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Longitudinal Results on Phonological Awareness and Reading Performance of Turkish-Speaking Children by Socioeconomic Status

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Abstract

Although several studies show that phonological awareness predicts reading performance, longitudinal results in different socioeconomic levels are not clear enough. This study aimed to examine to what extent the phonological awareness skills of Turkish-speaking children coming from different socioeconomic levels are predictive of later reading performance. Children's phonological awareness was assessed in three time points including in the fall and spring semesters of kindergarten and in the beginning of first grade while reading performance was assessed at the end fall semester in first grade. A total of 451 children participated in all assessments. Three regression models were tested for the analyses. The results showed that phonological awareness skills assessed during kindergarten and in the beginning of first grade predicted reading performance in first grade in children from all socioeconomic levels, and predictive power of phonological awareness skills were higher in the spring of kindergarten compared to other assessment points.

Keywords

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Introduction

Reading is broadly characterized as understanding, using and reflecting on written texts to achieve goals, develop knowledge and potential, and participate in society (OECD, 2018), and is regarded as one of the most fundamental instruments for academic achievement and success in life. Due to its developmental significance, studies investigating the risks concerning the acquisition of reading skills and the long-term effects of reading performance frequently appear in the developmental literature. Past research indicates that difficulty in the acquisition of reading impacts other academic skills and that early diagnosis of these difficulties facilitates the prevention of potential future failures (Grimm, Solari, McIntyre, & Denton, 2018). In this context, numerous studies focus on the relationship between reading and various basic skills developed in the preschool period, as well as, the role of these skills in reading achievement.

Phonological Awareness and Reading Performance

While the role of different linguistic and cognitive factors on reading is being researched, many studies denote particularly early literacy skills among the strongest predictors of reading (Hudson & Test, 2011). Studies emphasize that children who begin primary school bereft of early literacy skills (i.e. prerequisite knowledge, skills and attitudes for reading and writing that preschoolers are expected to acquire) generally experience significant challenges in learning to read (Jesson & Limbrick, 2014; Justice, Invernizzi, Geller, Sullivan ve Welsch, 2005; Justice et al., 2015; McCardle, Scarborough, & Catts, 2001; Snow, Burns, & Griffin, 1998; Sulzby & Teale, 1991; Whitehurst & Lonigan, 2001). However, early literacy skills were introduced into the Turkish preschool education program in 2013, after which research on the subject has gained momentum. As a result, there is a lack of adequate knowledge as to the long-term effects of early literacy practices in the preschool period on reading performance.

Phonological awareness, in principle, signifies distinguishing and manipulating phonemic components in speech (Gillon, 2018). This skill requires children to be aware of sound structures in words. Studies in languages other than Turkish have shown that phonological awareness begins to form at around two years of age and develops from a shallow awareness towards a deeper level of awareness (Stanovich, 2000). Developmentally, phonological awareness comprises word, syllable, and rhyme awareness, phoneme recognition, blending, segmentation, and manipulation. Research conducted in various languages indicate phoneme manipulation as the highest level skill to be acquired in a series of skills that develop from the beginning of preschool to primary school (Kaderavek, 2011; Kaderavek & Justice, 2004). In addition, preschoolers who have difficulty in the acquisition of phonological awareness are considered at-risk for the future reading difficulties (Parrila, Kirby, & McQuarrie, 2004).

Phonological awareness displayed in the preschool is closely related to the reading acquisition (Anthony & Francis, 2005). Previous research contains results indicating the high predictive power of phonological awareness, even when controlled for mother's level of education, as well as, age, intelligence and receptive language (Bryant, MaeLean, Bradley, & Crossland, 1990; Lonigan, Burgess, & Antony, 2000; Whitehurst & Lonigan, 1998). The study by Wagner et al. (1997), where a longitudinal analysis of the phonological processing and vocabulary skills of 216 children was conducted from preschool to fourth grade, showed that phonological awareness explained 23% of the variance in word reading skills of children until second grade. Another study carried out by Catts, Fey, Zhang, and Tomblin (2001) with 604 children revealed that phonological awareness was one of the five variables (together with letter recognition, sentence repetition, mother's education and rapid naming) that predicted reading difficulties in the second grade. In another study with 570 children with reading

difficulties and language impairments, Hogan, Catts, and Little (2005) found that phonological awareness and letter recognition in the preschool predicted reading achievement in second grade, and that reading performance in second grade predicted reading achievement in fourth grade. In addition, Furnes and Samuelsson (2010) longitudinally investigated whether phonological awareness was predictive of reading and spelling in transparent and opaque orthographies. The results showed that phonological awareness in preschool significantly predicted spelling in second grade in both English and more transparent languages such as Norwegian and Swedish.

Whether the development of phonological awareness differentiate by the orthographic system is another question that research seeks to answer. In their study analyzing phonological awareness, rapid naming, verbal short-term memory, vocabulary, non-verbal intelligence, and word reading skills in 1265 second graders, Ziegler et al. (2010) revealed the importance of phonological awareness skills in every language, independent of the orthographic system (French, Finnish, Dutch, Hungarian and Portuguese). However, the effect of phonological awareness on reading varied, with greater impact in languages with relatively more complex orthographies. In addition, the variation of the relationship between reading and phonological awareness in different language structures was explained by the variability of reading measures in languages with opaque and transparent orthographies (Furnes & Samuelsson, 2010; Tainturier, Roberts, & Charles Leek, 2011). While reading performance is generally dependent on fluency measures in languages with transparent orthographies, many studies based on English focused on reading accuracy. As phonological awareness is mostly related to reading accuracy in almost all orthographies, it is claimed that phonological awareness has a less pronounced effect on reading fluency in transparent orthographies (Vaessen et al., 2010).

Turkish is one of the rare languages with alphabetic writing systems in which the reading and spelling systems display transparency (Babayiğit & Stainthorp, 2011). None the less, the number of longitudinal studies investigating phonological awareness and reading in Turkish-speaking children is quite limited. The study by Öney and Durgunoğlu (1997) examining the phonological awareness of 30 Turkish-speaking students in the fall and spring semesters of first grade revealed a significant contribution of these skills to reading achievement. The study by Babayiğit and Stainthorp (2007) conducted with Turkish-speaking children investigated whether phonological awareness in preschool was related to future reading and spelling measured in first and second grades. The results indicated the existence of a relationship between phonological awareness and future spelling skills. In a more recent longitudinal study by Babayiğit and Stainthorp (2011), reading fluency, spelling accuracy, reading comprehension and narrative text writing skills of 103 Turkish Cypriot children were followed up for a year, where the phonological awareness, rapid automatized naming, vocabulary, listening comprehension and working memory skills of the second- and fourth-grade students were reassessed a year later (i.e. in third and fifth grades, respectively). The results indicated that phonological awareness was one of the strongest predictors of spelling. In the longitudinal study by Erdoğan (2012) investigating the relationship between phonological awareness and reading in first grade, phonological awareness was assessed at the beginning of fall semester, while reading and reading comprehension were assessed in the middle and at end of the fall semester, as well as, in the middle of the spring semester. The results showed that phonological awareness was related to the mid-fall reading achievement.

Socioeconomic Status and Reading Performance

Socioeconomic characteristics have diverse influences on children's development. Socioeconomic disadvantage, mostly cited together with low socioeconomic status, is defined by parental income, occupation, education or any combination of these factors (Buckingham, Beaman, & Wheldall, 2014) and developmental challenges in children caused by socioeconomic disadvantages is one of the most prevalent educational problems (Mol & Bus, 2011; Stanovich, 2017).

Home environment quality plays a mediator role between socioeconomic status and developmental outcomes. The Family Investment Model based on this mediation highlights the more positive contribution of more prosperous families to their children's physical, emotional and cognitive development, in comparison to low-income families who focus on the primary needs of the family rather than their children's developmental needs (Lohndorf, Vermeer, Carcamo, & Mesman, 2018). Past studies have yielded results that support this model. Children with reading difficulties were found to have a lower chance to gain experience (Allington, 1984) and less opportunity to develop reading comprehension strategies (Brown, Palinscar, & Purcell, 1986), and were more likely to develop a negative attitude toward reading (Oka & Paris, 1986). Similar to the concept coined as the Matthew Effect by Stanovich (2017), children who experience difficulties while learning to read continue to lag behind their peers in the following years. Children with limited reading skills rarely catch up with their peers and their difficulties most likely persist throughout their academic lives (McDowell, Lonigan, & Goldstein, 2007). In other words, children who fail to acquire basic reading skills can have less propensity for reading and inadequate reading experiences lead to a limited vocabulary and lower comprehension (Buckingham et al., 2014), resulting in a spiral of causality (Mol & Bus, 2011).

Past studies emphasize the relationship between socioeconomic characteristics and literacy achievement at different stages of education (Buckingham et al., 2014; Şirin, 2005). Socioeconomic status is considered to be an indicator of the quality of home learning environment, as well as, reading motivation and attitudes (Petscher, 2010; Senechal & LeFevre, 2002; Taylor, Clayton, & Rowley, 2004; Mol & Bus, 2011). Concordantly, children from low-socioeconomic families tend to have poorer linguistic and reading performance than middle-socioeconomic children (Chung, Liu, McBride, Wong, & Lo, 2017). The results of the studies investigating the relationship between early literacy and socioeconomic status suggest that socioeconomic characteristics indirectly influence early literacy skills, which in turn acts on reading performance. These studies emphasize the indirect impact of socioeconomic characteristics on difficulties in the acquisition of phonological awareness through home environment opportunities (Bilvashree, Akshatha, Deepthi, & Narasimhan, 2010; Lundberg, Larsman, & Strid, 2012). Although there is a limited number of studies on the relationship between phonological awareness and socioeconomic status, it is salient that most of these studies highlight the mediator role of socioeconomic status. Similarly, the results of the study carried out by Raz and Bryant (1990) to examine the effects of socioeconomic status on phonological awareness showed that the gap in the reading achievements of low- and high-socioeconomic children could be explained not directly by socioeconomic status, but by phonological awareness in the preschool years. The results of various studies point at a "Mediating Factor Model" where socioeconomic status acts on the acquisition of phonological awareness to indirectly influence reading achievement (Noble, Farah, & McCandliss, 2006).

Knowledge about the phonological awareness skills of Turkish-speaking children from families with different socioeconomic status would facilitate the long-term development of programs aimed at eliminating possible differences in children's reading performance due to socioeconomic factors. Therefore, research on the impact of socioeconomic factors is critical to identify the variables that affect children's reading performance in the long term. On the other hand, the number of studies focusing on the joint longitudinal effect of phonological awareness and socioeconomic characteristics on reading skills in Turkish-speaking children is very limited. With this perspective, this study aimed to investigate whether the children's phonological awareness in kindergarten predict reading performance in the first grade. In line with this objective, the study sought to answer the following questions:

1. Do children's phonological awareness skills in the fall and spring semesters of kindergarten and the beginning of first grade predict reading performance in first grade?
2. Does predictive power vary by socioeconomic status?

Method

Participants

This study was part of a larger project to investigate the developmental profiles of language, early literacy and cognitive skills in Turkish-speaking kindergartners and the predictive power of these skills on later reading outcomes. The study sample comprised children who attended kindergartens in different socioeconomic areas of Ankara. In order to carry out the study, ethical committee permission and written consent from the families that their children allowed to participate in the research were obtained. Participation in the research was based on the volunteering of families and children and their right to withdraw from the study was reserved.

The initial assessment was administered to 540 students in the fall semester of kindergarten. The second assessment, which was conducted in the spring semester of kindergarten, were completed with 525 children. The third assessment was carried out with 451 children of 540 in the fall of first grade. Participant attrition was mostly due to a change in residence and school.

Participant attrition is a common issue that results in missing data in longitudinal studies (Rubin, 1987; Allison, 2002). Analysis of the missing data revealed no significant relationship between missing data and either gender (χ^2=2.055, sd=1 and p>0.05) or socioeconomic status (χ^2=4.001, sd=2 and p>0.05). In addition, there was no significant difference between mean phonological awareness scores of missing children and others in the fall and spring of kindergarten (Fall: t=0.388, sd=523 and p>0.05; Spring: t=1.396, sd=519 and p>0.05). These analyses showed that the missing data due to the participant attrition was missing at random. If the missing data in a dataset are completely missing at random, then they can be ignored in further analyses (Allison, 2002). Therefore, further analyses were conducted with data from 451 children.

One hundred and twenty-nine (28.6%), 161 (35.7%) and 128 (28.4%) participants were from families with low, middle and high socioeconomic status, respectively, while SES categorization was not performed for 33 (7.3%) children due to missing data. Therefore, this study evaluated phonological awareness skills in children who attended schools designated by random assignment from each social stratum representative of low, middle and high socioeconomic status in Ankara (45 schools in total), who were 5 years old at the time the study commenced (*M*= 66.29 months, *SD*= 3.91), whose mother tongue was Turkish, and who were not diagnosed with any disability. Assessments were conducted in the fall and spring semesters of kindergarten and in beginning and at the end of the fall semester of first

grade. Parents of all participating children gave their informed consent and children gave their assent prior to their inclusion in the study.

Measures

SES Index Parent Information Form (Ergül & Demir, 2017)

This form was used to evaluate the socioeconomic status of parents of the children participating in the study. It comprises 23 SES variables related to parents' education, occupational status, home possessions, book ownership and participation in cultural activities, and involves five socioeconomic status (i.e. low, lower-middle, middle, upper-middle, high). Following the analysis of data gathered from parents of 2411 children ranging from kindergartner to fourth grader, the five-factor structure which explained 57% of the variance for SES Index was defined and verified.

Test of Early Literacy (Kargın, Ergül, Büyüköztürk, & Güldenoğlu, 2015; TEL)

Test of Early Literacy (*TEL*), which was developed to assess early literacy skills in children aged 60-72 months in 7 areas: *Receptive Language, Expressive Language, Category Naming, Function Knowledge, Letter Knowledge, Phonological Awareness* and *Listening Comprehension*. Only the Phonological Awareness was employed in the scope of the present study. In this area, phonological awareness skills were assessed by eight subtests: *Rhyme awareness, matching initial sound, matching ending sound, word segmentation, syllable segmentation, syllable blending, initial* and *ending sound deletion*. The Phonological Awareness subtests comprise a total of 32 items, 4 items for each subtest. During administration, the examiner ensures the child understands the task by presenting two sample items before proceeding to the test items. Validity and reliability studies conducted with 403 children yielded factor loadings ranging between .43 and .93 for construct validity and congruence among the subtests. TEL's reliability analyses yielded an internal consistency coefficient of .87 with KR20, a split-half correlation coefficient of .67 with Spearman-Brown, and a test-retest reliability coefficient of .70.

Literacy Assessment Battery (Ergül, Ökcün-Akçamuş, Akoğlu, Kılıç-Tülü, & Demir, 2018; LAB)

LAB developed by the researchers to assess reading, writing and reading comprehension skills of children from the first grade to the fourth grade consists of a total of 10 tests aimed at examining these skills in different aspects. LAB has four tests for reading, three tests for writing and three tests for reading comprehension. Assessments are carried out individually and the number of words or items that the child can read/answer correctly at certain times (eg., one minute, 90 seconds, etc.) is determined. In writing, the texts created by children are evaluated with two different rubrics in terms of its form and content. There are two parallel forms, A and B, of the tests that have been created considering the structural features of Turkish. Within the scope of the validity studies of LAB, the opinions of the field experts, the suitability of the content to the grade level, the order and the parallelism of the A / B forms were evaluated and scope validity was determined within this framework. Then, in the trial phase of the test development, 252 children were selected in 12 different schools through random assignment. In the analysis, the construct validity of LAB, the equivalence reliability of A and B forms, the discrimination validity of the tests for the upper and lower groups were examined.

According to the results of exploratory factor analysis (EFA) and subsequent confirmatory factor analysis (CFA) conducted as a construct validity analysis on the data obtained in the trial phase, it showed that LAB consists of three sub-dimensions, namely reading, reading comprehension and writing, and that the paths between the tests and these sub-dimensions of the battery were statistically significant ($p < .05$ for all t values related to the paths). In addition, it was determined that the fit indexes of three sub-dimensional structure consisting of reading, writing and comprehension were high

(RMSEA = .077; X2 / sd = 2.48, CFI = .99, GFI = .93; NFI = .98, SRMR = .043). The coefficient of equivalence for the A and B forms of all tests were found to be high and significant (r values between .86 and .95 and p <.05). In terms of discrimination validity, in all tests, there were significant differences between the 27% upper and lower groups at the level of .001, and the validity of the tests in terms of discrimination was high (eta-square values between effect sizes .70 and .93). In addition, the total scores of reading, writing, and comprehension were found to be high in discrimination of upper and lower groups (eta-square values between .83 and .92 as effect sizes).

The main phase was carried out in order to conduct CFA analyzes regarding the structure validity and to determine the cut-off points for the evaluation. In this context, the data obtained as a result of the assessments of the 401 children, who was followed longitudinally from the first grade to the end of second grade in both fall and spring semesters, were used. The assessment results of 252 children who continued to the third grade and 252 children who continued to the fourth grade in the fall semester were also included in the analysis of the CFA and in the identification of cut-off scores. As a result of the confirmatory factor analysis performed on the data obtained in the main phase, LAB consisted of three sub-dimensions; reading, writing, and reading comprehension in all grade levels, and the paths between the tests and these sub-dimensions were meaningful (p<.05 for all t values related to the paths). In addition, it was determined that the goodness of fit indices of the model were high in all grades (RMSEA=.065; X^2/sd=2.81, CFI=.98, GFI=.95; NFI=.98, RMR=.058). Within the scope of reliability analyzes, Cronbach's alpha internal consistency coefficients for both tests and the battery were found to be between .74 and .85. Finally, cut-off scores in all tests and dimensions were determined in order to evaluate children's performance as very low, low, medium, high, and very high.

Within the scope of this study, Word Recognition Test, Word Decoding Test, Phonetic Analysis Test, and Passage Reading Fluency Test in LAB to assess reading performance were used. Detailed information on these tests is provided below.

Word Recognition Test is a list of words that are arranged hierarchically according to the number of syllables (1-6 syllables) to determine children's reading fluency. It is composed of 100 words and has two forms (A and B) created with the same criteria. In the application of the test with the first grades, the 18pt TTKB Vertical Basic Abece Font was used. The words were printed in two columns on both sides of a thick sheet of paper. It is a time based test and the number of words read correctly in one minute is determined in the test.

Word Decoding Test, which is used to determine the fluency in phonological decoding, consists of 60 nonwords that are non-existent in children's vocabulary, therefore they cannot read as a whole and require them to use their phonological decoding skills to read. Nonwords were created in accordance with the syllable structure of Turkish and they are listed hierarchically according to the number of syllables (1-6 syllables). The test has two parallel forms, A and B. In the administration of the test with the first grades, the 18pt TTKB Vertical Basic Abece Font was used. The words were printed in two columns on both sides of a thick sheet of paper. It is a time based test and the number of nonwords read correctly in one minute is determined as a score in this test.

Phonetic Analysis Test aims to assess distinguishing phonemes in words and letter-sound matching skills in children. It is assessed by a task that requires children to distinguish the first sound of the words told them and to identify the letter corresponding to that sound among the three letters on a card shown. The three letters shown to the child for each word are selected from other letters in the word. In the case that the word consists of two letters, the letter of another sound similar to the first

sound is used as the third letter. The test consists of a single and two syllable, hierarchically ordered 53 words. The test, which has two parallel forms, is a time based test and the number of letters that children show accurately in one minute is determined.

Passage Reading Fluency Test was employed to determine the number of words children read accurately in one minute to examine fluency when reading a passage. For this purpose, a narrative text created using class level readability was used. The text consisted of 37 sentences and 144 words. Because the assessments were conducted with the first graders, the text written by the 18pt TTKB Vertical Basic Abece Font was used.

Data Collection

In the study, the assessments were performed by researchers and graduate students trained by the researchers. Phonological Awareness subtests of the *Test of Early Literacy* was individually administered to the kindergartners in the fall and spring semesters. Children were followed up in the next year and reassessed in the fall semester of first grade between 20 November - 29 December. The measures were administered individually in a quiet room at their schools. The administration order of the reading measures was adjusted to control for sequence effects.

Statistical Analysis

Data analysis was conducted with longitudinal data from four time points. Multiple linear regression analysis was employed in finding answers to the research questions. Three regression models were tested for fall and spring semesters of kindergarten year and fall of first grade. An "enter model" which included all predictors considered was used in the analyses. All models were limited to testing the main effects, with the assumption that no interaction effects existed. Insignificant variables were eliminated from the model to obtain the simplest models for interpretation.

Children's reading skills was designated as the predicted variable of the regression models tested, while the eight variables that represented phonological awareness skills were designated as the predictors. As predicted variable, children's reading skills was characterized by factor regression scores calculated with principal component analysis of the four variables measured in the fall semester of the first grade: (1) *word recognition*, (2) *word decoding*, (3) *phonetic analysis* and (4) *passage reading*. The adequacy of sample size (KMO=0.802) and the power of intervariable multiple correlations (Bartlett' Appr.χ^2=1580,361, sd=6 and p<0.001) were tested as basic assumptions prior to analysis, and the data were found to be suitable for analysis. According to the analysis results, the variances explained by each variable were 0.912, 0.899, 0.430 and 0.839, and the factor loadings were computed as 0.955, 0.948, 0.655 and 0.916, respectively. These variables were combined into a single factor that explained 77% of the variance with an eigenvalue of 3.079. In conclusion, these four variables were found to be factorable into a unidimensional structure and consequently produce joint regression scores, which were denominated as "READING" and added to the data set.

Descriptive statistics for the READING variable yielded a right-skewed and sharp distribution curve. Subsequently, a logarithmic transformation was applied to obtain a normal distribution for READING scores, after which further analyses were conducted with the transformed scores designated as "log_READING."

Eight variables that represented phonological awareness skills were included in the regression models as predictors: (1) *Rhyme Awareness*, (2) *Matching Initial Sound*, (3) *Matching Ending Sound*, (4) *Word Segmentation*, (5) *Syllable Segmentation*, (6) *Syllable Blending*, (7) *Initial Sound Deletion* and (8) *Final Sound Deletion*. The scores of these variables measured in the fall and spring of kindergarten and fall of first grade varied between 0 and 4.

Prior to testing the regression models, the correlations between the variables by semester were calculated with the Pearson Product-Moment Correlation Coefficient. The correlations between reading scores and phonological awareness scores by semester were weak but mostly significant at 0.01 level, which demonstrated that although the constructed models might not be very strong, they satisfied the linearity assumption. Tolerance and VIF values were computed to test whether a multicollinearity problem existed between the predictors. The estimations yielded Tolerance values greater than 0.10 and, accordingly, VIF values smaller than 10, which revealed that there was no multicollinearity problem between the predictors. Before the analyses, the normality of error terms and autocorrelation problems, other important assumptions in regression analysis, were tested with graphical methods and the Durbin-Watson statistic, respectively, which revealed no violations.

In the analyses for the second research question, using the data gathered with the *SES Index Parent Information Form*, three socioeconomic status categories were characterized: low, middle and high. The number of children (451 in total) with low, middle and high SES were 129 (28.6%), 161 (35.7%) and 128 (28.4%), respectively. A SES categorization could not be performed for 33 children (7.3%) due to insufficient data. The regression model was tested separately for each SES and for each semester. The basic assumptions were also tested for each socioeconomic status, which showed no significant violation.

Linear regression models, in which reading skills were predictive and phonological awareness skills were predictors, were constructed and tested to answer the research questions. General representation of the tested model as regression equation was "*reading = b0 + b1 * (rhyme awareness) + b2 * (matching initial sound) + b3 * (matching ending sound) + b4 * (word segmentation) + b5 * (syllable segmentation) + b6 * (syllable blending) + b7 * (initial sound deletion) + b8 * (ending sound deletion)*". This model has been tested separately by overall, semester, and SES. IBM SPSS Statistics 24 software was used in the analyses.

Results

Descriptive Statistics for Phonological Awareness by SES and Time

Using data obtained from the *SES Index Parent Information Form*, the mean and standard deviation distributions of the eight phonological awareness variables based on three socioeconomic status by time is presented in Table 1.

Table 1. Descriptive Statistics for Phonological Awareness Skills by SES

		Kindergarten Fall Semester		Kindergarten Spring Semester		First Grade Fall Semester	
SES		**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Low (n=129)	Rhyme Awareness	2.10	1.13	2.54	.95	2.50	1.10
	Matching Initial Sound	1.72	.91	1.75	.86	2.09	1.05
	Matching Final Sound	1.50	.99	1.67	.93	2.04	1.15
	Word Segmentation	.54	.87	1.04	1.10	1.68	1.40
	Syllable Segmentation	3.07	1.27	3.28	1.08	3.63	.81
	Syllable Blending	2.33	1.57	2.72	1.46	3.37	1.09
	Initial Sound Deletion	.01	.12	.12	.49	.33	.89
	Final Sound Deletion	.19	.58	.23	.67	.70	1.22
Middle (n=161)	Rhyme Awareness	2.27	1.12	2.52	1.14	2.73	1.11
	Matching Initial Sound	1.65	.96	1.81	1.05	2.14	1.09
	Matching Final Sound	1.40	.92	1.75	.92	1.97	1.25
	Word Segmentation	.82	1.16	1.04	1.20	1.70	1.38
	Syllable Segmentation	3.10	1.29	3.29	.98	3.73	.67
	Syllable Blending	2.35	1.55	2.91	1.43	3.52	1.01
	Initial Sound Deletion	.03	.20	.06	.26	.28	.78
	Final Sound Deletion	.32	.79	.20	.57	.83	1.25
High (n=128)	Rhyme Awareness	2.72	.97	3.14	.85	3.08	1.01
	Matching Initial Sound	2.13	1.03	2.34	1.09	2.57	1.13
	Matching Final Sound	1.81	.91	1.99	1.09	2.55	1.06
	Word Segmentation	1.06	1.31	1.38	1.31	2.34	1.48
	Syllable Segmentation	3.37	1.20	3.51	1.01	3.87	.55
	Syllable Blending	2.93	1.35	3.32	1.17	3.77	.71
	Initial Sound Deletion	.07	.29	.39	1.01	.65	1.07
	Final Sound Deletion	.31	.71	.58	1.18	1.51	1.50

In Table 1, the means for phonological awareness skills display an increase from fall of kindergarten to fall of first grade, except for *rhyme awareness* at low and high SES and *final sound deletion* at middle SES. This result is indicative of the developmental progress of phonological awareness.

Predictors of Reading Performance by Time

The regression model, in which reading score was the predicted variable and the eight variables for phonological awareness skills were the predictors, were tested separately for each time point. Initially, models that had all eight variables as predictors were tested. These models were statistically significant for all three time points: F (8, 442)=5.778 and p<0.01 for fall of kindergarten, F(8, 442)=11.802 and p<0.01 for spring of kindergarten, and F(8, 442)=8.401 and p<0.01 for fall of first grade. The analyses were reconducted after the variables with no significant contribution were removed one by one. The coefficients for the reduced models and the coefficients of determination are given in Table 2.

Table 2. Regression Results by Time for Reduced Models

Time		Raw Coefficients		Std. Coefficients	t	R^2	Adjusted R^2
		B	S.E.	Beta			
K Fall	(Constant)	0.100	0.030		3.325**	0.085	0.087
	Word Segmentation	0.031	0.009	0.150	3.267**		
	Rhyme Awareness	0.027	0.010	0.129	2.764**		
	Matching Initial Sound	0.025	0.011	0.104	2.251*		
	Final Sound Deletion	0.034	0.015	0.104	2.225*		
K Spring	(Constant)	0.051	0.028		1.799	0.169	0.160
	Syllable Blending	0.034	0.008	0.201	4.445**		
	Final Sound Deletion	0.035	0.014	0.128	2.525*		
	Matching Initial Sound	0.026	0.011	0.114	2.435*		
	Initial Sound Deletion	0.044	0.018	0.121	2.442*		
	Word Segmentation	0.018	0.009	0.091	1.966*		
First Grade Fall	(Constant)	0.005	0.043		0.119	0.118	0.112
	Initial Sound Deletion	0.048	0.011	0.199	4.213**		
	Syllable Blending	0.046	0.011	0.188	4.165**		
	Matching Initial Sound	0.024	0.010	0.115	2.424*		

*p<0.05 **p<0.01 - Dependent variable: log_READING

According to Table 2, in the fall of kindergarten, children's word segmentation, rhyme awareness, *matching initial sound* and *ending sound deletion* skills can explain 9% of the reading achievement in the fall of first grade, while *syllable blending, ending sound deletion, matching initial sound, initial sound deletion, and word segmentation* skills in the spring of kindergarten can explain 16%. In the fall of first grade, the skills of *initial sound deletion, syllable blending, and matching initial sound* can explain 11% of the reading achievement in the same semester. Accordingly, it is possible to say that the phonological awareness skills of the children in the spring semester of kindergarten can explain the reading achievement of the children in first grade at a higher level compared to other semesters.

Predictors of Reading Performance by SES and Time

The analysis the regression models by SES was conducted using an "enter model" which includes all predictors considered and only the main effects. Then, the variables with no significant contribution were removed one by one to obtained reduced models, which were all found to be statistically significant: $F(1, 127)=6.578$ and $p<0.05$ at low SES, $F(2, 158)=6.384$ and $p<0.05$ at middle SES, and $F(2, 125)=7.777$ and $p<0.05$ at high SES, for fall of kindergarten; $F(1, 127)=6.713$ and $p<0.05$ at low SES, $F(3, 157)=11.059$ and $p<0.05$ at middle SES, and $F(3, 124)=9.142$ and $p<0.05$ at high SES, for spring of kindergarten; and $F(1, 127)=5.089$ and $p<0.05$ at low SES, $F(2, 158)=15.012$ and $p<0.05$ at middle SES, and $F(1, 126)=10.511$ and $p<0.05$ at high SES, for fall of first grade. Table 3 presents the regression coefficients and the coefficients of determination for each SES.

Table 3. Regression Results by SES and Time for Reduced Models

Time	SES		Raw Coefficients		Std. Coefficients	t	R^2	Adjusted R^2
			B	S.E.	Beta			
K Fall	Low	(Constant)	0.088	0.038		2.308*	0.049	0.042
		Syllable Blending	0.035	0.014	0.222	2.565*		
	Middle	(Constant)	0.165	0.039		4.207**	0.075	0.063
		Rhyme Awareness	0.033	0.016	0.165	2.147*		
		Final Sound Deletion	0.057	0.022	0.199	2.579*		
	High	(Constant)	0.171	0.043		3.970**	0.111	0.096
		Matching Initial Sound	0.051	0.018	0.240	2.798**		
		Word Segmentation	0.031	0.014	0.190	2.210*		

Table 3. Continued

Time	SES		Raw Coefficients B	Raw Coefficients S.E.	Std. Coefficients Beta	t	R^2	Adjusted R^2
K Spring	Low	(Constant)	0.066	0.045		1.460	0.050	0.043
		Syllable Blending	0.038	0.015	0.224	2.591*		
	Middle	(Constant)	0.083	0.043		1.911	0.174	0.159
		Syllable Blending	0.028	0.012	0.177	2.399*		
		Initial Sound Deletion	0.207	0.062	0.244	3.316**		
		Matching Initial Sound	0.045	0.016	0.211	2.819**		
	High	(Constant)	0.134	0.053		2.503*	0.181	0.161
		Syllable Blending	0.043	0.015	0.229	2.798**		
		Initial Sound Deletion	0.042	0.021	0.193	1.991*		
		Final Sound Deletion	0.035	0.018	0.189	1.935*		
First Grade Fall	Low	(Constant)	0.151	0.023		6.618**	0.039	0.031
		Initial Sound Deletion	0.054	0.024	0.196	2.256*		
	Middle	(Constant)	-0.068	0.064		-1.058	0.160	0.149
		Syllable Blending	0.062	0.016	0.276	3.741**		
		Matching Initial Sound	0.051	0.015	0.249	3.376**		
	High	(Constant)	0.276	0.022		12.669**	0.077	0.070
		Initial Sound Deletion	0.056	0.017	0.277	3.242**		

*p<0.05 **p<0.01 - Dependent variable: log_READING

Table 3 reveals that phonological awareness skills explained a maximum of 11% of first grade reading performance of high SES children in fall of kindergarten, a maximum of 17% and 18% of reading performance of middle and high SES children in spring of kindergarten, respectively, and 16% of first grade reading performance of middle SES children in fall of first grade.

Discussion

The results of the study carried out to investigate whether children's phonological awareness skills assessed at different time points predicted reading performance of children in first grade showed that phonological awareness explained reading performance most strongly in the spring semester of kindergarten. In addition, phonological awareness skills predicting reading performance varied by time; the predictive power of *word segmentation* was higher in kindergarten fall and spring semesters, and *syllable blending* in spring of kindergarten and at the beginning of first grade, in comparison to other skills.

The study by Denton, Hasbrouck, Weaver, and Riccio (2000) revealed syllable awareness as a strong predictor for phonetically regular languages. In the present study, the fact that the predictive power of *syllable blending* displayed relative continuity from fall of kindergarten to the beginning of first grade indicates that syllable awareness is one of the early acquired skills and that the characteristics of the syllable structure of Turkish might have an impact on this result. Wyse and Goswami (2012) suggested that syllables are the primary linguistic unit to be perceived and that syllable awareness is the most prominent skill developed in the acquisition of phonological awareness. Research on syllable structure has shown that Turkish has fewer syllable types than many other languages and that 98% of syllables in Turkish are in the form of V, VC, CV and CVC (V: vowel, C: consonant), with CV being the most common form. Also, Demircan (2002) stated that the most used syllable types in Turkish are in the form of CV and CVC. As the lack of consonant clusters in common syllable types facilitates recognizing

phonemes in syllables, syllable segmentation in Turkish is easier than English and other similar languages, which suggests that the structure of the Turkish language expedites earlier acquisition of many phonological awareness skills including syllable awareness (Oktay & Aktan, 2002). The study by Durgunoğlu and Öney (1999) carried out to compare phonological awareness development in Turkish- and English-speaking kindergarten and first-grade children yielded higher syllable segmentation performance in Turkish-speaking children in comparison to English-speaking peers. The results were explained by the limited number of syllable types and the saliency of the syllables. Similarly, another study by Acarlar, Ege, and Turan (2002) showed that Turkish-speaking children could display this skill from approximately age 3. The results of the present study also indicate that *syllable blending* is acquired at an early period and exhibits continuity with the reading and writing instruction which is based on blending phonemes then syllables to form words which also promotes the development of syllable awareness.

Word segmentation displayed in the fall and spring semesters of kindergarten, that requires dividing sentences by words, was also one of the early predictors of reading performance. The fact that *word segmentation* displayed in the fall of kindergarten predicts future reading achievement suggests that it develops earlier than *syllable blending*. On the other hand, *word segmentation* was a predictor only in kindergarten year, which indicates that it is a relatively early-acquired skill that loses its predictive ability later on. Consequently, the results pertaining to the predictive ability of phonological awareness skills on reading performance offer some insight into the developmental acquisition of these skills.

The variables that predict reading performance differed by time in this study. *Rhyme awareness* was acquired early and lost its predictive ability at later periods, while *final sound deletion* predictive of reading in the fall of kindergarten gave way to *initial sound deletion* in the spring semester. This change suggests that developmentally late-acquired skills are predictive in later periods. Indeed, it is striking that the *final sound deletion* scores of children in the middle-socioeconomic level decreased in the spring compared to the fall of kindergarten but increased dramatically in the first grade. This indicates that the acquisition of reading affects the *final sound deletion* skill, presenting an important finding as to the reciprocity of the relationship between phonological awareness and reading. Studies investigating this relationship have revealed the influential role of spelling and reading experience in the development of phonological awareness (Arrow & McLachlan, 2014). Intervention research has also yielded similar results (e.g. Bus & van IJzendoorn, 1999).

Another remarkable finding of this study was that *matching initial sound* was among the predictors of reading achievement in all time points of assessment. This finding suggests that *matching initial sound* is a developmentally important skill for Turkish-speaking children both before and after the reading acquisition.

Investigation of the results regarding the predictive ability of phonological awareness on reading by socioeconomic status showed that *syllable blending*, an early-acquired skill predicting reading in low-socioeconomic children, did not vary between fall and spring semesters of kindergarten. However, the phonological awareness skills predicting reading in the beginning of first grade in low- and high-socioeconomic children was the same (i.e. *initial phoneme deletion*). This variation in predictors of reading skills in children at lower socioeconomic level essentially suggests a developmental progress in phonological awareness, and emphasizes the importance and necessity of promoting early literacy

skills in young children. Previous research demonstrate that early literacy practices are conducive to significant developmental gains particularly in low-socioeconomic children (e.g. McLachlan & Arrow, 2014). Ziegler and Goswami (2005) proposed that vocabulary capacity expanding throughout development may be related to the development of the phonological skills as they explained this phenomenon with the *Psycholinguistic Grain Size Theory*. According to the theory, children begin to notice large units in words, such as syllables, in the early stages of development. The number of words containing similar phonemes increases as vocabulary grows, and this phonological similarity acts as a developmental force for the recognition of larger units at the level of syllable and rhyme. Consequently, there is a transitive development from larger to smaller units during the acquisition of both phonological awareness and reading, and children begin to recognize similarities at the phoneme level (Bilvashree et al., 2010; Gottardo, Pasquarella, Chen, & Ramirez, 2016; Ziegler & Goswami, 2005). Goswami (2010) highlighted the advantages of orthographically transparent languages over those with opaque orthography with respect to syllable and rhyme awareness. She explained that the acquisition of these skills could vary by age and awareness at phoneme level develops latest in almost every language, independent of structural differences. In this context, the change in the predictors of low-socioeconomic children's reading skills in the present study can be attributed to the provision of stimuli via the kindergarten education and the influence of the resulting overall vocabulary growth on phonological awareness and reading. It is stated in the literature that the development of phonological awareness is intertwined with the competencies related to other verbal language skills developed as a result of verbal interactions with parents and other adults in preschool period (Buckingham et al., 2014; Snow et al., 1998). Another explanation this result can be attributed is that phonological awareness skills gain stability with age (Lonigan, Burgess, Anthony, & Barker, 1998) and the approximation of phonological awareness skills over time in children with different socioeconomic status may be the influence of chronological age.

Considering the predictive ability of phonological awareness on reading achievement in kindergarten, it is noteworthy that predictive power of phonological awareness skills for middle- and high-socioeconomic children are higher than low-socioeconomic children. Although this finding points to the existence of other variables that more strongly predict reading in all socioeconomic levels, it also suggests the potential effect of home literacy experiences and/or parental literacy on reading, particularly in low-socioeconomic children. Numerous studies have reported limited access of children to written materials, as well as, less frequent shared reading activities and letter, rhyme and word games especially in families affected by socioeconomic difficulties (Senechal, 2006), and emphasized the effect of the home literacy environment and parental literacy experiences on reading as mediators (Inoue, Georgiou, Parrila, & Kirby, 2018; Mol & Bus, 2011). Families have a very low awareness of early literacy which is a recently-emerging field in Turkey. Therefore, notwithstanding their diversity in kindergarten, the parity of the variables that predict reading skills of low- and high-socioeconomic children in the first grade indicate the contribution of kindergarten education, as well as, early literacy activities rather than experiences provided by parents. However, in order to verify this prediction, there is a need for studies in which the possible contribution of the kindergarten education and home literacy experiences on reading are compared.

Another salient result of the study was the low predictive power of phonological awareness skills on reading performance for all socioeconomic levels. Furthermore, the relatively higher predictive power observed in spring semester of kindergarten declined in all socioeconomic levels in the beginning of first grade, which suggests that skills other than phonological awareness investigated in this study might have become predictors with the initiation of children to the first grade. There are several studies that list various skills – especially vocabulary (Duff & Clarke, 2011), alphabet knowledge (McLachlan & Arrow, 2014) and phoneme awareness skills that require phoneme manipulation (Carson, 2017; Ehri et al., 2001) – as relatively strong predictors of reading, and that suggest that some of these skills interact with the reading process.

Conclusion and Suggestions

Overall, results showed that phonological awareness skills of kindergartners with different socioeconomic characteristics were among the predictors of reading performance in first grade. In addition, the relatively higher predictive power of phonological awareness skills in the spring of kindergarten compared to other time points is an important finding that can light the way for the assessment of phonological awareness in kindergarten. However, it is noteworthy that phonological awareness was less predictive of reading in comparison to the results of studies conducted in languages other than Turkish, which could be due to the transparent structure of the Turkish language as mentioned above, or attributed to variables such as home literacy experiences, diversity of the phonological awareness skills investigated and the limited content of the Turkish preschool education program to promote phonological awareness. In this context, there is a need for studies examining the contribution of the home environment and/or parental variables on reading acquisition (e.g. quality of the stimuli that promote early literacy in the home environment and whether parents support early literacy experiences). Furthermore, the content of the phonological awareness skills investigated in the study were influential in the results and therefore should be regarded as a limitation. Analyses about the possible effects of particularly alphabet knowledge and other phonological awareness skills on reading performance would greatly contribute to the research. Finally, although early literacy skills have gained more coverage in kindergarten with the Turkish preschool education program updated in 2013, which comprise only a few skills (producing a word that rhymes with a given word, saying the initial and final sounds of a word and producing a word that begins and ends with a given sound), the results of the study indicate potential practical difficulties in the implementation of the preschool education program. Consequently, it is essential to make amendments to improve the quality of practices that promote especially early literacy skills and to facilitate the administration of teaching strategies that support early literacy development through systematic teaching approaches. Moreover, for greater contribution, the current preschool education program for phonological awareness skills should be reviewed, and amendments which involve letter knowledge and phoneme manipulation (e.g. phoneme blending, segmentation and deletion) conforming to contemporary research results should be implemented. In this context, conducting longitudinal studies extending from preschool to the primary school would facilitate a more comprehensive analysis of phonological awareness skills and a realistic examination of their potential contribution to reading performance.

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