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Investigating Factors that Affect Reading Literacy Skills in PISA Turkey Sample

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Abstract:

Introduction: In this study, it was aimed to examine the relationships between the variables that related the reading skills of the students and the variables related to the opportunities that the student, family, and the school have. Variables related to students' reading skills (reading skills scores/PV1READ, perception of competence in reading/SCREADCOMP and perception of difficulty in reading/SCREADDIFF) comprised the criterion variable set, and variables related to students' socio-economic and cultural characteristics (cultural possessions/CULTPOS, home educational resources/HEDRES, index of economic, social, and cultural status/ESCS, joy/like reading/JOYREAD, teacher's stimulation of reading engagement perceived by student/STIMREAD, subjective well-being: Sense of belonging to school/BELONG, student-teacher ratio/STRATIO, shortage of educational material/EDUSHORT, student behavior hindering learning/STUBEHA, teacher behavior hindering learning/ TEACHBEHA) comprised the predictive variable set.

Methods: Between two sets of variables, used canonical correlation analysis to examine, simultaneously, the relationship between these two sets and the contribution of the variables to each set. Turkey data of the PISA 2018 organized by OECD was used as the sample. PISA 2018 Turkey data consisted of 6890 Turkish students from the 15-year-old age group. The variables PV1READ, SCREADCOMP, SCREADCOMP, SCREADDIFF, CULTPOS, HEDRES, ESCS, BELONG, STIMREAD and JOYREAD in the student survey and the variables STRATIO, STUBEHA, TEACHBEHA, EDUSHORT in the school survey in the PISA 2018 were used as data collection tools.

Results: A summary of the results of the canonical correlation analysis revealed that the most important factor in the predictive variable set was liking/enjoying reading, followed by the student behaviours that hinder learning, economic and

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socio-cultural status, cultural position, sense of belonging to the school, and teacher behaviours that hinder learning, respectively. In the criterion variable set consisting of students' reading skills, the most important factor was the perception of reading competence, followed by reading scores and perception of reading difficulty, respectively. In this context, it can be said that the variable that had the most relationship with the reading literacy skills of the students was the variable of like/enjoy reading.

Discussion: It is important for teachers to include additional materials that students can enjoy in the teaching process. Positive school climate is one of the factors that help increase student achievement.

Limitations: This study focused on variables related to students' socio-economic and cultural characteristics and school-related variables as predictors of reading literacy. In addition to the variables, studies can examine the effect of the categorical variables such as gender and school type.

Conclusions: The results of the study showed that the variable that had the most relationship with the reading literacy skills of the students was the variable of like/enjoy reading. This variable was followed by student behaviours that hinder learning and the socio-economic cultural status of the students respectively. In line with the results of this study, positive school climate is one of the factors that help increase student achievement. In order for the school climate to be positive, student or teacher behaviors that prevent learning should be minimized. Thus, students can learn more easily in a school climate where there are no obstacles to learning. Finally, as the socio-economic and cultural status of the students increased, it was observed that the reading scores increased.

Key words: reading literacy, reading skills, Canonical Correlation Analysis.

Introduction

Education is one of the most important factors determining countries' social, economic, and political levels (Guler & Veysikarani, 2022). Baykul (2000) considered education to be a system. Accordingly, the education system has input, process, control assessment, and output elements. Through the assessment element, one can determine the extent to which a student, who is the most important input of this system, has achieved the educational goals. Essentially, the assessment provides an opportunity to identify the system's flaws and deficiencies (Tan, 2014, p. 14). At this point, the problems in the system stem not only from the teacher and the student. Additional problems arise due to the suitability of education programs and the financial resources allocated to education. Unfortunately, the "level of spending per student," which is an important indicator of quality in education, is quite low in Turkey compared to other OECD (Organization for Economic Co-operation and Development) countries (Demirtasli, 2014; Tan, 2014). Thus, to understand the problems in the

education system and conduct reliable analyses, it is necessary to compare the achievement levels of students with those of their peers in different countries. In this context, countries participate in evaluation platforms using international large-scale tests (Berberoglu & Kalender, 2005). The Program for International Student Assessment (PISA), launched within the OECD in 2000, is one platform enabling such a comparison. PISA, which operates on a three-year cycle, compares the students aged 15 in OECD countries in terms of math, science, and reading literacy. Additionally, it focuses on one of the three main types of literacy for each cycle (OECD, 2019). Reading literacy was the main focus of assessment of PISA 2018 (i.e., the most recent iteration).

With regard to PISA cycles' definitions of reading literacy, PISA 2000 maintained the following definition: "understanding, using and reflecting on written texts, in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society." PISA 2009 added "engagement in reading" to the definition of reading literacy. This definition also appeared in 2012 and 2015. PISA 2018 defined it as follows: "Reading literacy is understanding, using, evaluating, reflecting on and engaging with texts in order to achieve one's goals, to develop one's knowledge and potential and to participate in society." Unlike the definitions in previous years, this one omitted the word "written" and added "evaluating … texts" (OECD, 2019).

Reading literacy includes linguistic competencies, such as vocabulary, grammar, and textual information for comprehension. It also includes cognitive competence (integrating meaning with knowledge) and metacognitive competence (using appropriate strategies in processing texts). The term "literacy" indicates an individual's knowledge in a particular field. One can express reading literacy as individuals' reading of written or printed information and applying this information in different situations (OECD, 2019). PISA evaluates students in the 15-year-old age group with different profiles from different countries. Some of these students will pursue academic careers, some will enter the workforce directly without proceeding to higher education, and some will enter the workforce after completing their university education. To put their knowledge into practice in these different situations, students must acquire reading literacy.

Literacy is a very important skill not only in education but also in daily life. It is necessary for individuals to fully participate in society, acquire various information; and reflect this acquisition (Gulleroglu, Demir, & Demirtasli, 2014). In other words, individuals must understand and relate to content in different situations or fields (Coombe, Vafadar, & Mohebbi, 2020). In this context, students' success depends on their ability to use, in real life, the knowledge and skills they gained at school (Haladyna, 1997). In addition, the importance of reading literacy in school life is not limited to literature lessons. Reading literacy is equally important, as reading and comprehension are

necessary for other subjects such as math and science. Studies show the relationship between reading literacy and other lessons. For example, Caponera, Sestito, and Russo (2016) confirmed the effect of Italian students' reading literacy skills on mathematics achievement. Another study found that reading literacy supports geometry achievement (Capraro & Capraro, 2006). Essentially, a student who does not read well is unlikely to be successful because every lesson requires "reading" (Sengul, 2011). Therefore, according to the PISA 2018 results, determining the variables related to Turkish students' reading literacy will not only provide the opportunity to improve their reading skills but also help develop students' skills in other areas.

In the last 10 years, rapid developments have occurred in the field of digitalization. In turn, significant changes have occurred with regard to the future professions and social interactions of young people. Young people are spending more time with computer screens and smartphones rather than with printed materials, which has changed the structure and format of texts in the field of reading. Along with these developments, the measurement of reading literacy skills in PISA 2018 was computer-based. The platform applied an individualized test design (computer adaptive testing), which made the next question different. The PISA 2018 reading literacy assessment framework defined cognitive processes as “locate information,” “understand,” and “evaluation and reflection.” However, the cognitive process of "fluent reading,” which was taken as a separate process for the first time in PISA 2018, forms the basis of other cognitive processes. The test used two different types of questions to measure reading literacy (OECD, 2019b): items requiring selection (multiple-choice, yes/no; true/false items) and items requiring structuring by the student. Eight proficiency levels described students’ PISA 2018 reading literacy scores. These levels showed what students could and could not achieve in terms of reading skills (1.c, 1.b, 1.a, 2, 3, 4, 5, 6).

PISA also applies surveys to collect data about students' motivations, opinions about themselves, psychological characteristics with regard to learning processes, school environment, and families. Thus, research focuses on how students' reading literacy skills relate to these variables. Studies examining the relationships between these variables and PISA reading scores differ in their methods and variables. For example, one study performed multiple regression analysis to predict reading performance by socio-economic and demographic variables (Koyuncu & Firat, 2020). It revealed that economic, social, and cultural status and metacognition affect reading literacy. Another study, using regression analysis, examined the effect of online chatting on reading literacy and reported a negative effect (Luyten, 2022). Yet another study used hierarchical linear modeling (HLM) to investigate variables affecting reading literacy at both student and school levels and thereby revealed the effect of classroom climate

(Ertem, 2020). Another study using HLM analysis revealed that the increase in school digital capacities makes it easier to perceive reading literacy tasks (Arı & Keskin, 2021). Ma, Luo, and Xiao (2021), who employed academic self-concept and academic enjoyment as mediating variables, revealed that perceived teacher support together with these variables affected reading literacy. Another study investigating the effects of teacher-related variables on reading literacy showed that metacognitive strategies had a significant effect on reading success (Memisevic & Cehic, 2022).

Different studies examined the factors affecting students' reading literacy. According to these studies, multiple factors, such as students' or parents' economic, cultural, and social variables, play a role in the development of reading performance. Most of the studies used regression analysis to examine the variables predicting literacy (Koyuncu & Fırat, 2020; Muratkyzy, 2020; Luyten, 2022; Memisevic & Cehic, 2022). The present study uses PISA 2018 to group factors affecting students' reading literacy skills. The aim is to reveal the relationship between reading literacy performance and socio-economic and cultural variables. In addition to socio-economic and cultural variables, the effects of motivation sources for reading and school-related variables, which are thought to be effective in reading performance, were also examined. Unlike the studies in the literature, the present study considers the framework of reading literacy together with the perception of difficulty and the perception of competence in reading, as well as reading scores. These variables (reading scores/PV1READ, self-concept of reading: perception of difficulty/ SCREADDIFF, self-concept of reading: perception of competence/ SCREADCOMP) formed the criterion variable set. The variables investigating the relationship with the criterion variable set are the students' motivation for reading, family background, home environment and the school-related factors. If we call these indicators (which are supposed to affect students' reading literacy) the predictive variable set, they consist of: cultural possessions (CULTPOS), home educational resources (HEDRES), the index of economic, social, and cultural status (ESCS), and joy/like reading (JOYREAD), teacher's stimulation of reading engagement perceived by student (STIMREAD), subjective well-being: Sense of belonging to school (BELONG), student-teacher ratio (STRATIO), shortage of educational material (EDUSHORT), student behavior hindering learning (STUBEHA), teacher behavior hindering learning (TEACHBEHA). Canonical correlation analysis examined the relationship between these two variable sets.

Thus, the main goal was to determine the relationship between the predictor variable set, which consisted of factors related to students' socio-economic and cultural status and school-related factors and the criterion variable set, which

consisted of factors related to students' reading skills. The research questions were as follows:

(1) What level of relationship exists between the predictor variable set (students' socio-economic and cultural status and school-related factors) and the criterion variable set (factors related to students' reading skills)?
(2) To what extent do factors related to students' socio-economic and cultural status and school-related factors predict students' reading skills?
(3) What is the relative importance of factors within the predictor and criterion variable sets consisting of variables related to students' reading literacy achievement?

1 Method

1.1 Research model

The model of the present research, which aims to determine the relationship between the factors related to Turkish students' reading skills (constituting the criterion variable set) and the factors related to students' socio-economic and cultural status and school-related factors (constituting the predictor variable set), is relational. The relational research model aims to determine whether a relationship exists between two or more variables and the degree of this relationship (Fraenkel & Wallen, 2006).

1.2 Sample and data

The data of this study, the PISA 2018 Reading Literacy test and the Turkey student questionnaire, came from the official website of OECD (www.oecd.org). PISA 2018 Turkey data consisted of 6890 Turkish students from the 15-year-old age group.

The basic assumptions (normality, homoscedasticity, linearity, multicollinearity) underwent testing before the canonical correlation analysis, which is one of the multivariate statistics (Tabachnick & Fidell, 2007). At the stage of controlling the assumptions, firstly, the analysis did not include missing data. Because the amount of missing data was less than 5%, data assignment was not necessary (Tabachnick & Fidell, 2007, p. 63). Converting each variable to the z-score determined the univariate outliers. In addition, for each variable, Mahallonobis distances determined multivariate outliers. Computation of VIF and tolerance values between variables resulted in the detection of multicollinearity correlations. The variable of home possessions (HOMEPOS) was highly correlated with other predictor variables (multicollinearity) and was therefore left out as a predictor variable to the data. This was because HOMEPOS consisted of WEALTH, CULTPOS, and HEDRES variables. Levene's test and Box's statistics checked homoscedasticity. As a result, the canonical correlation analysis covered 6160 participants of PISA 2018.

1.3 Data collection tools

The data in this research obtained from the PISA 2018 reading literacy skills test, the student questionnaire and the administrator's questionnaire. The data sources included in the criterion variable set in the study constitute the framework of reading literacy. These data sources are reading literacy skills scores, perception of difficulty, and perception of competence in reading. The data sources in the student questionnaire, which constitute the set of predictor variables in the study, are cultural possessions, home educational resources, index of economic, social, and cultural status, and joy/like reading, while the data sources in the administrator's questionnaire are teacher's stimulation of reading engagement perceived by student, subjective well-being: sense of belonging to school, student-teacher ratio, shortage of educational material, student behavior hindering learning and teacher behavior hindering learning. The study's criterion and predictor variables, and their codes, appear in Table 1.

Table 1

Criterion and predictive variables used in the research and PISA 2018 codes

Name of Canonical Variable Set	*Variable Name*	*Variable Code*
Criterion Variable Set	Perception of difficulty in reading	SCREADDIFF
	Perception of competence in reading	SCREADCOMP
	Reading skills scores	PV1READ
Predictor Variable Set	Cultural possessions	CULTPOS
	Home educational resources	HEDRES
	Index of economic, social, and cultural status	ESCS
	Student-teacher ratio	STRATIO
	Teacher's stimulation of reading engagement perceived by student	STIMREAD
	Subjective well-being: Sense of belonging to school	BELONG
	Joy/like reading	JOYREAD
	Shortage of educational material	EDUSHORT
	Student behavior hindering learning	STUBEHA
	Teacher behavior hindering learning	TEACHBEHA

The variables mentioned above formed two different sets of variables of the canonical analysis. The variables in the predictor variable set (CULTPOS, HEDRES, ESCS) appear as indexes in the PISA data set. Therefore, the study treats these scores as continuous.

1.4 Data analysis

Canonical commonality correlation analysis determined the common effect of the model with the variables affecting reading literacy. Firstly, SPSS 22 statistical software checked the basic assumptions of multivariate analyses as mentioned above. After the data provided the basic assumptions, the canonical correlation analysis (CCA) began. CCA employed the R packages "Ggally," "CCA," and "CCP." The reason for preferring this analysis is that it can reveal the relationship between more than one independent variable set and dependent variable set (Tabachnick & Fidell, 2007). In other words, CCA determines the relationships between two sets of variables assumed to be related (Capraro & Capraro, 2001). This analysis expects that the total number of observations will be 20 times the variable set. Because the model contains 13 variables, the amount of data (6160) was sufficient.

2 Findings

This study considered CULTPOS, ESCS, HEDRES, JOYREAD, STRATIO, STIMREAD, BELONG, EDUSHORT, STUBEHA and TEACHBEHA as the predictor variables set and PV1READ, SCREADDIFF, and SCREADCOMP as the criterion variables set. Before the canonical correlation analysis, an examination of the correlations between the variables in the criterion and predictor variable sets took place. As seen in Table 2, the correlations in the criterion variable set range from 0.181 to 0.366. The correlations in the predictor variable set range from 0.00 to 0.560. An examination of the relationships between criteria and predictor variable sets revealed that the highest correlation was between the variables HEDRES and ESCS. The other correlation values were low.

Table 2

Correlation coefficients between variables

		PV1READ			SCREADDIFF				SCREADCOMP		
Criterion Variables	SCREADDIFF	-0.246**			1						
	SCREADCOMP	0.179**			-0.385**				1		
		ESCS	CULTPOS	HEDRES	STIMREAD	JOYREAD	BELONG	STRATIO	EDUSHORT	STUBEHA	TEACHBEHA
Predictor Variables	CULTPOS	0.517**	1**	0.450**							
	HEDRES	0.560**	0.450**	1**							
	STIMREAD	0.038*	0.098**	0.106**	1**						
	JOYREAD	0.052**	0.187**	0.037*	0.190**	1**					
	BELONG	0.041**	0.086**	0.069**	0.169*	0.115**	1**				
	STRATIO	-0.204**	-0.120**	-0.131**	0.004	0.065**	0.045**	1**			
	EDUSHORT	-0.184**	-0.100**	-0.135**	-0.004	-0.019	-0.010	0.168**	1**		
	STUBEHA	-0.160**	-0.103**	-0.097**	-0.044**	-0.098**	-0.056**	-0.064**	0.268**	1**	
	TEACHBEHA	-0.098**	-0.050**	-0.037*	-0.049**	-0.032*	0.005	0.090**	0.300**	0.483**	1**
		ESCS	CULTPOS	HEDRES	STIMREAD	JOYREAD	BELONG	STRATIO	EDUSHORT	STUBEHA	TEACHBEHA
Predictor and Criterion Variable Set	PV1READ	0.355**	0.252**	0.238**	0.083**	0.230**	0.096**	0.043**	-0.196**	-0.362**	-0.087**
	SCREADIFF	-0.096**	-0.143**	-0.078**	-0.101**	-0.311**	-0.180**	-0.046**	0.028*	0.085**	-0.001
	SCREADCOMP	0.079**	0.225**	0.091**	0.198**	0.552**	0.173**	0.025*	-0.007	-0.022	0.013

Note. *: p<.05, **: p<.001

Canonical correlation analysis produced three canonical variable pairs, calculated as the number of variables in the variable set containing fewer variables. Table 3 shows canonical correlation values, Wilks' lambda, F values, degrees of freedom, and significance tests between these canonical variable sets. Wilks' lambda and F values provide information about the significance level of the calculated canonical correlation values. Table 3 shows that all the canonical variable sets were significant ($p<0.001$). The square of the canonical correlation coefficients indicates the common variance explained between the criteria and predictor sets. Accordingly, the common variance explained by the first, second and third canonical variable pairs was 0.40%; 0.20% and 0.01% respectively. Because the common variance explained by the third canonical variable pair was

less than 10%, it can be said that the interpretation was not significant (Capraro & Capraro, 2001). Based on this finding, the first and the second canonical correlation coefficients explained the important relationships between the predictor and criterion variable sets.

Table 3

Significance tests of canonical variables

	Canonical Correlation	*Wilks' Lambda*	*F*	*DF*	*Sig.*
1	0.632	0.477	172.711	30	<0.001
2	0.446	0.794	83.451	18	<0.001
3	0.095	0.991	7.025	8	<0.001

Note: DF: degrees of freedom, Sig.: significance level

Table 4 shows the standardized canonical correlations indicating the weight of each variable in forming the linear combination of the variable set. These coefficients show the part that the variables explained in their own sets. Therefore, one can write the equation of the first canonical variable pair, found to be significant before, formed with standardized canonical coefficients, as:

U_1= -0.174*CULTPOSS + -0.194*ESCS + -0.762*JOYREAD + -0.048*HEDRES + -0.070 STRATIO + 0.081*EDUSHORT + -0.104*STIMREAD + 0.219*STUBEHA + -0.130*TEACHBEHA+ -0.162*BELONG

Y_1= -0.484*PV1READ + 0.162*SCREADDIFF + -0.701*SCREADCOMP

Examination of the equations revealed that the variable contributing the most to the first canonical variable were JOYREAD in the predictive variables set (U_1) and SCREADCOMP in the criterion variables set (Y_1). The equation of the second canonical variable pair, found to be significant, formed with standardized canonical coefficients is as follows:

U_2= 0.108*CULTPOSS + -0.549*ESCS + 0.435*JOYREAD + -0.038*HEDRES + -0.147 STRATIO + 0.195*EDUSHORT + 0.069*STIMREAD + 0.691*STUBEHA + -0.219*TEACHBEHA+ 0.087*BELONG

Y_2= -0.892*PV1READ + 0.080*SCREADDIFF + -0.629*SCREADCOMP

The variable that contributed the most to the second canonical variable in the predictor variables set was STUBEHA, as seen both in the equation and in Table

4. The variable contributing the most to the second canonical variable in the criterion variables set was PV1READ.

Table 4

Standardized canonical coefficients and canonical loadings of the variables in the predictor and criterion variable set

Canonical Variable Pair		1		2	
		β	r_s	β	r_s
Predictor Variables	CULTPOS	-0.174	-0.479	0.108	-0.160
	ESCS	-0.194	-0.384	-0.549	-0.582
	JOYREAD	-0.762	-0.869	0.435	0.375
	HEDRES	-0.048	-0.303	-0.038	-0.334
	STRATIO	-0.070	-0.073	-0.147	-0.041
	EDUSHORT	0.081	0.165	0.195	0.376
	STIMREAD	-0.104	-0.309	0.069	0.131
	STUBEHA	0.219	0.324	0.691	0.677
	TEACHBEHA	-0.130	0.051	-0.219	0.192
	BELONG	-0.162	-0.329	0.087	0.085
Criterion Variables	PV1READ	-0.484	-0.650	-0.892	-0.759
	SCREADDIFF	0.162	0.551	0.080	0.103
	SCREADCOMP	-0.701	-0.850	-0.629	-0.500

Note: β: Standardized canonical coefficient, r_s: Canonical loadings

The canonical loadings in Table 4 show the variance that each variable in the related set explained. The percentage of explained variance is calculated by the square of each canonical loading. The variable of JOYREAD indicated the highest loading (-0.869) in the predictor variable set, explaining 76% of the variance. In the criterion variable set, the SCREADCOMP variable had the highest loading (-0.850), explaining 72% of the variance. In the second pair of canonical variables, the variable of STUBEHA indicated the highest loading (0.677) in the predictor variable set, explaining 46% of the variance. In the criterion variable set, the PV1READ variable had the highest loading (-0.759), explaining 58% of the variance.

To promote understanding, Figure 1 shows correlations between canonical variables and canonical loadings for the first and second canonical variable pairs.

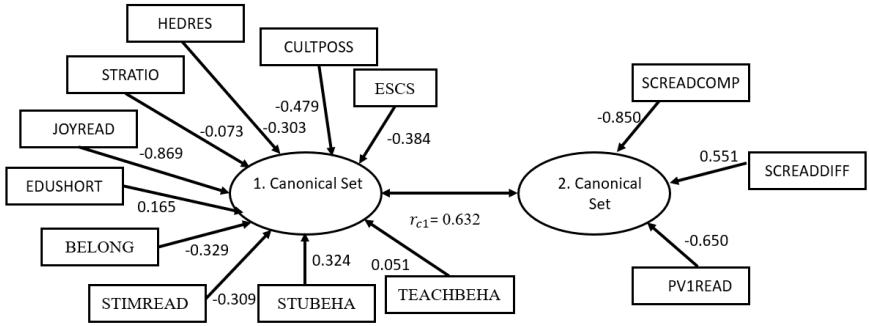

Figure 1. First canonical correlation pair.

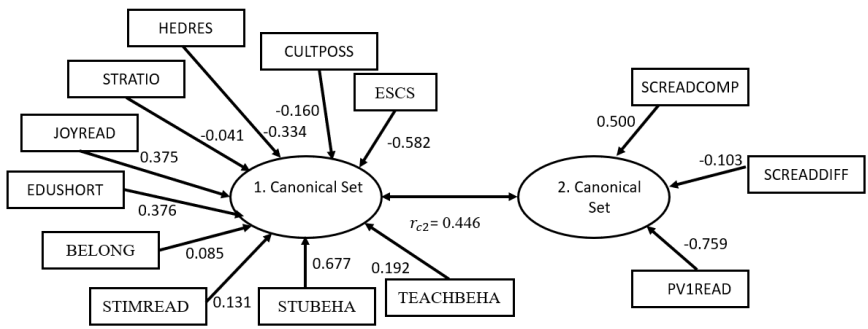

Figure 2. Second canonical correlation pair.

Table 5

Proportion of variance explained

Canonical Variable	*Set 1 by Self*	*Set 1 by Set 2*	*Set 2 by Self*	*Set 2 by Set 1*
1	0.156	0.062	0.483	0.193
2	0.128	0.025	0.279	0.055
3	0.099	0.001	0.238	0.002

Finally, the proportions of variance explained by canonical variable pairs in the cross set and in the own set were calculated. Table 5 shows that the three

canonical variables in the second set explain 100% (0.483 + 0.279 + 0.238) of the variance in set 2. And all these variables showed a significant relationship. The canonical variables in the first set explain 25% (0.193 + 0.055 + 0.002) of the variance in set 2.

A summary of the results of the canonical correlation analysis revealed that the most important factor in the predictive variable set was liking/enjoying reading, followed by the student behaviours that hinder learning, economic and socio-cultural status, cultural position, sense of belonging to the school, teacher behaviours that hinder learning and teacher's stimulation of reading engagement perceived by student respectively. The variables of home educational resources, student-teacher ratio and shortage of educational materials had very low canonical coefficients and were less important than other variables. In other words, these variables contributed less to explaining the relationship of the first canonical variable pair. In the criterion variable set consisting of students' reading skills, the most important factor was the perception of reading competence, followed by reading scores and perception of reading difficulty, respectively. For the second canonical variables pair, the most important factor in the predictor variable set was the student behaviours that hinder learning, followed by economic and socio-cultural status, liking/enjoying reading, teacher behaviours that hinder learning, shortage of educational materials, student-teacher ratio, and cultural position, respectively. The variables of home educational resources, teacher's stimulation of reading engagement perceived by student and sense of belonging to the school contributed less to explaining the relationship of the second canonical variable pair. In the criterion variable set consisting of students' reading skills, the most important factor was the reading scores, followed by perception of reading competence and perception of reading difficulty, respectively.

The negative canonical loadings of the variables in the predictor and criterion variable sets mean that the decrease in one variable is associated with the decrease in the other variable. The variables of SCREADIFF, EDUSHORT and STUBEHA had positive loading in the first canonical variables set. Because these variables were the perception of difficulty in reading, shortage of educational materials and student behaviours that hinder learning the expectation was that it would be negatively correlated with reading literacy skills. Therefore, the more the student likes to read, and as the student’s socio-economic level increases, the student's reading score and perception of reading competence increase, while the perception of difficulty in reading decreases. Similarly, as the shortage of educational materials and student behaviors that hinder learning increase, the student's reading score and perception of reading competence increase, while the perception of difficulty in reading decreases. However, for the first canonical variables pair, the shortage of educational materials, home

educational resources and student-teacher ratio had very low canonical loadings and therefore did not have much of an effect on reading score. According to the results of canonical correlation analysis for the second canonical variable pair, as student behaviors that hinder learning decreases and as the student's socio-economic level increases, the student's reading score and perception of reading competence increase, while the perception of difficulty in reading decreases.

3 Discussion

In this study, it was aimed to examine the relationships between the variables that related the reading skills of the students and the variables related to the opportunities that the student and the school have. The effects of motivational sources were also examined. The study, in which variables related to students' reading literacy comprised the criterion variable set and in which variables related to the students' socio-economic and cultural status and school-related factors comprised the predictive variable set, used canonical correlation analysis to examine, simultaneously, the relationship between these two sets and the contribution of the variables to each set.

Among the linear combinations of the criterion and predictor variable sets, the first canonical variable explained the most variance (40%). In this linear combination, the most important variable in the predictive variable set was the students' liking/enjoyment of reading. Among the linear combinations of criterion and predictor variable sets, the second canonical variable explained 20% of the common variance. In this linear combination, the most important variable in the predictive variable set was the student behaviors that hinder learning. According to the results of canonical correlation analysis, in addition to the best predictors, the students' economic and socio-cultural status and teacher behaviors that hinder learning were found to be significantly related to students' reading scores in both canonical variable sets.

In many studies examining the relationship between enjoyment of reading, which can be described as an intrinsic source of motivation for reading, and reading literacy, it has been observed that students' enjoyment of reading positively affects their reading literacy (Coşguner & Güzeller, 2015; Doğaç, 2021; Ertem, 2020; Tavşancıl, Yıldırım & Bilican Demir, 2019). Kasap, Dogan, and Kocak (2021) found that the best predictor of the reading literacy was liking/enjoyment of reading. Accordingly, it is important for teachers to include additional materials that students can enjoy in the teaching process. For example, in Coşguner and Güzeller's study (2015), it was stated that planning reading activities that students can enjoy reading will have positive results to students' reading skills. In addition, researches show that students who enjoy reading use higher-level strategies to learn more (Tavşancıl, Yıldırım, & Bilican Demir, 2019; Weibel, Wissmath, & Mast, 2011). So, individuals who like reading use

more high-level mental skills while reading a text. Studies have also shown that as the time spent on reading increases, students enjoy reading more and their academic success increases (eg. Baker, Dreher & Guthrie, 2000). Considering that reading literacy is necessary for all lessons, it is an expected result that academic success increases as students enjoy reading.

In addition to intrinsic motivators, there are also studies showing that extrinsic motivators such as teacher's stimulation of reading engagement or student-perceived teacher-support are positively related to reading scores (Lan & Yu, 2022; Ma, Luo, & Xiao, 2021). In this study, it was found that the teacher's stimulation of reading engagement perceived by student, which was considered as an extrinsic motivation source, positively affected students' literacy skills, although it did not have a large effect.

In the study, the criterion variable set included the variables of perception of competence in reading and perception of difficulty in reading, as well as reading scores within the framework of reading literacy. Therefore, enjoyment of reading was the best predictor of these variables, too. The SCREADIFF variable in the criterion variable set had opposite canonical loading compared to the other variables. In other words, as students enjoy reading, their perception of competence in reading increases and their perception of difficulty in reading decreases.

Other variables affecting students' reading skills were the student behaviors that hinder learning, students' economic and socio-cultural status and teacher behaviors that hinder learning. Most of the previous studies in the literature showed that variables related to socio-economic and cultural status of students and families were related to reading literacy (Arıcı & Altıntaş, 2014; Aydın, Selvitopu, & Kaya, 2018; Büyükatak, 2022; Chiu ve Chow, 2015; Demirel & Yağmur, 2017; Doğaç, 2021; Güler & Veysikarani, 2022; Gülleroğlu, Bilican Demir, & Demirtaşlı, 2014; Koçak, 2022; Mavi, 2022; Okatan, 2021; Özdemir & Gelbal, 2014; Polat & Madra, 2018; Dadandı, Dadandı & Koca, 2018; Woessmann & Fuchs, 2004). As can be seen, in the majority of previous studies, socio-economic variables were investigated as predictors of reading literacy. And as expected, in these studies it was observed that as the socio-economic level of the students increased, their reading skills increased. On the other hand, Dadandı, Dadandı and Koca (2018) emphasized that it may not be correct to take only parental income as the socio-economic variable and to make a linear relationship between income level and reading literacy. In this context, the determining factor in terms of students' reading skills is to which sources family income is allocated. This finding was supported in this study. As well as the ESCS index, the CULTPOS variable was an important predictor of reading literacy. Students' possession of cultural assets such as literature books, works of art, etc. increased their reading literacy. This finding supported in studies

employing data from different countries as well as studies with Turkish samples (Dong & Hu, 2019; Gülleroğlu, Bilican Demir, & Demirtaşlı, 2014; Ho & Lau, 2018).

Another important factor affecting reading literacy in the present study was found to be student behaviors that hinder learning. In Gómez and Suárez's (2020) study, student and teacher behaviors that hinder learning were addressed together under the school climate factor. It is accepted that school climate positively affects learning as a protective factor by helping to reduce negative situations related to school (Hapson & Lee, 2011). The findings of their study showed that school climate and, indirectly, behaviors that hinder learning are important moderator variables on learning. Another study investigating the effect of school-related factors on students' achievement in PISA showed that student behaviors that hinder learning are a significant predictor of student achievement (Lee & Lee, 2021). As expected, the variable of student behaviors that hinder learning was found to be inversely related to student achievement in studies conducted in Turkey (Arıcı, & Altıntaş, 2014; Cayak, 2021; Üstün, et al., 2019). In line with the results of the studies in the literature and this study, one of the factors that help to increase student achievement is school climate. In order for the school climate to be positive, student or teacher behaviors that hinder learning should be minimized. Thus, students can learn more easily in a school climate where there are no hindrances to learning.

Conclusion

In this study, it was aimed to examine the relationships between the variables that related to the reading skills of the students and the variables related to the opportunities that the student and the school have. There have been many studies in the literature that include variables associated with reading literacy. However, this study handled reading scores and the variable of perception of competence in reading and perception of difficulty in reading within the framework of reading literacy and revealed that the variable most related to these variables was the student' liking/enjoyment of reading.

This research employed only PISA 2018 Turkey data. In the future, studies can handle reading scores in different countries and can examine whether the factors affecting reading literacy differ according to the country. In addition to socio-economic and cultural and school-related variables, studies can also examine the effect of categorical variables such as gender and school type on reading literacy, which could not be done in this study due to the assumptions of canonical correlation analysis. Additionally, in this study, educational resources at home and the teacher's stimulation of reading engagement perceived by student, which is one of the extrinsic motivation sources, were not significant predictors of reading literacy scores. In the studies to be conducted with different data, the

relationship between these variables and reading literacy can be investigated again. Finally, the researcher recommends using canonical correlation analysis in such cases, as it enables the simultaneous analysis of related variable sets both within and between sets.

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