CHILDREN'S INTELLECTUAL ABILITY, FAMILY ENVIRONMENT, AND PRESCHOOL AS PREDICTORS OF LANGUAGE COMPETENCE FOR 5-YEAR-OLD CHILDREN

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Abstract: This study ascertains the extent to which children's intellectual ability and factors in the family environment (paternal and maternal education, and quality of the family environment) and in preschool (the age at which children start preschool and preschool quality) are linked to children's language competence (language comprehension, language expression, and metalinguistic awareness). The sample comprised 115 five-year-old children that were attending a Slovenian preschool. The adopted path model of relationship between variables was checked using structural equation modeling (SEM). This model - which includes children's intellectual ability, preschool quality, children's ages when they started preschool, quality of family environment, and maternal education as exogenous variables, as well as parents' and children's reading together and an estimate of the three areas of verbal development as endogenous variables - has good fit. It makes it possible to explain the 16% of variability in the results obtained on the *Language Comprehension Scale*, the 7% of variability in the results obtained on the *Language Expression Scale*, and the 9% of variability in the results obtained on the *Metalinguistic Awareness Scale*. The results also indicate that the best predictors of children's language development are the development of their intellectual ability and parents' and children's reading together. Maternal education is indirectly linked to children's language competence, specifically through reading together, whereas paternal education is seen to be the least important predictor. Consequently, we also excluded this variable from the final model.

Key words: children's language competence, children's intellectual ability, parents' and children's reading together, quality of the family environment, preschool quality, parental education

INTRODUCTION

In early childhood there is rapid and mutually connected language development in the area of grammar, which includes form and content, and in the area of pragmatics and comprehension. Although the researchers of language development emphasize that by the age of five all areas of children's language competence are almost fully developed, they often report on great individual differences between children in their language competence, which are rarely overcome after enrollment in primary school (Ragnarsdottir, 2006). This is why it appears to be of great importance that the sources of individual variability in children's language development be as clearly identified as possible.

In both developmental psychology (e.g., Bruner, 1983; Tomasello, 1999, 2000; Vygotsky, 1978) and psycholinguistics (e.g., Caron, 1992; Chomsky, 1980, 1986; Clark, Clark, 1977), the results of empirical studies have confirmed the importance of the role of genetic and environmental factors in language development.

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In a meta-analysis of more than 100 behavior-genetic studies, Stromswold (2001, in Kovas, Hayiou-Thomas, Oliver, Dale, Bishop, Plomin, 2005) found that various areas of language development such as syntax, semantics, phonology, and articulation are partially influenced by genetic factors. In a sample of 787 pairs of 4½ year old twins, Kovas et al. (2005) found a moderate effect of genetic factors and nonshared environment, and a low effect of shared environment on children's language competence measured on nine standard measures of language development.

Apart from genetic ones, the different factors and characteristics of the child's environment also play an important role in children's general language competence or individual areas of language development. The family environment and children's exposure to various factors - for example, parents' and children's reading together, storytelling, attending cultural events and visiting libraries - that indirectly or directly promote children's language development represent a multi-layered context that is strongly defined by parental education, the family's economic status, the size of the family, and parents' implicit theories on rearing children (e.g., Foy, Mann, 2003). In his psycholinguistic theory, Bernstein (1974) specifically analyzes the linguistic codes that parents in families of lower or higher socioeconomic status use (including in conversations with children), and which they transfer as a model into their children's speech. The limited linguistic code that is primarily used by parents of lower socioeconomic status is characterized by the use of simple or disconnected utterances, much repetition, and limited use of grammatical rules, whereas the more elaborate linguistic code primarily used by parents of a higher socioeconomic status is characterized by more flexible use of language, broader vocabulary, and complex and grammatically appropriate utterances that most often communicate explicit meaning. The results of other studies (e.g., Crain, Lillo-Martin, 1999; Haden, Ornstein, Eckerman, Didow, 2001) also show that low- and high-level styles of language (these differ primarily in the frequency of questions posed, inclusion of new information, and expansion of the children's utterances) that parents use when communicating with children have a significant effect on children's language development.

Researchers agree that variability in language development between children may be partly explained by the effects of parental education. Various authors (e.g., Bornstein, Haynes, 1998; Marjanovič Umek, Fekonja, Kranjc, Lešnik Musek, 2003; Marjanovič Umek, Fekonja, Bajc, Kranjc, 2005; Moynihan, Mehrabian, 1978; Silven, Ahtola, Niemi, 2003) establish positive, albeit low or moderate, correlations (correlation coefficients around 0.20) between the level of maternal education and children's language competence (language comprehension, expression, and storytelling), measured with various language tests. The level of maternal education was found to have a significant positive correlation with the quality and frequency of mothers' verbal interaction with their children (Bornstein, Hahn, Suwalsky, Haynes, 2003). Researchers (e.g., Butler, McMahon, Ungerer, 2003; Hoff, 2003) have found that mothers that have a higher level of education speak with their children longer and more often, using a broad and more diverse vocabulary, and their linguistic utterances, which include many interrogatives, are complete and relatively long. Mothers with higher education also read to their children more frequently, and when reading together they include their

children in linguistic interaction; they attend puppet theaters and watch various children's television programs with their children (Marjanovič Umek, Podlesek, Fekonja, 2005). Marjanovič Umek, Podlesek, and Fekonja (2005) found that maternal education, together with measured factors from the family environment, can explain at most 9% of variation in children's language abilities. Parental education thus represents one of the measures of the quality of home literacy environment (Alwin, 1984; Brody, Flor, 1998; Browne, 1996; Kelly, Sanchez-Hucles, Walker, 1993; Zevalkink, Riksen-Walraven, 2001, in: van Bakel, Riksen-Walraven, 2002). Caldwell and Bradley (1984) establish a high correlation between family environment and measures of intellectual and language development - specifically, a positive correlation between results on the Stanford-Binet test ($r = 0.57$, $p < 0.01$) and results on the *Illinois Test of Psycholinguistic Abilities* ($r = 0.48$, $p < 0.01$ for verbal expression, and $r = 0.62$, $p < 0.01$ for grammatical closure).

Studies in which the authors deal in greater detail with the effect of preschool on children's development, including cognitive development, have further expanded the factors that are either directly or indirectly related to the development of children's language competence. The variables that are most often connected with studies of the effects of preschool are the children's age when starting preschool, the quality of the preschool that the children are attending (from the perspectives of structure and process), and the quality of the family environment (e.g., the amount of time that children spend in preschool on a daily or weekly basis, maternal education, and activities in the family that promote children's development and learning). The results of studies in which authors focus on the age of children when starting preschool vary somewhat, but preschools that are of high quality are seen as a neutral or positive factor in children's development and learning. Researchers (e.g., Lamb, Sternberg, Prodromidis, 1992; Marjanovič Umek, Kranjc, Fekonja, in press; Zupančič, Kavčič, 2004) have found that children's age when starting preschool does not have a direct effect on children's attachment, social adaptation, cognitive and language development, or later success in learning. Based on the results of an extensive longitudinal study, Andersson (1989) reports that 8-year-old children that entered preschool between the ages of 6 and 12 months achieved higher results on measures of cognitive and socio-emotional development than children that began attending after they were 1 year old. Later, Andersson (1992) further confirmed the positive effect of preschool with results obtained by the same children when they were 13 years old, in which it was found that the age at which the children began attending preschool had a significant positive effect on success in school at the ages of 8 and 13. A group of Swedish researchers (Broberg, Wessels, Lamb, Hwang, 1997) reported similar results: children that spent several months at preschool before the age of 40 months (i.e., began attending preschool early enough) achieved higher results on language competence tests in school than did their peers that began attending preschool later. Researchers also ascertained the effect of preschool on children's cognitive and language development as part of an extensive North American study (NICHD, 2000). This longitudinal study, which followed children from 1 to 36 months of age, assessed children's family and preschool environments, as well as demographic information connected with the

children's linguistic and cognitive achieve-
ments, when they were 15, 24, and 36
months old. The researchers included pre-
school quality, type of preschool, number
of hours spent in preschool per week, and
certain other factors from the family envi-
ronment (e.g., maternal vocabulary, and
maternal responsiveness and stimulation)
as independent variables. The results indi-
cated that the type and quality of preschool
correlated positively with children's lin-
guistic and cognitive achievements, al-
though preschool quality was only able to
account for 1.3% to 3.8% of variability in
the results for children's language and
cognitive competence. The share of unex-
plained variability increased with the addi-
tion of variables connected to family
environment and children's sex. Children
that did not attend preschool achieved
higher results on measures of cognitive
and language ability than did their peers
that had attended lower quality preschools,
but lower results than their peers that had
attended high-quality preschools. The re-
searchers also determined that preschool
teachers' cognitive and linguistic stimula-
tion in the preschool as well as their sensi-
tivity and responsiveness were a good
predictor of children's later linguistic and
cognitive development. The effect that
preschool has on the development of chil-
dren's language also interacts with the
quality of the family environment, since
Caughy, DiPietro, and Strobi (1994) found
that early enrollment of children from a
less stimulating family environment in
preschool has a positive effect on their
reading skills. Children's long-term expo-
sure to stimulation in preschool can make
up for deficiencies in lower quality stimu-
lation in the family environment for those
children that come from families with a
less stimulating socioeconomic environ-
ment.

Besides the genetic and environmental
influences on children's language compe-
tence, we cannot overlook an important
connection between children's language
and intellectual abilities. The studies show
a high positive correlation between the two
variables, although the results differ some-
what according to the instruments used or
the area of language or cognitive develop-
ment that they measured. Terman and
Merill (1937, in Williams, Wang, 1997)
found that the vocabulary subtest was
the most important subtest in the entire
Binet-Simon Intelligence Scale. Similarly,
Wechsler (1991) reported that among all of
the subtests on the *WISC-III* (*Wechsler
Intelligence Scale for Children - Third
Edition*, Wechsler, 1991) the vocabulary
test correlated most highly with the results
on the combined IQ scale. Kaufman (1994,
in Williams, Wang, 1997) found that the
vocabulary test is most saturated with the
g factor on the *WISC-III*. In the *PPVT-III*
(*Peabody Picture Vocabulary Test - Third
Edition*, Dunn, Dunn, 1997) standardiza-
tion study, the researchers (Dunn, Dunn,
1997; Williams, Wang, 1997) found that
the correlation of results on the *PPVT-III*
with nonverbal measures of intelligence
($r = 0.62$ to 0.84) were lower than the
correlation with verbal scales of intelli-
gence ($r = 0.08$ to 0.92). The authors also
found that vocabulary comprehension is
more linked to crystallized (correlation
coefficient $= 0.87$ to 0.91) than fluid
(correlation coefficient $= 0.65$ to 0.62)
intelligence, and that the results of the
PPVT-III also correlate highly with general
intelligence ($r = 0.76$ to 0.90). The correla-
tions between general language tests and
children's intellectual functioning are
somewhat lower, but significant nonethe-
less. Hresko, Reid, and Hammill (1999)
state that there is a moderate to high cor-
relation ($r = 0.33$ to 0.59) between various

measures of intellectual ability (*Stanford-Binet Intelligence Scale, Fourth Edition; WISC-III; Woodcock-Johnson Psycho-Educational Battery-Revised*) and a test of general language ability (*Test of Early Language Development - TELD-3*, Hresko, Reid, Hammill, 1999).

The aim of this study was to determine the complexity of many relations between different factors of a child's language development. We examined the children's intellectual ability, the quality of family literacy environment (considering both, i.e. direct and indirect approaches), and preschool (the age at which the children start preschool and preschool quality) in connection with children's language competence.

METHOD

Participants

The sample comprised 115 children 5 years ±3 months old (44.3% boys and 55.7% girls) from 17 preschool institutions that were sampled in different regions of Slovenia (representing urban and rural environments). All the children were monolingual and were attending a Slovenian preschool that they entered between the age of 10 and 36 months.

The parents of the children differed in their level of education (from 8 to 18 years of formal education completed). 115 mothers (3.5% with a primary level of education; 56.6% with a secondary level of education; 39.9% with a tertiary level of education) and 114 fathers (10.5% with a primary level of education; 63.2% with a secondary level of education; 26.3% with a tertiary level of education) participated in the study.

The study also included 40 preschool teachers, of which 40% had a secondary level of education and 60% had a tertiary level of education.

Materials

The *Scales of General Language Development - LJ (SGLD - LJ)* (Marjanovič Umek, Kranjc, Bajc, Fekonja, 2004) represent a measure of general language development ($\alpha = 0.91$) and are currently being standardized against a sample of Slovenian children. They are composed of three scales - the *Language Comprehension Scale* ($\alpha = 0.73$), *Language Expression Scale* ($\alpha = 0.87$), and *Metalinguistic Awareness Scale* ($\alpha = 0.71$) - and are intended to assess the language development of children from 2 to 6 years old. The *Language Comprehension Scale* includes 93 tasks that relate to understanding instructions, words indicating parts of the body, spatial concepts, quantities, relations between persons and objects, qualities, people and property, colors, understanding time sequence in stories, negation, understanding the use of objects, understanding actions, and the result of actions. The tasks request the child's non-verbal answers, e.g., "Show me your *nose*". The *Language Expression Scale* includes 94 tasks that relate to children's vocabulary, pronoun use, the use of words denoting qualities, expressing actions and states in the present, past, and future tense, use of the plural and dual number, use of words denoting spatial relations, quantities, negation, questions, storytelling, hypernyms, explaining words, use of words denoting social relations, coordination and subordination, the use of direct and reported speech, declension, and verba dicendi. The tasks request the child's verbal answers, e.g., "What is this?" "A *car*.". The *Metalinguistic Awareness Scale* includes 22 tasks that relate to children's ability to correct mistakes, dif-

ferentiate between long and short words, and identify the last word in a sentence, and the first and last syllables in a word. The tasks request the child's verbal answers, e.g., "What is the last letter of the word *road*?". The test administrator conducts the tasks on all three subscales with the help of various play items (e.g., dolls, dice, and toy cars) and pictures. Correct answers are given various numbers of points (from 1 to 5) on various tasks, and the points within individual subscales are added together. Thus three partial results are achieved: an assessment of children's language comprehension (up to 78 points possible), language expression (up to 105 points possible), and metalinguistic awareness (up to 22 points possible), as well as a total result, which is the sum of all three partial results (up to 205 points possible) and represents an assessment of children's language abilities. The *SGLD - LJ* include types of tasks similar to those in some other well established scales used for assessing child's language development, e.g., *The Reynell Developmental Language Scales III* (Edwards, Fletcher, Garman, Hughes, Letts, Sinka, 1997), *Vane Evaluation of Language Scale, Vane-L* (Vane, 1975), *Test of Early Language Development - Third Edition* (Hresko, Reid, Hammill, 1999).

Raven's Colored Progressive Matrices Test (CPM) (Raven, Raven, Court, 1999) is a set of nonverbal multiple choice tests of reasoning ability that requires children to complete a matrix by selecting the appropriate missing pattern from a set of six alternatives. The *CPM* comprises 36 items divided into three sets of 12 (A, Ab and B). All items are colored in order to maintain children's attention. Within each set, items are ordered in terms of increasing difficulty. Set A contains the least and set B the most challenging items. The test can be administered individually or to a group, and was designed specifically for children between ages 5 and 11.

Quality of the preschool institution was assessed using two scales:

The *Assessment Scale for Professionals: Quality at the Process Level* ($\alpha = 0.94$, assessed on a sample of Slovenian preschool teachers) was designed as part of a research project for assessing and determining quality in Slovenian preschools (Marjanovič Umek, Fekonja, Kavčič, Poljanšek, 2002). The assessment scale is composed of four subscales that relate to preschool teachers' stimulation of various aspects of children's *speaking, thinking, social interactions,* and *movement,* and make possible self-evaluation or external evaluation of the quality of teachers' work in class on a 7-point scale (1 point represents unsatisfactory or low-quality work, and 7 points represents high-quality work). Each subscale includes a description of various kinds of behavior that represent the preschool teacher's higher- or lower-quality stimulation of children's development in a particular area. While observing the teacher in class, the assessor uses the assessment scale to note the kinds of behavior observed and the behavior of the preschool teacher on specific subscales by which quality is assessed on the basis of assessment criteria.

The *Caregiver Interaction Scale (CIS)* Arnett, 1989) ($\alpha = 0.85$, assessed on a sample of Slovenian preschool teachers) makes possible external assessment of interaction between the teacher and children in class. The scale is composed of 26 statements that are combined into 4 subscales: *Positive Interaction* (statements that apply to the teacher's positive relationship during interaction with the children, the method and quality of the teacher's communication, and inclusion while working

with them), *Punitiveness* (statements that focus on the level of the teacher's brusqueness, irritability, and supervision during interactions with the children), *Reserve* (statements that say how reserved the teacher is in emotions and conduct towards the children and how long the teacher spends being like this), and *Permissiveness* (statements that indicate to what extent the teacher avoids disciplining children even when their behavior demands greater strictness and decisiveness). The total result on an individual subscale is represented by the totaling of assessments for the statements that comprise the individual subscale. The observations made of the preschool teacher in the class are used by the observer on a 4-level scale to assess how frequently a particular behavior described by an individual statement occurs (1 point indicates that it never occurs, and 4 points that it frequently occurs).

The total quality score for a preschool is composed of the scores obtained using both quality assessment scales.

The quality of children's home literacy environment was assessed using the *Home Literacy Environment Questionnaire (HLEQ)* (Marjanovič Umek, Podlesek, Fekonja, 2005). The *HLEQ* consists of 33 items ($\alpha = 0.91$, calculated on a sample of 308 mothers of 4-year-old children) describing different parental behavior and activities supporting children's language development that are combined into 5 factors: *Stimulation to Use Language, Explanation; Reading Books to the Child, Visiting the Library and Puppet Theater; Joint Activities and Conversation; Interactive Reading*, and *Zone-of-Proximal-Development Stimulation*. Parents indicate the frequency of the specified activities performed or forms of behavior on a 6-point rating scale.

The quality of children's home literacy environment was also measured indirectly. We used the *Checklist of Storybook Titles* (Marjanovič Umek, Bajc, 2005) ($\alpha = 0.88$ assessed on a sample of Slovenian mothers) to assess maternal familiarity with children's books. Parental familiarity with children's story book titles, in comparison to parents' reports about how often they read to their children, represents a more objective measure of children's storybook exposure and a better predictor of children's language competence (Sénéchal, LeFevre, Hudson, Lawson, 1996). The checklist contains 45 actual and 15 fabricated randomly arranged storybook titles, among which mothers are to indicate the real storybook titles. The measure of maternal familiarity with children's books represents the total of correct minus the total of wrong choices.

The *Socio-Demographic Questionnaire* for parents was designed to obtain data about the children's age, sex, and age at entry into preschool, and the formal level of paternal and maternal education.

Procedure

Each child was individually tested with the *SGLD - LJ* and *CPM* in a room at the preschool separate from the rest of the class. The test administrators were properly trained university psychology students. The children's answers to the administrators were recorded on response sheets and were then appropriately assessed.

With the help of the *Assessment Scale for Professionals: Quality at the Process Level* and the *CIS*, trained psychology students then evaluated the quality of the preschool teachers' work in the classes that the children were attending. Individual observers observed preschool teachers' behavior in

the class on one day, from the beginning of breakfast to the end of lunch (approximately 4 hours). During this time they did not engage in social interaction with the children or the teacher. Immediately after finishing the observation, the observer assessed the quality of the preschool teacher's work with the help of both assessment scales. We ensured the high reliability of the assessors by monitoring the recording of the behavior of the preschool teacher and children in a class that was not included.

The *HLEQ* and *Socio-Demographic Questionnaire* were given to the children's parents. They completed the instruments at home and returned them to their children's preschool teacher. Mothers completed the *Checklist of Storybook Titles* at preschool when they came to pick up their children.

RESULTS

The distributions of all variables, except for children's age at entry into preschool, approach normal distribution. The distribution of children's age at entry into preschool is slightly platykurtic.

The results obtained show that children that achieved higher results on the *Language Comprehension Scale* also achieved higher results on the *Language Expression Scale* and *Raven's Colored Progressive Matrices Test*, and also showed higher metalinguistic awareness. The results show that children's results achieved on the *Language Comprehension Scale* also positively correlated with maternal familiarity with children's books as well as with a more supportive family environment. Children of mothers that were more familiar

Table 1. Descriptive statistics for the variables used in analysis

	M	SD	Skewness	Kurtosis	Minimum	Maximum
L. C.	73.96	5.21	.39	.20	60.00	89.00
L. E.	70.36	9.47	-.04	-.29	45.00	91.00
M. L.	7.51	3.14	-.16	-.47	.00	14.00
Checklists	21.00	6.57	.72	.93	4.00	42.00
CPM	16.02	3.30	.56	.78	9.00	28.00
Entry	22.34	9.15	.16	-1.51	10.00	36.00
M. E.	13.02	2.16	.15	-.46	8.00	18.00
P. E.	12.21	2.38	.39	.11	8.00	18.00
P. Q.	-.02	1.76	.17	-.85	-3.60	4.38
HLEQ	146.13	17.29	-.25	-.51	103.00	183.00

Note: L. C. = Language Comprehension Scale; L. E. = Language Expression Scale; M. L. = Metalinguistic Awareness Scale; Checklists = lists of storybook titles; CPM = Raven's Colored Progressive Matrices Test; P. Q. = preschool quality; Entry = age at entry into preschool; M. E. = maternal educational level; P. E. = paternal educational level; HLEQ = home literacy environment questionnaire

Table 2. Correlations (Pearson's r) between the variables used in analysis

	L. E.	M. L.	Checklists	*CPM*	Entry	M. E.	P. E.	P. Q.	*HLEQ*
L. C.	.63**	.43**	.27**	.24*	-.08	.12	.08	-.07	.21*
L. E.		.53**	.15	.14	-.09	.04	-.06	.08	.15
M. L.			.19*	.20*	.02	.06	.08	-.03	.06
Checklists				-.02	.03	.29**	.14	.03	.17
CPM					-.09	.00	.15	-.15	-.07
Entry						.09	.05	.10	.11
M. E.							.25**	.04	.16
P. E.								-.02	.21*
P. Q.									.10

Note: ** = Correlation is significant at the level 0.01 (2-tailed); * = Correlation is significant at the level 0.05 (2-tailed). See also note under Table 1

with children's books also showed higher metalinguistic awareness. Children's results achieved on the *Metalinguistic Awareness Scale* also positively correlated with their results on the *Language Expression Scale* and *Raven's Colored Progressive Matrices Test*. The educational level of children's parents shows a positive, and in the father's case statistically significant, correlation with *HLEQ*. The results furthermore reveal that mothers with a higher educational level showed a higher familiarity with storybook titles assessed by the Checklists and that maternal education positively correlates with paternal education, suggesting that both parents have a similar educational level.

We tested the assumed path model of relationship between variables with structural equation modeling (SEM), which allows us to fit the theoretical model to the data obtained. We used Lisrel 8.7 for our analysis.

In the initial path model we assumed seven endogenous variables (language comprehension, language expression, metalinguistic awareness, maternal familiarity with children's storybook titles, children's age at entry into preschool, quality of preschool institution, and quality of home literacy environment) and three exogenous variables (*Raven's Colored Progressive Matrices Test*, and maternal and paternal educational levels). On the basis of previous research, we assumed that maternal and paternal levels of education would affect all endogenous variables, whereas the children's intellectual ability, quality of preschool institution, quality of home literacy environment, maternal familiarity with children's storybook titles, and age at entry into preschool would have an effect on children's language competence (language comprehension, expression, and metalinguistic awareness). The quality of the home literacy environment was also assumed to have a significant effect on maternal familiarity with storybook titles.

Goodness of fit of the assumed path model to empirical data was evaluated consid-

ering different indexes of fit. Results show a poor fit of the model: MFFχ^2 (Minimum Fit Function Chi-Square) = 100.64 (df = 12, p = 0.00); RMSEA (Root Mean Square Error of Approximation) = 0.26 (90% confidence interval for RMSEA = 0.21; 0.30); SRMSR (Standardized Root Mean Square Residual) = 0.11; NFI (Normed Fit Index) = 0.46; AGFI (Adjusted Goodness of Fit Index) = 0.32.

The parsimony of the model was improved by fixing the parameters with the lowest t-values. We also calculated modification indexes (MI) to identify the parameters that should be freed to improve the fit. On the basis of the MI obtained, certain parameters in the PSI matrix were freed. Parameters were freed or fixed in successive steps (one parameter at a time) until an acceptable fit was reached. Consequently, we eliminated the majority of the remaining path coefficients that did not reach statistical significance. Paternal education proved to have no predictive value on any of the endogenous variables, and it was therefore excluded from the model. In addition, the results showed that maternal education has no significant effect on children's age at entry into preschool, quality of the preschool, and children's home literacy environment; therefore, the parameters anticipating these directions were fixed. Consequently, the final model included age at entry into preschool as well as the quality of the preschool and the children's home literacy environment as exogenous variables. Although age at entry into preschool and the quality of the preschool institution did not prove to be significant predictors of children's language competence, these variables were retained in the model (only the parameters closest to statistical significance were retained) because they represented crucial variables in our research. As such, the fitness of the model was appropriate.

Figure 1 presents the path diagram for the final model with four endogenous and five exogenous variables. The results show an excellent fit: MFFχ^2 = 2.37 (df = 11, p = 1.00); RMSEA = 0.00 (90% CI for RMSEA = 0.00; 0.00); SRMSR = 0.03; NFI = 0.99; AGFI = 0.98.
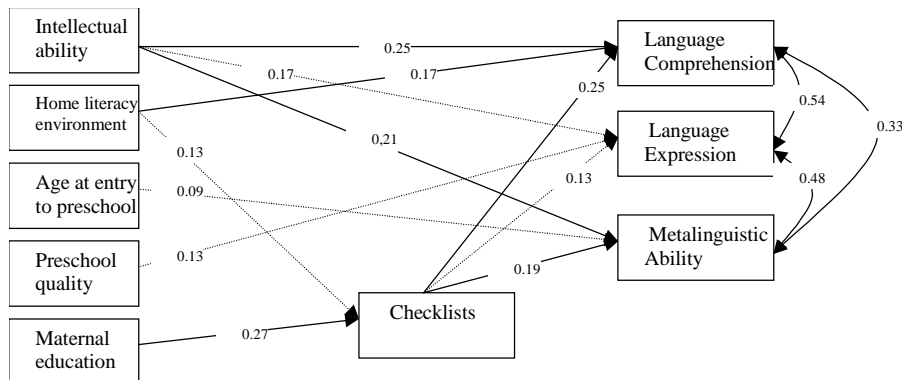

Figure 1. Path diagram for the final model with standardized coefficients

Table 3. Unstandardized path coefficients with standard errors and t-values

	BETA	GAMMA				
	Checklists	*CPM*	Entry	M. E.	P. Q.	*HLEQ*
L. C.						
p.c.	.20	.40				.05
S.E.	.07	.14				.02
t-value	2.78	2.86				2.05
L. E.						
p.c.	.19	.48			.70	.06
S.E.	.13	.27			.37	.04
t-value	1.43	1.78			1.97	1.31
M. L.						
p.c.	.09	.20	.03			
S.E.	.04	.09	.03			
t-value	2.06	2.29	1.15			
Checklists						
p.c.				.83		.05
S.E.				.28		.03
t-value				2.97		1.42

Note: p.c. = path coefficients. See also notes under Table 1

Figure 1 shows that children's cognitive competence, quality of the home literacy environment, and maternal familiarity with children's storybooks are important predictors of children's language comprehension. Furthermore, maternal education has an indirect effect on children's achievement on the *Language Comprehension Scale* through reading together by parents and children. All the path coefficients predicting children's achievements on the *Language Expression Scale* are low and not statistically significant. Children's language expression can best be predicted on the basis of their cognitive ability and the quality of interaction between children and their preschool teacher (supporting different areas of children's development). As with language comprehension, children's intellectual abilities are the best predictor of their metalinguistic awareness. The level of maternal familiarity with storybook titles is a variable that makes an important direct contribution to explaining children's individual differences in achievement on the *Metalinguistic Awareness Scale* and it also represents a mediating variable for the effect of maternal education on children's metalinguistic awareness. Despite the fact that paternal educational level has a significant (although low) correlation with children's

Table 4. Elements of the PSI matrix

PSI	L. C.	L. E.	M. L.	Checklists
L. C.				
Ψ	22.72			
S.E.	3.08			
t-value	7.38			
L. E.				
Ψ	26.68	83.59		
S.E.	4.89	11.32		
t-value	5.45	7.38		
M. L.				
Ψ	5.42	14.36	9.14	
S.E.	1.47	2.98	1.24	
t-value	3.68	4.81	7.38	
Checklists				
Ψ				38.70
S.E.				5.24
t-value				7.38

Note: See notes under Table 1

home literacy environment (see Table 1), it was not included in the model, because the fitness of the model which included father's level of education was not appropriate. The final path model explains the 16% of variability in children's results on the *Language Comprehension Scale* as well as the 7% of variability in children's results on the *Language Expression Scale* and the 9% in their metalinguistic awareness.

The results show (cf. Figure 1) that important correlations exist between the residuals of endogenous variables (language expression, comprehension, and metalinguistic awareness), suggesting that certain parts of the variance of endogenous variables that cannot be explained with the predictors used in analysis are moderately (language comprehension & metalinguistic awareness) to highly (language comprehension & language expression; language expression & metalinguistic awareness) correlated. The results obtained thus suggest that the unexplained part of variance in children's achievements on all three scales includes a common variance that presumably derives from children's general language competence.

DISCUSSION

The results obtained support the findings of a number of authors (e.g., Wechsler, 1991; Williams, Wang, 1997; Hresko et

al., 1999) that there is a significant positive correlation between children's linguistic and intellectual development. The measure of intellectual development in our study (children's achievements on *Raven's Colored Progressive Matrices Test*) also had a significant positive correlation with children's language competence (children's achievements on the *Language Comprehension Scale* and *Metalinguistic Awareness Scale*), although the correlation coefficients were somewhat lower than those established in certain other studies (cf. Table 2). Intellectual ability showed itself to be the best predictor of children's language comprehension and metalinguistic awareness (cf. Figure 1). Although children that achieved high results on the *Language Comprehension Scale* also achieved higher results in language expression and metalinguistic awareness, children's results on the *Language Expression Scale* do not correlate significantly with their scores on *Raven's Colored Progressive Matrices Test*.

As the results of various studies have shown, maternal education (e.g., Bornstein et al., 2003; Foy, Mann, 2003) is an important factor in children's language development. The results obtained indicate a positive correlation between children's mothers' level of education and their familiarity with the titles of children's books, whereas the correlations between maternal educational level and measures of children's linguistic and intellectual development were low and not significant. The relatively low correlations may be influenced by a low variability in parental educational level as most parents (both mothers and fathers) had a middle level of education.

The results also do not support findings by other researchers (e.g., Bornstein et al., 2003; Marjanovič Umek, Fekonja, Bajc,

Kranjc, 2005) that report a positive correlation between the level of education of children's mothers and the quality of the family environment. More highly educated mothers are expected to offer their children a more stimulating family environment and, consequently, more support for children's development than mothers with a lower level of education. Mothers with a higher level of education talk to their children more frequently and longer, their utterances are longer, and they use a broader vocabulary in their verbal interactions with their children (Hoff, 2003). Compared to mothers with lower levels of education, these mothers also report that they stimulate their children to use language more frequently, read to them more often, visit puppet theatres and cinemas with them, and include them in verbal interaction when they read together and do activities together (Marjanovič Umek, Podlesek, Fekonja, 2005). A relatively low variability also appeared in the self-reports of home quality environment, thus lowering the correlations between the maternal education and the quality of home literacy environment. The self-reports on how well the child's language development is supported are often considered a less objective measure as they are frequently expected and socially desired, projecting parental beliefs, implicit theories and expectations.

When the family literacy environment was measured indirectly using a checklist of children's storybook titles, the results obtained indicate that mothers with a higher level of education know more titles of children's books than do mothers with a lower level of education, which may also indicate that they read to their children more often or read a greater variety of children's literature than do mothers with a lower level of education. Children whose parents knew more titles of children's

books achieved higher results on the language development scales (*Language Comprehension Scale* and *Metalinguistic Awareness Scale*). Many studies have identified the frequency of reading children's literature aloud and the method of reading as factors that have an important effect on the development of children's language and, later, on the development of children's reading ability as well. The results of a Slovenian study, comprising a sample of 123 preschool children, showed a significant and positive correlation between the average parental level of education and parental familiarity with children's literature (r = 0.29) (Marjanovič Umek, Bajc, 2005).

Children whose parents frequently read aloud to them between 1 and 3 years of age, discussed the stories they read with them and used a broad vocabulary in the discussion, displayed greater language competence between 2 and 5 years of age and better understood texts read to them at 7 years of age than did children whose parents rarely read with them (Papalia, Wendkos Olds, Feldman, 2001). These children also spoke their first words earlier, developed a broader vocabulary, used more complex utterances while speaking, and learned to read earlier (Bus, van Ijzendoorn, Pellegrini, 1995; Pellegrini, Galda, 1998). When interpreting parental familiarity with children's literature as a measure of children's exposure to parent-child joint reading we should consider that the high score on a checklist does not necessary imply the high frequency of joint reading (e.g., a mother can be familiar with children's literature because she works in a library or a bookshop). Nor does a low score on a checklist always indicate that a child is not exposed to joint reading. There can be other adults (e.g., grandparents, a preschool teacher) and siblings who are involved in the joint reading activities with a child.

The results obtained indicate that parental familiarity with children's literature, the quality of the family environment, and children's intellectual ability are the best predictors of children's language comprehension, and that maternal education has an indirect influence on children's scores on measures of language comprehension, specifically through mothers' familiarity with children's books (cf. Figure 1). The quality of the stimulation offered to children's language development by the family environment is more closely connected to the level of paternal education than maternal education. Mothers whose partners have a higher level of education indicated that they offer their children a higher quality family environment through various activities and material circumstances than those whose partners have a lower level of education. The levels of maternal and paternal education also have a significant positive correlation.

Neither of the variables connected with children's preschool experience (age of children when starting preschool and preschool quality) correlated with measures of children's intellectual or linguistic development. Although certain authors (e.g., Andersson, 1992; Broberg et al., 1997) have emphasized the importance of starting preschool early on various areas of language development, others have stated that children's age at entry into preschool has a low predictive value for their language competence (e.g., Kontos, 1991). Children's cognitive and language development ought to be largely predicted by variables from the family environment, and preschool variables ought to largely predict children's social development. The results of other studies (e.g., *Starting strong*, 2001; Marjanovič Umek, Kranjc,

Fekonja, Bajc, 2005) also indicate that preschool as an institution per se has neither a positive nor a negative effect on various areas of children's development and learning, and that what is of primary importance is the quality of the preschool that children attend, and this in connection with certain variables of the children's quality of life in the family. In a Slovenian study (Marjanovič Umek, Fekonja, Bajc, Kranjc, 2005), the authors found that starting preschool earlier correlated positively with children's storytelling competence at 3 and 4 years of age, but not with the results that children achieved on the *Language Development Scale.*

The final path model makes it possible to explain the 16% of variability in children's results on the *Language Comprehension Scale*, the 7% of variability on the *Language Expression Scale*, and the 9% of variability in children's results on the *Metalinguistic Awareness Scale*. The results of a study (Marjanovič Umek, Podlesek, Fekonja, 2005) that included 298 four-year-old Slovenian children indicated that maternal education and individual factors of family environment obtained with the *HLEQ* questionnaire explain at most a 9% variability (from 1% to 9% for various areas of language competence) in children's results on the *Language Development Scale* and *Test of Pragmatic Language Use*. The results obtained therefore indicate that the inclusion of additional variables (children's age when starting preschool, preschool quality, parental familiarity with children's literature, and children's intellectual ability) in individual areas of children's language development (e.g., language comprehension) can explain most of the variability among children.

We consider the main contribution of our study to be the assessment of different factors in various social contexts (the preschool and home environment) that affect the child's language development. We tried to consider a more holistic approach to child language development, including the complexity of many relations between its different factors. The indication of the factors that influence and codetermine the child's language gives us the theoretical framework for developing different forms of support for children coming from a less supportive environment. This would enable us to offer all children the opportunities to achieve the highest possible levels of their language competence by the time of transition to primary school. We also assessed the quality of home literacy environment and of the preschool institution using different approaches and instruments, thus capturing different aspect of quality and support given (using two different scales for assessing the quality of the preschool and using two different approaches for assessing the quality of home literacy environment). The results of the study also have a national significance for developing new instruments for assessing child's language development and quality of preschool and home.

One of the shortcomings of the present study is that only the parental educational level and the quality of home environment were included as measures of socio-economic status of families. Some other factors, such as the family's income, the age of parents, the number of siblings, can also influence the characteristics of child's language development. It would, furthermore, also be interesting to investigate the child's social network, including the number of other adults (e.g., grandparents, members of the extended family) who interact with a child during different activities. A more objective estimate of the quality of home environment would be

obtained via direct observation of verbal interaction between the parents and their children than via parental self-reports on the frequency and quality of support for their child's language development that were used in this study.

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INTELEKTOVÉ SCHOPNOSTI DETÍ, RODINNÉ PROSTREDIE
A PREDŠKOLSKÁ VÝCHOVA
AKO PREDIKTORY JAZYKOVÝCH SCHOPNOSTÍ 5-ROČNÝCH DETÍ

L. M a r j a n o v i č U m e k, G. S o č a n, U. F e k o n j a P e k l a j

Súhrn: V štúdii autori sledujú do akej miery intelektové schopnosti detí a faktory rodinného pros-
tredia (vzdelanie otca a matky, kvalita rodinného prostredia) i predškolskej výchovy (vek, v kto-
rom deti nastúpili predškolskú výchovu a kvalita tejto výchovy) súvisia s jazykovými
schopnosťami detí (porozumenie reči, vyjadrovanie sa v jazyku a metalinvistická pripravenosť).
Vzorku tvorilo 115 päťročných detí navštevujúcich slovinské predškolské zariadenie. Autori
použili model analýzy cesty (path model) na overenie vzťahu medzi premennými pomocou mode-
lovania štrukturálnych rovníc (SEM). Tento model, ktorý zahŕňa intelektové schopnosti detí,
kvalitu predškolskej výchovy, vek detí, v ktorom nastúpili predškolskú výchovu, kvalitu ro-
dinného prostredia a vzdelanie matky ako exogénne faktory a tiež ako endogénne premenné spo-
ločné čítanie rodičov s deťmi a posúdenie troch oblastí verbálneho vývinu - je vyhovujúci.
Vysvetľuje 16% variability získaných výsledkov v *Škále porozumenia jazyka,* 7% variability
získaných výsledkov v *Škále jazykového prejavu* a 9% variability získaných výsledkov v *Škále
metalingvistickej pripravenosti.* Výsledky taktiež ukazujú, že najlepšími prediktormi jazykového
vývinu detí sú vývin ich intelektových schopností a spoločné čítanie rodičov s deťmi. Vzdelanie
matky nepriamo súvisí s jazykovými schopnosťami detí, najmä prostredníctvom spoločného číta-
nia, zatiaľ čo vzdelanie otca je najmenej dôležitým prediktorom. Preto sme túto premennú vylúči-
li z konečného modelu.