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How socioeconomic status, verbal memory, rapid naming and receptive language contribute to phonological awareness in Turkish preschool children

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ABSTRACT

The present study investigated the relative importance of verbal memory, rapid naming, receptive language and phonological awareness for Turkish children from low-versus middle and high-socio economic status (SES) backgrounds. A total of 132 kindergarten children were assessed on verbal memory, rapid naming, receptive language and phonological awareness in Turkish. Results revealed that low-SES children exhibited lower levels of verbal memory, rapid naming, receptive language and phonological awareness than their middle and high-SES counterparts. Regression analyses also indicated that verbal memory and receptive language made significant contributions to phonological awareness. Overall, findings show the potential importance of SES inequalities, verbal memory skills and receptive language input to their children for phonological awareness.

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Introduction

Preschool is a very important and critical period in early childhood in terms of early diagnosis and intervention. This is the period when children exhibit their academic skills such as reading, writing, and math for the first time. The future academic performance is shaped by what is done in this period. However, a significant portion of children starts elementary school devoid of fundamental skills required for learning (Hudson and Test 2011; Whitehurst et al. 1994). Studies in literature show that children who start elementary school devoid of fundamental skills such as phonological awareness, and vocabulary knowledge get off on the wrong foot, and face challenges throughout their school life (Justice et al. 2005, 2015). Verbal working memory and rapid naming skills, which are found by literature to be closely linked to phonological awareness are the two cognitive skills to be analysed in this study.

Literature review

It is thought that an effective and multi-component structure such as the *working memory* may be associated with early literacy skills, which are among early academic skills. Verbal memory consists of verbal short-term memory and verbal working memory. Verbal short-term memory is an individual's ability to store verbal information in their memory. Verbal working memory is the ability to manage the information by associating it with information in the long-term memory, or a piece of new information while keeping it in the verbal information memory (Baddeley 2003; Cowan 2008; Diamond

2013; Ergül et al. 2018a). As it is understood from the definitions, verbal short-term memory is the storage of information while verbal working memory is the storage and processing of information simultaneously. Verbal working memory both activates information that individuals previously processed and found in their long-term memory, and enables them to link this information with information in the text (Swanson, Howard, and Saez 2006). The importance of the correlation between phonological awareness and working memory has been previously studied in different languages (Oakhill and Kyle 2000; Ouellette and Sénéchal 2008). In their study, Ouellette and Sénéchal (2008) found a moderately positive correlation between working memory and phonological awareness among children of 5 years of age. It was also reported that working memory skills at ages 4 and 5 are the strongest predictor of reading and other academic skills 3 years later (Gathercole, Brown, and Pickering 2003). In their study on 50 children in third and fourth grades, Georgiou, Das, and Hayward (2008) aimed at identifying the effect of working memory measurements on word reading and comprehension skills, which are associated with phonological awareness and rapid naming. The results of the study show that working memory as well as phonological awareness and rapid naming skills make a significant contribution to the variant in terms of their power to predict reading. According to the results of the study, earlier assessment of working memory can give an idea about the reading performance of children, which can help to develop early intervention skills.

Rapid naming is based on the calculation of time spent naming a series of familiar objects, colours, letters, and digits that are presented visually (Ergül and Demir 2018; Liao et al. 2015). This result offers information about automatised processing skills/processing speeds of students. It is a skill that provides an index of the speed of phonetics retrieved by the memory (Georgiou et al. 2013; Powell et al. 2007). Rapid automatized naming is a skill, which is also associated with reading skills and predicts success in reading skills in languages that have either transparent and opaque orthographies before learning reading (Carroll, Solity, and Shapiro 2016; Fricke et al. 2016). Previous studies have revealed positive associations between PA and Rapid Naming (Wasserstein and Lipka 2019). It is also noted that early rapid automatized naming evaluations can identify students with reading difficulties before they even start school (Willburger et al. 2008).

Many studies found that students with high *receptive language skills* are more successful in learning reading (Catts et al. 2006; Dickinson and Tabors 2001; Senechal and LeFevre 2002; Storch and Whitehurst 2002) and comprehension (Nation et al. 2010; Storch and Whitehurst 2002). Understanding spoken language is often considered a prerequisite for comprehension skills (Pike et al. 2013). In a longitudinal study carried out by Roth et al. (2002) covering the preschool period and first and second grades, it was found that preschool language performance is one of the most important predictors of comprehension skills in the first and second grades. It is noted that children, who have difficulties reading during school, develop language problems that cause such difficulties before learning how to read (Hulme and Snowling 2016). Since children who struggle with language skills before learning reading also experience difficulty in reading, they gain less reading experience preventing them to improve their language skills through reading (Verhoeven and Perfetti 2011).

Phonological awareness is the ability to divide words in spoken language into syllables, syllables into phonemes, manipulate phonemes and notice words consisting of common phonemes (Anthony and Francis 2005; Gillon 2004). The information gained about the phonological structure of a language thanks to phonological awareness can allow one to acquire the alphabetic principle required to develop word recognition and writing skills (Adams 1990). Children of low economic status tend to exhibit poorer phonological awareness skills before preschool compared to their peers of middle income status (Chaney 1994). The phonological awareness skill starts developing in preschool and continues to develop during the early years of school. It also predicts the development and success of the reading skill (Acarlar, Ege, and Turan 2002). Güldenoğlu, Kargın, and Ergül (2016) noted that success in phonological awareness in preschool has an impact on the reading skill in first grade. Ergül et al. (2020) measured in preschool the level of phonological awareness skills of children of various socioeconomic levels whose native language is Turkish and examined the level of

prediction of this measurement of reading skills in first grade. The results of the study show that the phonological awareness skills, which are measured in both semesters of preschool and in the fall semester of the first grade, of children of various socioeconomic levels predict their reading skills in the first grade. The results of the study by Furnes and Samuelsson (2010) suggest that rapid automatized naming is a significant and reliable predictor of reading in Scandinavian languages, which have a transparent orthography, and in English, which has an opaque orthography. Researchers noted that phonological awareness and rapid automatized naming have considerable effects on reading even in different writing systems and that theories based on these skills can be generalised for languages with different orthographies. Kirby, Parrila, and Pfeiffer (2003) monitored English-speaking preschool students up to fifth grade. The study found that phonological awareness and rapid naming performance in preschool independently predict the reading skill; poor phonological awareness, and low naming speed are caused by slow reading development, and children performing as such experience reading difficulties in fifth grade. It was seen that the predictive effect of naming speed on reading enhances in later years of school.

Phonological awareness in Turkish

The phonological awareness development of Turkish-speaking children is expected to be different than of speakers of other languages. The fact that each grapheme in Turkish corresponds to a phoneme will lead to a higher phonological awareness. Increased awareness of and control over the spoken language will be highly advantageous for Turkish-speaking children when learning literacy. Given the writing systems of English or French, the contrast is quite clear. The only thing left for Turkish-speaking children who can distinguish phonemes in words, and blend and manipulate these phonemes, in other words, turn phonemes in words into a game, to do is to correspond graphemes to phonemes. Durgunoğlu and Öney (1999) compared Turkish-speaking and English-speaking children in terms of their phonological awareness skills. Among the participants, who were in preschool and first grade, 44 were English speakers and 94 were Turkish speakers. Durgunoğlu and Öney (1999) note that first-graders in both Turkish and English-speaking groups show a higher performance of phonological awareness skills compared to the preschool group. These differences between languages are due to their different phonological characteristics. In terms of the development of phonological awareness skills in Turkish, a study examining the metalanguage skills of Turkish children aged 3–8 using tasks such as splitting sentences into words, splitting words into syllables, splitting syllables into phonemes, recognising words starting with the given phoneme, and recognising words ending with the given phoneme found syllable awareness to be the earliest acquired skill (Acarlar, Ege, and Turan 2002).

Various studies showed that socioeconomic infrastructure is one of the factors that lead students to differ in terms of having the desired competencies (Kennedy et al. 2007; OECD 2010b; Schulz 2005). These studies emphasise that the socioeconomic infrastructure variable directly or indirectly affects the academic performance and competencies of students in various fields. In particular, it is noted that children of low and middle socioeconomic levels are more disadvantaged than others. Research shows that children with a history of low socioeconomic status (SES) perform poorly in terms of literacy success compared to their more advantaged peers (Akoğlu and Şipal 2012). This gap in success is quite emphasised in preschool and remains visible throughout the school. For socioeconomically-disadvantaged individuals, the lack of a stimulating environment leads them to lag behind in terms of thinking skill development (Gingsburg, Lee, and Boyd 2008). Raising children in an environment and family with rich stimuli positively affect their cognitive skills and intellectual development (Li and Atkins 2004).

Chung (2015) notes that socioeconomic status (SES) is associated with children's cognitive and language skills and academic performance. Children who grow up in a low SES environment have poorer cognitive and language skills and exhibit poorer academic performance in preschool compared to those who grow up in middle SES. Children of low SES exhibit limited performance in

spoken language (Rowe 2008), and phonological awareness (Duncan and Seymour 2000; Noble, Farah, and McCandliss 2006), and have lower-performing working memories. Such children lag further behind when they start elementary school. In their longitudinal study, Ergül et al. (2018b, October) examined the vocabulary knowledge and phonological awareness of preschool children on the basis of SES. The results of the study show that children from the high SES perform better in vocabulary knowledge and phonological awareness skills in all three terms than children from the lower and middle SES. Children who are disadvantaged in terms of SES start preschool with one or more factors (living in a single-parent home, living in poverty, having a poorly educated mother, genetic factors, and malnourishment) that may affect their skills and knowledge. Locke, Ginsborg, and Peers (2002) concluded that preschool children, who are raised in a disadvantaged environment, have comparable spoken language and cognitive skills, but still, they perform considerably poorer than their peers. Therefore, low SES delays the development of both spoken language skills (Locke, Ginsborg, and Peers 2002) and literacy skills (Bowey 1995) of children. Evans (2004) stresses that compared to middle SES, children of low SES receive less and lower quality parental language inputs and less parental participation in academic skills-related activities.

The present study

The relationship between phonological awareness and working memory, rapid naming, receptive language skills, and SES are complex and not yet fully understood. Preschool education services provided by the state in Turkey are mostly half-day education for children over the age of 5. Also, preschool education is not mandatory. In terms of income level, only 18.2% of 3–5 year-olds living in the poorest 20% households go to preschool, kindergarten, or day-care while this rate is 55.1% for those living in the wealthiest 20%. These results suggest that as income level falls, participation in preschool education also goes down. However, it is important that preschool education services are of the quality to best support the development of children. In Turkey, only a third of children aged 3–5 years are included in preschool education. What is clear is that children of high income families get a head start on the school compared to those of low income families. Given the multiplier effect of correct interventions in preschool, it is important to expand the scope of these services.

Evaluating the working memories, rapid naming and language skills, as well as phonological awareness skills of preschool children of Turkish families with various SES in this study will be important in preventing/reducing possible reading difficulties and academic failure. In addition, it is believed that the examination of phonological awareness performances of children of various SES in relation to other skills will contribute to studies and practices to be carried out in countries with languages similar to Turkish, which is unlike many languages due to its transparent orthography.

Method

Participants

A total of 132 Turkish students from low-SES to high-SES in four schools in Konya, participated in the study. This sample comprised 41 low-SES (18 girls, 23 boys), 49 middle-SES (24 girls, 25 boys), and 42 high-SES students (23 girls, 19 boys). These 132 children ranged in age from 58 to 73 months, with a mean age of 66.12 months ($SD = 3.72$).

Depending on the social and economic characteristics of school regions, schools were grouped under three socioeconomic levels (low, middle, high). Before evaluation, the families of children were sent a participation permission letter and only children who were allowed to participate by their families were included in the evaluation. Demographics of children included in the study and information about the socioeconomic properties of families were collected using the 'Family-Child Information Form', which was developed by the researchers. Educational levels of mothers

Table 1. Educational levels of mothers and fathers.

	Educational level of mothers		Educational level of fathers	
	n	%	n	%
Primary school	36	27	31	23
Secondary school	27	20	33	25
High School	31	23	20	15
Graduate	31	24	40	30
Postgraduate	6	5	7	6
Doctorate	1	1	1	1

and fathers are divided into 6 groups (Table 1). Table 1 provides information about the educational levels of mothers and fathers. According to Table 1, the majority of mothers are primary school graduates and graduates, while the fathers are graduates and secondary school graduates.

Measures

To evaluate language skills, all children participating in the study for the fall semester took the Test of Early Language Development (TELD) (Topbaş and Guven 2011), the Phonological Awareness Test (Karaman 2013), the Working Memory Scale (Ergül, Özgür-Yılmaz, and Demir 2016), and the Rapid Naming Test (Ergül and Demir 2016).

Family-child information form

The form used to determine the socioeconomic levels of the families of the children participating in the study includes SES variables such as the educational status of the parents, their occupational status, the age of the child, book ownership and participation in cultural activities. This form was filled by the families.

Phonological awareness

The Phonological Awareness Sub-dimension of the Early Literacy Skills Assessment Tool, which was developed by Karaman (2013), was employed to evaluate phonological awareness skills. The Phonological Awareness Sub-dimension consists of five subtests, namely matching words starting with the same phoneme, recognising rhyming words, recognising initial phonemes in words, deleting syllables and phonemes, and blending phonemes. Correct answers are given ‘1’ point and wrong answers are given ‘0’ points. If a child does not give an answer to a question, that question is repeated 3 times. If the child still does not answer, ‘0’ points are given.

Verbal memory

The Working Memory Scale, which was developed by Ergül et al. (2018a), was employed to evaluate the verbal working memories of children aged 5–10 years. Values obtained as a result of calculating the test retest reliability coefficient of the scale ranges from .41 to .83. As a result of the DFA performed to identify the construct validity of the scale, the factor load values of each item in each sub-scale were found to be between .40 and .92 in the first trial, and .49 and .93 in the second trial.

Verbal short-term memory includes the subtests of recalling words, recalling nonwords, and recalling digits. Verbal working memory includes backwards digit recall and initial word recall subtests. The tests are administered individually. The subtests include series of two trials. In addition, each subtest has two sample applications to explain the participant the task. The number of units in series that need to be recalled gradually increases. During the administration of sub-scales, items in the trials of each series are presented to the child in an order and clearly. If the child succeeds in at least one trial in each series, he/she then can move onto the next series. When both

series are failed, that sub-scale is terminated. All subtests in sub-scales that include short-term verbal memory assessment are evaluated over 1 point. Incorrect answers are given 0 points. Following the administration of the scale, all subtest scores are added up. The maximum score from all subtests is 48.

Rapid naming test (RNT; Ergül and Demir 2016, 2018)

This test was developed to evaluate the rapid naming skills of children from preschool to fourth grade. The purpose is to evaluate how long it takes for children to retrieve the name of and name familiar objects, colours, letters, and digits from their memories. It is made up of 4 subtests, namely object, colour, letter, and digit naming. Each subtest contains five items (colours, objects, letters or digits) that are presented in a mixed and repetitive manner. The selected items are placed in five rows with 10 items in each row. The total naming time in each subtest gives the measurement result of that specific subtest. During administration, the measurement results of a subtest are not taken into account if the child makes more than six naming mistakes in that specific subtest. Given the fact that they may not be familiar, only the colour and object naming subtests of the rapid naming test are administered to preschool children. The letter and digit subtests are used starting from the first grade. The validity and reliability studies of the rapid naming test are completed and its norms are established from preschool to the fourth grade. The content validity of RNT was identified by evaluations of various experts. Exploratory and confirmatory factor analyses were performed for construct validity and the expressed variant for all subtests under a single factor was found to be 67.53%. It was also determined by hypothesis tests that the test has discriminant validity according to grades. The test retest coefficients are between .83 and .95.

The test of early Turkish language development (Receptive Vocabulary Knowledge; Topbaş and Guven 2011)

This individually-administered test aims at measuring the receptive and expressive verbal language skills of children between the ages of 2 and 7. It is the Turkish adaptation of the test widely used in international literature and known as the Test of Early Language Development (TELD). It consists of 76 items and two subtests, namely Receptive Language and Expressive Language. These subtests are made up of items that measure various fields of the language such as semantics, morphological knowledge, and syntax. Some of these questions require showing or describing pictures, and others require fulfilling verbal instructions and verbally answering questions. According to the reliability data about the Receptive Language Subtest, the test-retest test reliability is .96, the inter-rater reliability is .99, and the internal consistency coefficient is .94. The validity data shows that the test's correlation with parallel forms ranges from .64 to .96 and the correlation between test items and the total test score ranges from .87 and .91.

Data collection and analysis

Children, who do not have any diagnosed developmental disability, were administered the phonological awareness, verbal working memory, and rapid naming tests, and then TELD receptive language subtest in two separate sessions with 10 min in between. Parental consent was obtained before administering the tests. The data collection began in the fall semester and lasted two months. Low, middle, and high SES children were evaluated in the fall semester. All tests were administered by trained experimenters in preschools. Children were administered the tests in their own schools individually in 40-min sessions with short breaks during sessions. The scales that were employed are described above. In this study, descriptive, MANOVA and multiple regression analyses were used.

Findings

Descriptive analyses

The Multivariable ANOVA (MANOVA) Test was performed to analyse whether phonological awareness, rapid naming (colour and objects), verbal memory, and receptive language skills of children from various SES levels show a significant difference in the first semester of preschool. Descriptive statistics of scale scores are provided in Table 2.

Since values of skewness and kurtosis are between +1.5 and –1.5, it is safe to say that the data has normal distribution (Tabachnick and Fidell 2013). With regard to the average scores obtained in all sub skills covered in the study, a result was obtained that is in favour of the high SES group. Given the fact that averages in rapid naming are calculated based on seconds, average scores obtained from skills decreased as SES was higher while average scores obtained from all other skills were higher in the high SES.

It was decided to use MANOVA due the fact that no serious hypothetical violation was observed in the majority of test scores taken into account according to SED levels. Homogeneity of covariance matrices was evaluated using Box's M statistic. The results of the analysis are provided in Table 3.

As shown in Table 3, the hypothesis of homogeneity of covariance matrices is satisfied ($p > .001$). In large samples, Tabachnick and Fidell (2013) suggest evaluating the level of significance of Box's M statistics according to a value as low as 0.001.

The Multivariable ANOVA (MANOVA) Test was performed to analyse whether phonological awareness, colour naming, object naming, verbal memory, and receptive language skills of children from various SES levels show a significant difference. MANOVA results point to a statistically significant difference ($\lambda=.540$ $F(10, 250) = 9,024$, $p = .000$, $n_2=.265$).

Between-group effect analysis results were analysed to identify the source of this significant difference. The results showed significant differences in receptive language ($F(2, 129) = 12.2$, $p=.000$, $n_2=.159$), phonological awareness ($F(2, 129) = 12,909$, $p=.000$, $n_2=.167$), objects naming ($F(2, 129) = 34,893$, $p=.000$, $n_2=.351$), colour naming ($F(2, 129) = 31,611$, $p=.000$, $n_2=.329$), and verbal memory ($F(2, 129) = 15,517$, $p=.000$, $n_2=.194$) between SES levels. According to the Tukey HSD test performed to analyse the paired comparisons between SES, there was found a significant difference between low, middle, and high SES in phonological awareness, receptive language, verbal memory, and rapid naming (colour and object) skills. In terms of effect sizes, SES has a large effect on receptive language, phonological awareness, rapid naming, and verbal memory.

Average scores show that high SES and middle SES children, respectively, are more successful in these skills than low SES children.

According to Table 4, significant differences were found between groups in all sub skills. The children of primary-school-graduate mothers had the lowest average scores in terms of their

Table 2. Means, standard deviations on various measures for the three SES groups.

	Measures	Phonological awareness	Receptive language	Rapid naming (colour)	Rapid naming (object)	Verbal Memory
Low-SES ($n = 41$, female = 18)	<i>Skewness</i>	.712	-.798	.694	.707	.330
	<i>Kurtosis</i>	-.506	.095	.569	1.196	-1.366
	<i>M</i>	17.48	4.09	115.63	108.31	11.09
	<i>SD</i>	8.03	1.01	23.81	19.01	3.63
Middle-SES ($n = 49$, female = 24)	<i>Skewness</i>	-.221	-.474	.300	.610	-.258
	<i>Kurtosis</i>	-.622	-.372	-.796	-.690	-.168
	<i>M</i>	20.61	4.53	88.93	83.63	13.97
	<i>SD</i>	6.38	1.34	17.15	16.93	3.44
High-SES ($n = 42$, female = 23)	<i>Skewness</i>	.307	-.317	1.636	.769	.306
	<i>Kurtosis</i>	-.759	-.882	5.65	-.666	.490
	<i>M</i>	24.90	5.40	85.40	80.26	15.28
	<i>SD</i>	5.45	1.28	15.64	14.15	3.44

Table 3. Box's M statistics of phonological awareness, objects naming, colour naming, verbal memory, and receptive language performances based on socioeconomic level.

Variables	Box M	F	df1	df2	p
SES	50.056	1.575	30	50370.521	.024

phonological awareness, receptive language, rapid naming, and verbal memory performance, which suggests that the performance of children increases as the educational level of mothers increases.

Effect sizes of all sub skills were large. In terms of effect sizes, the educational level of mothers had a large effect on the receptive language, phonological awareness, rapid naming, and verbal memory skills of children.

It is particularly striking that the effect size of phonological awareness and verbal memory skills was quite high $\eta^2 = .35$. Since only a few mothers were doctorate graduates, they are most likely unable to represent their group. Other than that, the scores of children increased as the educational level of mothers improved for all sub skills.

Correlations

Table 5 shows Pearson's correlations across phonological awareness, rapid naming, receptive language, and verbal memory. They show a medium-level and positively significant correlation between receptive language skills and phonological awareness skills. Children's receptive language performances increased as their performance in skills that make up phonological awareness increased. A medium-level and negative correlation was found between receptive language and phonological awareness skills and rapid object and colour naming skills. As children's object

Table 4. Performances of study groups by educational level of mothers.

	Group	N	$\bar{x}$	F	p	η^2
Receptive Language	Primary school	36	3.57	30.75	.000	.21
	Secondary school	27	4.10			
	High School	31	4.35			
	Graduate	31	5.02			
	Postgraduate	6	5.16			
	Doctorate	1	5.00			
Rapid Naming (colour)	Primary school	36	115.51	24.94	.000*	.29
	Secondary school	27	114.81			
	High School	31	95.71			
	Graduate	31	84.22			
	Postgraduate	6	85.62			
	Doctorate	1	86.00			
Rapid Naming (figure)	Primary school	36	108.51	30.21	.000*	.34
	Secondary school	27	109.81			
	High School	31	85.11			
	Graduate	31	84.25			
	Postgraduate	6	80.62			
	Doctorate	1	86.00			
Phonological Awareness	Primary school	36	17.30	31.8	.000*	.35
	Secondary school	27	18.03			
	High School	31	20.14			
	Graduate	31	22.93			
	Postgraduate	6	23.25			
	Doctorate	1	24.60			
Verbal Memory	Primary school	36	11.15	32.38	.000*	.35
	Secondary school	27	12.76			
	High School	31	13.22			
	Graduate	31	14.09			
	Postgraduate	6	15.16			
	Doctorate	1	13			

Table 5. Correlations among all measures in the whole sample ($n = 132$).

	1	2	3	4
1. Receptive Language	-			
2. Phonological Awareness	.640**	-		
3. Objects Naming	-.414**	-.600**	-	
4. Colour Naming	-.376**	-.530**	.837**	-
5. Verbal Memory	.585**	.798**	-.583**	-.505**

* $p < .05$ ** $p < .01$.

naming and colour naming times decreased, their receptive language and phonological awareness skills increased. The correlation between object naming and colour naming skills was at a high-level and positively significant. Accordingly, as children's object naming times decreased, their colour naming times also decreased. A medium-level and positively significant correlation was found between verbal memory and receptive language and phonological awareness performances. A medium-level and negative correlation was found between verbal memory and object and colour naming skills.

Regression analyses

It significantly predicted the verbal memory variable for all three SES groups (Table 6). The receptive language skills variable was a significant predictor of phonological awareness for low SES students. It also predicted the receptive skills and the colour naming variable for the high SES group ($p < .05$).

For low SES, all four variables together explain approximately 80% of the total variance of phonological awareness. For middle SES, all four variables together explain approximately 69% of the total variance of phonological awareness. For high SES, all four variables together explain approximately 61% of the total variance of phonological awareness. The receptive language skills and verbal memory variable were significant predictors of phonological awareness for students. For all groups, all four variables together explain approximately 61% of the total variance of phonological awareness.

Table 6. Multiple regression analyses.

	Variable	B	Std. E.	β	t	p
Low-SES	Constant	-3.638	7.049		-.516	.609
	Receptive language	2.074	.719	.263	2.885	.007
	Objects naming	-.051	.066	-.120	-.764	.45
	Colour naming	.013	.046	.04	.293	.772
	Verbal memory	1.492	.212	.676	7.031	.000
	$R=0.896$, $R^2=.803$ $F_{(4, 36)}=36.573$, $p=.000$					
Middle-SES	Constant	5.656	4.957		1.141	.26
	Receptive language	.736	.466	.154	1.579	.122
	Objects naming	-.085	.048	-.224	-1.754	.086
	Colour naming	.02	.047	.053	.42	.677
	Verbal memory	1.212	.190	.654	6.393	.000
	$R=0.833$, $R^2=.694$ $F_{(4, 44)}=24.988$, $p=.000$					
High-SES	Constant	18.052	5.108		3.534	.001
	Receptive language	1.861	.543	.44	3.429	.002
	Objects naming	-.004	.054	-.01	-.073	.942
	Colour naming	-.115	.047	-.331	-2.466	.018
	Verbal memory	.456	.208	.288	2.193	.035
	$R=0.782$, $R^2=.612$ $F_{(4, 37)}=14.564$, $p=.000$					
Total Group	Constant	6.635	3.221		2.06	.041
	Receptive language	1.318	.327	.241	4.026	.000
	Objects naming	-.051	.033	-.144	-1.533	.128
	Colour naming	-.012	.028	-.04	-.447	.656
	Verbal memory	1.035	.126	.552	8.218	.000
	$R=0.839$, $R^2=.703$ $F_{(4, 127)}=75.217$, $p=.000$					

The standardised regression coefficient (β) shows that verbal memory had the largest effect on low and middle SES groups. The largest effect on the high SES group was of receptive language. The results of the t-test on the levels of significance of regression coefficients suggest that only verbal memory is a significant predictor in the low SES group, while only receptive language and verbal language were significant predictors in the middle and high SES levels.

Discussion

This study analyzes the differences in phonological awareness, verbal memory, rapid naming, and receptive language skills of low, middle, and high SES Turkish children. Findings first show that low SES children exhibit poor performance in cognitive (verbal memory and rapid naming) and language skills compared to their middle and high SES peers. Correlation and regression results show that cognitive and receptive language skills have a correlation with the phonological awareness skill and that verbal memory and receptive language skills contribute to the phonological awareness skill in all three SES levels. In line with previous results (Chung 2015; Chung and McBride-Chang 2011; Ergül et al. 2017, 2018b, october; Song, Spier, and Tamis-Lemonda 2014), these findings also accentuate the potential importance of receptive language, rapid naming, and verbal memory in shaping children's phonological awareness during preschool.

Cognitive skills and receptive language in relation to phonological awareness among children from low-SES backgrounds

The results revealed that in the Turkish society, cognitive and language skills of low SES children are significantly different than those of middle and high SES children. It is an undeniable fact that socioeconomic level plays an important role in children's development. High socioeconomic level families try to provide their children a favourable environment in all aspects (nutrition, educational material, socialising) while children of low socioeconomic level families are deprived of such resources and experiences, which poses a risk for their development (Brooks-Gunn and Duncan 1997). The reason for these significant differences among groups could be that children raised in low SES families receive parental input of less quality and quantity. Compared to middle SES, children raised in low SES families have parents that offer less educational experience and take less care of their children (Bradley and Corwyn 2002; Chung 2015; Evans 2004). For example, low SES children tend to be less encouraged by their parents to participate in academic skills-related activities and receive less education in language and cognitive skills. In addition, the fact that they receive less parental input and support compared to middle and high SES can lead them to face fewer opportunities in asking open-ended questions and exploring. The results are in line with the findings in the literature suggesting that SES can affect the development of children in terms of cognitive skills, phonological awareness, and receptive language (Bierman et al. 2008; Ergül et al. 2017).

Lonigan et al. (1998) note that one skill will effect the development of another and meeting formal education early will have an impact on skills development. Phonological awareness skills of 356 children of different SES aged 2–5 were evaluated using tasks such as recognising the non-rhyming word, recognising words starting with the same phoneme, blending words, deleting words, and recognising rhyming words (Lonigan et al. 1998). While sex did not lead to a significant difference in phonological awareness skills, children of middle SES performed much better than those of low SES. A study that examined the phonological awareness skills of 162 preschool children in Turkey using the sub-dimensions of recognising same-different phonemes and phoneme-grapheme relationship found a significant difference between sociocultural groups but did not find a difference between sexes (Karaman and Üstün 2011).

Socioeconomic infrastructure has an impact on cognitive, language, parental educational level and phonological performance, and this impact is usually amplified by the school. Therefore, the most effective method to reduce the predictiveness of socioeconomic infrastructure on student

performance is to disseminate high-quality preschool education. All of the children included in this study attend a preschool education facility. However, the results of the study raise some concerns about low SES children who do not receive any preschool education. Because in Turkey, 72% of children do not receive any preschool education while 20% receive it for only a year or less (OECD 2010b). Preschool education has a direct impact on an individual's future learning since it is the first phase of school for children and it is the first place where they experience school formally. For this reason, resources allocated to preschool education and applicable educational policies emphasise the importance of the quality of preschool education and preschool education practices (OECD 2010a). From this point of view, only through early and high-quality preschool education necessary interventions can be made to prevent the deepening of gaps among students that are caused by socioeconomic infrastructure. It can also be important for future longitudinal studies to examine the effects of SES, environmental and lingual factors such as home literacy practices and beliefs and practices of parents on their children.

Relations among cognitive skills and receptive language and phonological awareness

The correlation and multiple regression analysis revealed associations among verbal memory, rapid naming, colours rapid naming, receptive language, phonological awareness. Literature suggests that language development, which is considered to be an important skill in the early period, correlates with phonological awareness and that verbal language proficiency influences phonological awareness significantly (Goswami 2001). Storch and Whitehurst (2002) examined the correlation between phonological awareness and language skills of 626 children from preschool through fourth grade. They found that the correlation between language and phonological awareness is very high in preschool years and language proficiency predicts 48% of the variant of phonological awareness skills. As children's language skills develop, it becomes easier to distinguish the phonemes that make up words, identifying phoneme similarities and differences between words, and establishing a grapheme-phoneme correspondence (Lonigan 2007; Storch and Whitehurst 2002). This finding suggests that supporting language and phonological awareness skills, which are important predictors of the reading skill, together would make positive contributions to the development of children. Therefore, it would be important to offer enriched learning environments and opportunities to, particularly low SES children to support their language and phonological awareness skills.

Working memory, which plays an important role in the learning process, is known to have an impact on the development of receptive language skills (Alloway and Copello 2013; Swanson 2011). It is known to play a pivotal role in learning language skills, coding and processing words, and storing information (Adams and Gathercole 2000; Gathercole et al. 2005). Tucker-Drob (2012) point out that low, middle, and low SES have differentiating effects on language and cognitive skills and low SES children are the ones that most benefit from education. Not recalling verbal input or processing it fast enough can lead to difficulties in learning new language structures or understanding language. This may indicate a difficulty in verbal memory. Therefore, limitations in verbal memory can also limit the acquisition of language and/or understanding it. That is why it is important to take into consideration children's working memory capacity while planning activities to support their language development and necessary adaptations should be made.

The results of the analysis, which examined the correlation between children's rapid naming skills and receptive language, phonological awareness skills, a negatively significant correlation was found between rapid colour and object naming skills and receptive language skills. Children with high rapid naming times have lower receptive language and phonological awareness scores. Rapid naming, which requires the recall of phonological information from the long-term memory, is a skill affecting early language development (Bellocchi, Tobia, and Bonifacci 2017; Georgiou, Das, and Hayward 2008; Kirby, Parrila, and Pfeiffer 2003; Norton and Wolf 2012). Another finding is that verbal memory and the phonological awareness skill have a significant correlation across all SES levels. Since phonics-based reading is taught in the first grade in Turkey, the correlation

between working memory and phonological awareness skills is considered important. Children need to keep in their mind the words or phonemes and perform the task required (separating phonemes, blending phonemes, recognising words start with the same phoneme) since the phonological awareness skill requires simultaneous processing and storing. In this process, the performance of the working memory is important as it plays a vital role in processing the information about phonological awareness and recognising phonemes (Engle et al. 1999). In this context, it is important to take into consideration the working memory performances of children while supporting their phonological awareness skills and to plan activities accordingly. When the average scores of all sub-skills discussed in the study were examined, a result in favour of the higher SES group was got. Since the averages in rapid naming are calculated over seconds, the average values got from the skills decrease towards the higher SES, while the average scores got from all other skills were found to be higher in the higher SES.

According to the findings of the study, preschool children of low SES underperformed in phonological awareness, receptive language, rapid naming, and working memory skills compared to their middle and high SES peers. In addition, the analysis results are important in that they show that verbal memory and receptive language skills predict phonological awareness skills much more in low SES children compared to children of other SES. This finding can shed some light on future studies to be carried out on preschool phonological awareness skills, especially for languages similar to Turkish. Also, supporting children disadvantaged in terms of SES much earlier (early education) will help alleviate the limitations caused by SES.

Limitations and future research

This study has at least four limitations, which can pose challenges for future studies. First of all, its findings are limited to Turkish children. These findings may not be generalised to other societies due to differences in language and culture between Turkish and European-American children and families. Second, even though the correlation among verbal memory, rapid naming, and receptive language are both direct and indirect, more multi-dimensional auditory and visual assessments are needed to identify the scope of this correlation. Third, the data provided little evidence for family SES. Future researchers should use a more detailed SES form (knowledge levels of mothers, type of environment provided for children at home) to present the comprehensive relationship among verbal memory, language skills, rapid naming, and phonological skills. Fourth, this study was a cross-sectional one. In the future, longitudinal and experimental studies are required to confirm the correlation between the skills included in this study. Finally, it was seen that the education level of the mothers was related to the verbal memory, language skills, rapid naming and phonological awareness skills of the children. In this respect, at what level the child has gained these skills in the pre-school period how rich an environment is presented to him by his family is an important determinant of his academic success at school. In this context, it is suggested that this result should be evaluated as an important indicator that maternal education level should be planned and implemented for families in early intervention programmes.

Conclusion

Despite these limitations, as in studies carried out in other cultures, this study's findings show that children of low SES exhibit poorer performance in verbal memory, rapid naming, receptive language and phonological awareness tests. Findings also show that verbal memory and receptive language skills affect the results of phonological awareness tests. These findings emphasise that cognitive skills and receptive language can have a positive indirect effect on future academic performance by improving phonological awareness and the importance of these cognitive language skills in pre-school children. Since the differences in cognitive language skills and phonological awareness skills can be associated with differences in families' SES and the quality of interaction between

parents and children, early intervention programmes that target at-risk children should not only focus on supporting cognitive skills but also on helping parents to be more involved in verbal interaction.

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