended Anatolian High Schools, 31.1% Vocational and Technical Anatolian High Schools, and 13.7% Anatolian Imam Hatip High School. Students studying at Science High Schools, Social Sciences High Schools, Multi-Program Anatolian High Schools, and Anatolian Fine Arts High Schools constituted 11.2% of the PISA 2018 Turkey sample. However, 0.3% of the students in the target group continued their education at the secondary school level. Further, 49.6% of Turkey's sample consisted of female and 50.4% male students. Examining the grade-level distribution of students, 78.8% were in grade 10, 17.7% in grade 9, and 2.9% in grade 11. The proportion of students in other grade levels was below 1% (MoNE, 2019).

DATA COLLECTION TOOLS

The data used in this study were obtained using the PISA 2018 student and school questionnaires prepared by the OECD. The predictors and levels in this study are elaborated below:

LEVEL-1 PREDICTORS

Level-1 predictors were determined as student characteristics in the study. These predictors were metacognition, enjoyment of reading, student gender, socioeconomic level, parents' emotional support to the student, and the education level of parents. Information concerning these predictors was obtained from the student questionnaire prepared by OECD within the scope of the PISA applications. This questionnaire was filled out by students participating in PISA 2018.

LEVEL-2 PREDICTORS

Level-2 predictors were determined as school characteristics in the study. These predictors were student-teacher ratio, class size, creative extracurricular activities, shortage of educational materials, student and teacher behaviors hindering learning. This questionnaire was filled out by school administrators

DATA ANALYSIS

In this study, data were analyzed using two-level HLM to reveal how the variability in students' reading literacy was affected by student (Level-1) and school (Level-2) predictors. This is because of the hierarchical and nested nature of the data used. The use of two-level HLM in datasets with this type of nesting is considered important for the validity of the findings (Raudenbush & Bryk, 2002).

FINDINGS

One-Way ANOVA Model, which was conducted in the first stage of the HLM, revealed that the weighted least squares estimate of the mean reading literacy score was 4592.78 and significantly differed from zero ($p<.05$) and the standard error was 49.94. The reliability value of the reading literacy

mean score was .98. The Intra-Class Correlation Coefficient (ICC) value of .385 showed that 38.5% of the total variance of reading literacy could be attributed to the predictors relating to schools and the remaining 61.5% to those of students.

The Random-Coefficients Regression Model revealed that the reading literacy of female students was higher than that of male students ($\gamma = 43.73$, SE = 14.86, $p < .05$). The reading literacy levels of students decreased as their mothers' education status increased ($\gamma = -20.94$, SE = 4.86, $p < .05$), but increased as their fathers' educational status increased ($\gamma = 13.94$, SE = 3.99, $p < .05$). Further, the reading literacy levels of students were positively affective by predictors showing their metacognition levels ($\gamma = 66.60$, SE = 7.21, $p < .05$ for Understanding and Remembering sub-dimension, $\gamma = 62.91$, SE = 7.35, $p < .05$ for Summarization sub-dimension, and $\gamma = 102.53$, SE = 8.49, $p < .05$ for Evaluation sub-dimension). Students' reading literacy increased as their socioeconomic levels ($\gamma = 26.92$, SE = 9.35, $p < .05$), parents' emotional to students ($\gamma = 39.99$, SE = 6.13, $p < .05$), levels of reading enjoyment ($\gamma = 91.09$, SE = 7.94, $p < .05$), and attitude ($\gamma = 16.21$, SE = 5.87, $p < .05$) increased. Another finding of the study, on the other hand, indicated that students with a high mastery goal orientation have low achievement ($\gamma = -30.39$, SE = 6.54, $p < .05$).

Predictors causing differences between-school differences in terms of the reading literacy levels of students are the mother's educational status, the evaluation sub-dimension of metacognition, socioeconomic level, levels of reading enjoyment, and mastery goal orientations. Finally, the study found that student predictors added to the null model reduced the Level-1 error variance by 18.88%.

According to the Intercepts and Slopes as Outcomes Model, students' reading skills differed differences as per all predictors included in the Level-1. Father's education level ($\gamma = 14.06$, SE = 3.99, $p < .05$), metacognition level ($\gamma = 66.58$, SE = 7.21, $p < .05$ for Understanding and Remembering Sub-Dimension, $\gamma = 62.34$, SE = 7.34, $p < .05$ for Summarization sub-dimension, and 103.24, SE = 8.09, $p < .05$ for Evaluation sub-dimension), socioeconomic level ($\gamma = 25.55$, SE = 9.43, $p < .05$), family emotional support ($\gamma = 40.76$, SE = 6.13, $p < .05$), level of learning enjoyment ($\gamma = 89.63$, SE = 7.85, $p < .05$), and student attitude ($\gamma = 16.10$, SE = 5.86, $p < .05$) were predictors that had positive effects on the reading literacy of students. However, the mother's education level ($\gamma = -20.82$, SE = 4.75, $p < .05$) was a predictor, which had a negative effect. Considering this result, the reading literacy scores of students decreased as their mothers' education levels increased. On the other hand, the gender difference was also reflected significantly in the results ($\gamma = 43.98$, SE = 14.83, $p < .05$). Accordingly, female students were more successful in reading literacy than male students. Another surprising finding among the Level-1 predictors was observed in the mastery goal orientation ($\gamma = -30.84$, SE = 6.46, $p < .05$). As students' mastery goal orientations increased, their reading literacy decreased.

Findings obtained from the fourth stage of the HLM are summarized in Table 1.

Table 1. *Final Estimation of Fixed Effects for the Students' Reading Skills.*

Fixed Effects	*Coefficients*	*SE*
Model for Class Means[1]		
Intercept, γ_{00}	4528.13	46.95
Creative Activities, γ_{01}	106.56**	40.17
Educational Material Shortage, γ_{02}	-150.87**	43.57
Students' Behavior Hindering, γ_{03}	-300.27***	47.42
Teachers' Behavior Hindering γ_{04}	126.19**	46.39
Gender, γ_{10}	43.98**	14.83
Mother Education Level, γ_{20}	-20.82***	4.75
Creative Activities, γ_{21}	11.13**	4.02
Father Education Level, γ_{30}	14.06**	3.99
UNDREM, γ_{40}	66.58***	7.21
METASUM, γ_{50}	62.34***	7.34
METASPAM, γ_{60}	103.24***	8.09
Creative Activities, γ_{61}	16.20*	8.00
Students' Behavior Hindering, γ_{62}	-28.55**	8.23
Wealth, γ_{70}	25.55**	9.43
Family Emotional Support, γ_{80}	40.76***	6.13
Joyread, γ_{90}	89.63***	7.85
Creative Activities, γ_{91}	22.21**	7.32
ATTLNACK, γ_{100}	16.10**	5.86
Mastery Goals, γ_{110}	-30.84***	6.46
Students' Behavior Hindering, γ_{111}	16.26*	6.34

An examination of the effects of Level-2 predictors on reading literacy, providing creative extracurricular activities increases the level of reading literacy (γ = 106.56, SE = 40.17, p < .05). As expected, the shortage of educational materials (γ = -150.87, SE = 43.57, p < .05) and student behavior hindering learning (γ = -300.27, SE = 47.42, p < .05) reduced the reading literacy. By contrast, teacher behavior hindering learning positively affected reading literacy (γ = 126.19, SE = 46.39, p < .05). However, when the mediating role of these predictors between student predictors and reading literacy were examined, providing creative extracurricular activities in the school setting reduced the negative effect of the mother's education level to a certain extent (γ = 11.13, SE = 3.63, p < .05), increased the effect of the evaluation sub-dimension of metacognition on achievement (γ = 16.20, SE = 7.78, p < .05), and mediated the positive effect of reading enjoyment levels (γ = 22.21, SE = 6.80, p < .05). Another school-level predictor, student behaviors hindering learning negatively affected the reading literacy of the evaluation sub-dimension of metacognition level (γ = -28.55, SE = 8.20, p < .05), but reduced the negative effect of the mastery goal orientation (γ = 16.6, SE = 6.26, p < .05).

Considering the model with all these student and school predictors added, it reduced the unexplained school-level variance by 30.86%.

DISCUSSION, CONCLUSION AND IMPLICATIONS

This study attempted to explain the variability in the reading literacy of students in the PISA 2018 Turkey sample using a two-level HLM. The results, firstly, revealed that female students had higher reading literacy and the reading literacy was positively influenced by an increase in predictors of father's education level, predictors showing metacognition levels, socioeconomic levels, parents' emotional support to the students, reading pleasure levels, and reading attitudes. First of all, considering the education level of parents from Level-1 predictors, some of the studies conducted on this subject have concluded that the level of reading literacy of individuals increases as the education level of parents increases (i.e. Gülleroğlu et al., 2014; Gürsakal, 2012; Magnuson, 2007; Yıldırım, 2012). There are studies suggesting that this is due to the fact that parents provide richer learning

environments to their children as their education level increases and that this situation positively affects the reading literacy levels of students (Hernandez 1993 as cited in Lemke et al., 2005). In addition, there are also studies showing that the literacy level of individuals increases as the education level of the father increases, but the increase or decrease in the mother's education level does not have a statistically significant effect on their literacy levels (Magnuson, 2007). In the OECD (2012) report, it is stated that the education level of parents is theoretically more influential on student outcomes than their professions. Studies have shown that parents' education level affects the PISA scores of students (Anıl, 2009). She states the variable predicting the science achievement of 15 years old students in Turkey is the "father's educational status".

As a result of this research, it was found that individuals' reading literacy decreases as the level of their mothers' education increases, but their reading literacy increases as the level of their father's education increases. Schnabel, Alfed, Eccles, Köller, and Baumert (2002) found that as the education level of mothers increases, the pressure they put on their children's school achievement increases. The findings of another study show that as the education level of the mother increases, the level of academic burnout experienced by her children increases (Naftali, 2010). In this study, the reasons why an increase in the education level of mothers has a negative impact on reading literacy could be linked to the pressure they put on their children and the level of academic burnout. In parallel to the findings of this study, other studies in the literature also report that the reading literacy level of individuals increases with an increase in the education level of their fathers (Gülleroğlu et al., 2014).

The subject of whether there is an association between the income level of students' families and their academic achievements has received profound attention in international studies in education (Bindak, 2018). At this point, it is stated that the current financial state of households provides more information than the income level predictor (OECD, 2012). Families with high socioeconomic levels have a positive effect on their children's achievements in terms of providing rich learning environments and housing resources (Gülleroğlu et al., 2014). This study also found that the reading literacy level of individuals increases with an increase in the socioeconomic level of families. These findings are also supported by the existing literature (Gülleroğlu et al., 2014). Studies in the literature also show that there is a significant relationship between students' gender and their reading skills (Shera, 2014). Female students are 1.71 times likely to be successful in PISA examinations than male students (Bindak, 2018). Significant evidence from the research reveals that girls, on average, outperform boys in reading achievement (Shera, 2014). Similar findings were obtained in this study, showing consistency with the literature. Furthermore, of Level-1 predictors, metacognition skills are active supporters of individuals' academic achievement (Grant & Dweck, 2003). In parallel to the past research findings, this study also showed that reading literacy increases with an increase in metacognition skills. Similarly, the study found that children's reading literacy levels increase as the emotional support from parents increases. This finding also supports the previous studies in the literature (Ertem, 2021). In addition to PISA results, there are also studies in the literature that show positive relationships between parent support and academic performance (Walker, Shenker, & Hoover-Dempsey, 2010).

There are studies in the literature suggesting that reading for pleasure, one of the Level-1 predictors, is closely related to reading comprehension (Unrau & Schlackman, 2006). Student higher-order reading competencies are believed to be influenced by the predictor of reading enjoyment. The literature review shows that reading activities that students enjoy can improve their high-order reading skills (Ertem, 2021; Kasapoğlu, 2009; Tavşancıl et al., 2019). An examination of the results of this study also indicated that enjoying reading has a positive effect the reading literacy. A positive attitude towards reading was another Level-1 predictor in this study. There are sources in the literature noting that positive attitudes toward reading could be an indicator of reading achievement (Wigfield & Guthrie, 1997). Research conducted in parallel with these studies has shown that having a positive attitude towards reading significantly contributes to high reading achievements (Quinn & Jadav, 1987).

Similarly, the results obtained within the scope of this study also showed that the reading literacy of individuals having a positive attitude toward reading increases.

Mastery goal orientation aims to achieve a standard of competence defined by self-development or skill development. Individuals with a mastery goal orientation either seek task-related personal development or try to gain mastery of the task. It reflects an individual's goal to learn as much as possible (Grant & Dweck, 2003). A large number of studies show that mastery goal orientation has a positive relationship with academic achievement (Grant & Dweck, 2003; Linnenbrink-Garcia et al., 2008). However, there are also studies in which no significant relationship was observed between mastery goals and academic achievement (Pekrun et al., 2009; Theis, Sauerwein, & Fischer, 2020). In contrast to research findings in the literature, this study determined that the reading literacy levels of individuals decrease as their mastery goal orientations increase.

The study concluded that extracurricular activities, of level-1 predictors, had a positive impact on reading literacy. This result is parallel with the results of many studies (e.g., Akar & Nayir, 2015, Hinck & Brandell, 1999). Existing studies support the fact that these activities provide opportunities to develop students' interests, skills, and achievements and that the relevant activities play a key role in students' lifelong achievements (e.g., Akar & Nayir, 2015). Although the principles of extracurricular activities carried out in schools in our country are clearly determined by the relevant regulations and the significance of these activities is supported by many studies as well as the current study, it is believed that many of these activities are either overlooked or not implemented in practice. For this reason, it is believed that extracurricular activities implemented in schools should be enriched and organized in line with the interests and needs of students. In addition, one could suggest working on the planning and execution of such activities and making collaborative arrangements that encourage school administrators, teachers, and students to carry out the activities.

As was expected, student behaviors hindering learning negatively affect students' reading literacy. This finding shows consistency with many studies (Arıcı, 2019; Berberoğlu, et al., 2019). In the study that Berberoğlu et al. (2019) conducted with PISA 2015 science literacy, the predictor that yielded the highest negative relationship was negative student behaviors at school. In the PISA 2015 report, it is mentioned that "teacher resistance to change" under this index is the teacher behavior that hinders student learning the most in OECD countries (PISA, 2015). In Turkey, however, it has been determined that teacher behavior that affects students' learning the most is not responding to individual differences and needs. This study found that teacher behaviors hindering learning have a positive impact on reading literacy. This unexpected finding of the study contradicts many studies (Hattie, 2009). These studies report that there is a positive relationship between student behaviors and teachers' supportive behaviors and that teachers' supportive behaviors increase the achievement of students. To discuss the true nature of this finding in more detail, it is imperative to consider and examine the behaviors under this index separately.

As expected, the presence of a negative relationship between one of the Level-1 predictors, i.e., the shortage of educational materials, and students' achievement is also supported by other studies in the literature (Berberoğlu et al., 2019; Üstün, Özdemir, Cansız, & Cansız, 2020). Considering this relationship, it is necessary to increase the improvements in educational materials and the compensatory measures for the deficiencies. As such, giving priority to the between-school differences during the improvements that will be done is considered important.

Finally, the mediating effect of the Level-2 predictors in the relationship between the Level-1 predictors and reading literacy was examined. As mentioned above, there was a negative relationship between the mother's education level and reading literacy. However, according to the HLM findings, providing creative extracurricular activities in the school setting reduced the negative relationship between the mother's education level and student reading literacy. Similarly, it strengthens the positive relationships between students' metacognition and reading enjoyment levels and their

reading literacy. The Education at a Glance report note that there are support courses for extracurricular activities and literacy workshops are provided, especially in Turkey (OECD, 2014). Although it is believed that the course syllabuses are prepared according to the interests and needs specified in line with the curriculum, there might be points that have not fully achieved the objectives. At this point, providing these activities, whose positive contributions have been shown in several studies (e.g., Hinck & Brandell, 1999), is also influential in filling up the gap caused by the negative impact of the education level of mothers. Hinck and Brandell (1999) emphasized that extracurricular activities positively affect the metacognition levels, motivation toward learning, and thus achievement. Hence, the positive contribution of creative extracurricular activities to the relationship between metacognition and reading enjoyment levels and reading literacy is an expected state. As indicated in the OECD (2014) report, this may have occurred as a result of support courses and literacy workshops.

Student behaviors hindering learning included in the PISA 2018 dataset and used as a school-level predictor negatively affect the positive relationship between metacognition and reading literacy. PISA (2016) has described these negative behaviors as students being absent from school, not attending lessons, disrespecting their teachers, using alcohol and illegal drugs, and bullying through mocking and similar behaviors. Some of the negative behaviors noted in this statement (e.g., absenteeism, not attending the lesson) may prevent students with high metacognition levels from reflecting this skill in their reading literacy. Turkey is above the OECD average in student behaviors hindering learning. Also, this proportion increases in disadvantaged schools. From this perspective, it is of primary importance to control student behaviors that prevent learning for a positive relationship between students' metacognition levels and reading literacy. On the other hand, the study found that student behaviors hindering learning the negative effect of mastery goal orientation. This finding emerged as an expected result as well as the negative effect of mastery goal orientations on reading literacy. Therefore, discussing this finding in detail and addressing the behaviors under this index separately is considered important.

Lastly, considering the research findings, it seems necessary to carry out various revisions, taking into account the predictors discussed in this study, to improve the literacy level in Turkey. In this context, improving teacher training and language education programs at different levels of education (reading literacy goals, course contents, teaching-learning processes, and assessment and evaluation) is considered to be beneficial. In addition, it is possible to say that school environments need to be regulated in terms of the school-level predictors that have a positive impact on students' reading literacy levels. Likewise, considering the significance of the affective support provided to students, training on raising awareness of parents on this issue would make a significant contribution to reading literacy.

AUTHOR CONTRIBUTIONS

During the research process, the examination and analysis of the PISA data and the organization of the research were conducted in the meetings held jointly by all the authors. The introduction part of the study was written by N. Bilge Uzun and Hüseyin Selvi. The method and findings parts of the study were written by Savaş Pamuk and Mehtap Aktaş. The discussion, conclusion, and implications part were shared and co-written by all authors. The general coordination, mentorship, review, and final reading of the research was done by Devrim Alıcı.

REFERENCES

Akar, F., & Nayir, K. F. (2015). Eğitim kurumlarındaki sosyal kulüplerin etkililiğinin incelenmesi: Uygulamada değişim ihtiyacı. *Pegem Eğitim ve Öğretim Dergisi, 5*(2), 167-186. https://doi.org/10.14527/pegegog.2015.009

Anıl, D. (2009). Uluslararası öğrenci başarılarını değerlendirme programı (PISA)'nda Türkiye'deki öğrencilerin fen bilimleri başarılarını etkileyen faktörler. *Eğitim ve Bilim*, *34(*52), 87-100.

Arıcı, Ö. (2019). *Investigating the factors related to Turkish students' collaborative problem solving skills with mediating models according to PISA 2015 results.* [Doctoral dissertation, University of Ankara]. Council of Higher Education Thesis Center, Turkey.

Arıcı, Ö., & Altıntaş, Ö. (2014). PISA 2009 okuma becerileri yeterliklerinin sosyoekonomik alt yapı ve okul öncesi eğitime katılım açısından incelenmesi: Türkiye Örneği. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 47*(1), 423-448.

Avşar, A. S., & Yalçın, S. (2015). Determining the parental variables that explain students' reading success by using chaid analysis. *Eğitim ve Bilim, 40*(179), 1-9. http://dx.doi.org/10.15390/EB.2015.2890

Batyra, A. (2017). Türkiye'de cinsiyete dayalı başarı farkı. Aydın Doğan Vakfı ve Eğitim Reformu Girişimi Raporu. Retrieved from http://www.egitimreformugirisimi.org/yayin/turkiyede-cinsiyete-dayali-basari-farki-pisa-arastirmasi-bulgulari

Berberoğlu, G., Çalışkan, M., & Karslı, N. (2019). Variables predicting PISA scientific literacy scores in Turkey. *International Journal of Science and Education, 2*(2), 38-49.

Bindak, R. (2018). Lojistik regresyon analizi ile pisa araştırmasında öğrenci başarısının modellenmesi. *Ekonometri ve İstatistik Dergisi, 14*(28), 57–74. Doi: 10.26650/ekoist.2018.14.28.0010

Erdoğan, E. (2018). *Uluslararası öğrenci değerlendirme programında öğrencilerin sosyoekonomik özellikleri ile okuma becerileri arasındaki ilişki.* [Master's Thesis, Trakya University]. Council of Higher Education Thesis Center, Turkey.

Ertem, H. (2021). Examination of Turkey's PISA 2018 reading literacy scores within student-level and school-level variables. *Participatory Educational Research, 8*(1), 248-264. https://doi.org/10.17275/per.21.14.8.1

Grant, H., & Dweck, C. S. (2003). Clarifying achievement goals and their impact*. Journal of Personality and Social Psychology*, *85*(3), 541–553. https://doi.org/10.1037/0022-3514.85.3.541

Gülleroğlu, H. D., Bilican Demir, S., & Demirtaşlı, N. (2014). Türk öğrencilerinin PISA 2003-2006-2009 dönemlerindeki okuma becerilerini yordayan sosyoekonomik ve kültürel yordayıcıların araştırılması. *Ankara Üniversitesi Eğitim Bilimleri Fakültesi Dergisi, 47*(2), 201-222.

Gürsakal, S. (2012). PISA 2009 öğrenci başarı düzeylerini etkileyen faktörlerin değerlendirilmesi. *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi, 17*(1), 441-452.

Güzle Kayır, Ç. (2012). *PISA 2009-Türkiye verilerine dayanarak okuma becerileri alanında başarılı okullar ile başarısız okulları ayırt eden okul içi etmenler ve sosyo ekonomik faktörler.* [Master's Thesis, Akdeniz University]. Council of Higher Education Thesis Center, Turkey.

Hauser, R. M., Edley, C. F., Koenig, J. A., & Elliott, S. W. (2005). *Measuring literacy: Performance levels for adults.* National Academies Press.

Hattie, J. (2009) *Visible Learning: A synthesis of over 800 meta-analyses related to achievement*. Routledge.

Hinck, S. S., & Brandell, M. E. (1999). Service learning: Facilitating academic learning and character development. *National Association of Secondary School Principals Bulletin, 83*, 16-25.

Kasapoğlu, K. (2009). A logistic regression analysis of Turkey's fifteen-year-olds' scoring above the OECD average on the PISA'09 reading assessment. *Educational Sciences: Theory & Practice*, *14*(2), 649–667.

Koyuncu, İ., & Fırat, T. (2020). Investigating reading literacy in PISA 2018 assessment. *International Electronic Journal of Elementary Education*, *13*(2), 263–275. https://doi.org/10.26822/iejee.2021.189

Lemke, M., Sen, A., Johnston, J.S., Pahlke, E., Williams, T., Kastberg, D., & Jocelyn, L. (2005). *Characteristics of U.S. 15-year-old low ahievers in an international context: Findings from PISA 2000 (NCES 2006-010).* U.S. Department of Education, National Center for Education Statistics. Government Printing Office.

Linnenbrink-Garcia, L., Tyson, D. F., & Patall, E. A. (2008). When are achievement goal orientations beneficial for academic achievement? A closer look at main effects and moderating factors. *Revue Internationale de Psychologie Sociale*, *21*(1–2), 19–70.

Magnuson, K. (2007). Maternal education and children's academic achievement during middle childhood. *Developmental Psychology*, *43*(6), 1497-1512. https://doi.org/10.1037/0012-1649.43.6.1497

MoNE (2019). *PISA 2018 Türkiye ön raporu.* Millî Eğitim Bakanlığı. Retrieved from https://www.meb.gov.tr/meb_iys_dosyalar/2019_12/03105347_PISA_2018_Turkiye_On_Raporu.pdf

Mutluer, C., & Büyükkıdık, S. (2017). PISA 2012 verilerine göre matematik okuryazarlığının lojistik regresyon ile kestirilmesi. *Marmara Üniversitesi Atatürk Eğitim Fakültesi Eğitim Bilimleri Dergisi, 46*(46), 97-112. https://doi.org/10.15285/maruaebd.273926

Naftali, O. (2010). Recovering childhood: Play, pedagogy, and the rise of psychological knowledge in contemporary urban China. *Modern China, 36*(6) 589–616. https://doi.org/10.1177/0097700410377594

OECD (2012). PISA 2009 technical report. PISA, OECD Publishing. http://dx.doi.org/10.1787/9789264167872-en

OECD (2014). *Education at a glance 2014: OECD Indicators.* OECD Publishing.

OECD (2017). Table III.9.18 – parents who give their child emotional support: Result based on students' self-reports, in *PISA 2015 Results (Volume III): Students' Well-Being*, PISA, OECD Publishing, Paris, https://doi.org/10.1787/9789264273856-table158-en

OECD (2019), PISA 2018 Assessment and Analytical Framework, PISA, OECD Publishing, Paris. https://read.oecd-ilibrary.org/education/pisa-2018-assessment-and-analytical-framework_5c07e4f1-en#page7

OECD (2020). Turkey - OECD. https://www.oecd.org/pisa/publications/PISA2018_CN_TUR.pdf

OECD (2021). Programme for International Student Assessment (PISA). https://www.oecd.org/pisa/

Pekrun, R., Elliot, A. J., & Meier, M. A. (2009). Achievement goals and achievement emotions: Testing a model of their joint relations with academic performance. *Journal of Educational Psychology, 101*(1), 115–135. https://doi.org/10.1037/a0013383

PISA (2015). Ulusal nihai rapor. https://odsgm.meb.gov.tr

Quinn, B., & Jadav, A. D. (1987). Causal relationship between attitude and achievement for elementary grade mathematics and reading. *Journal of Educational Research*, *80*, 366–372.

Raudenbush, S.W., & Bryk, A.S. (2002). *Hierarchical Linear Models: Applications and data analysis methods.* (2nd Ed.). Sage Publications.

Savran, Z. N. (2004). PISA projesi'nin Türk eğitim sistemi açısından incelenmesi. *Gazi Üniversitesi Türk Eğitim Bilimleri Dergisi, 2*(4), 397-412.

Schnabel, K., Alfed, C., Eccles, J., Köller, O., & Baumert, J. (2002). Parental influence on students' educational choices in the United States and Germany: Different ramifications – same effect? *Journal of Vocational Behavior*, *60*(2), 178–198. https://doi.org/10.1006/jvbe.2001.1863

Shera, P. (2014). School effects, gender and socioeconomic differences in reading performance: A multilevel analysis. *International Education Studies, 7*(11), 28-39. http://doi.org/10.5539/ies.v7n11p28

Tavşancıl, E., Yıldırım, O., & Bilican-Demir, S. (2019). Direct and indirect effects of learning strategies and reading enjoyment on PISA 2009 reading performance. *Eurasian Journal of Educational Research, 82*, 169-189.

Theis, D., Sauerwein, M., & Fischer, N. (2020). Perceived quality of instruction: the relationship among indicators of students' basic needs, mastery goals, and academic achievement. *British Journal of Educational Psychology, 90*, 176-192. https://doi.org/10.1111/bjep.12313

Unrau, N., & Schlackman, J. (2006). Motivation and its relationship with reading achievement in an urban middle school. *Journal of Educational Research, 100*, 81-101. https://doi.org/10.3200/JOER.100.2.81-101

Urfalı Dadandı, P., Dadandı, G., & Koca, F. (2018). PISA 2015 Türkiye sonuçlarına göre sosyoekonomik faktörler ile okuma becerileri arasındaki ilişkiler. *Uluslararası Türkçe Edebiyat Kültür Eğitim Dergisi, 7*(2), 1239-1252.

Üstün, U., Özdemir, E., Cansız, M., & Cansız, N. (2020). Türkiye'deki öğrencilerin fen okuryazarlığını etkileyen faktörler nelerdir? PISA 2015 verisine dayalı bir hiyerarşik doğrusal modelleme çalışması. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 35*(3), 720-732. https://doi.org/10.16986/HUJE.2019050786

Walker, J. M., Shenker, S. S., & Hoover-Dempsey, K. V. (2010). Why do parents become involved in their children's education? Implications for school counselors. *Professional School Counseling, 14*(1), 27-41. https://doi.org/10.1177/2156759X1001400104

Wigfield, A., & Guthrie, J. T. (1997). Relations of children's motivation for reading to the amount and breadth of their reading. *Journal of Educational Psychology*, *89*(3), 420–432.

Yıldırım, Ö. (2012). *Okuduğunu anlama başarısıyla ilişkili faktörlerin aşamalı doğrusal modellemeyle belirlenmesi (PISA 2009 Hollanda, Kore ve Türkiye karşılaştırması).* [Doctoral Dissertation, Ankara University]. Council of Higher Education Thesis Center, Turkey.