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The Effect of Preschool on the Reading Literacy of 15-Year-Olds: A Secondary Analysis of PISA 2009

Abstract: Empirical research findings, especially those obtained in the last 20 years, show positive short- and long-term effects of a high-quality preschool on children's cognitive and social abilities and academic achievements. Because the results of the 2009 PISA international comparative study also show that in the majority of countries 15-year-olds who attended preschool for more than 1 year score higher in reading literacy than their peers who did not attend preschool, the effect of the length of children's preschool attendance and the effects of certain other structural indicators of preschool quality on the reading achievements of 15-year-olds were analyzed in greater detail in a secondary analysis of Slovenia and selected countries. The findings of these types of analyses, which are usually supported by findings of more specific studies, make it possible to seek weak points in the education system that may lessen its equity and effectiveness. In the analysis of data included in the secondary study, criticism is directed toward some weaknesses of data coverage in the 2009 PISA study, especially the answers provided retroactively to the "Student Questionnaire" by 15-year-olds and the inclusion of data from various databases comprising data on the same topic, but from various time periods.

Keywords: preschool, preschool attendance, social inclusion, family socioeconomic status, structural indicators of preschool quality, 2009 PISA reading literacy

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Introduction

The developmental stages of toddlerhood and early childhood are the periods during which a child can attend preschool. At the same time, these are also the periods of the most intense (quantitative and qualitative) development changes, especially in cognitive and social development. In the first years of life, toddlers develop language competence much faster than adults, which means that individuals' ages are negatively correlated with their optimal abilities to develop and learn a language. Researchers (e.g., Newport et al. 2001; Pugh et al. 2008) report that a decrease in the ability to develop and learn language occurs between ages four and six. At the same time, an increasing number of empirical findings available (e.g., Barnett and Yarosz 2007) have confirmed that early attendance at a good-quality preschool has positive effects on children's current and later cognitive abilities and school performance as well as an individual's education. Hence, it is not surprising that researchers (e.g., Cunha and Heckman 2006; Lowe et al. 2010) who combine developmental psychology, genetic, educational, and economic factors in their work emphasize the importance of early "investment" in the individual—that is, in development and learning in cognitive, social, and personality areas—and at the same time study the length and dimension of the effects of investing in early educational programs. In addition, the researchers are aware of the importance of studying the effect of preschool on the development and learning of children in all social groups (e.g., Barnett and Robin 2006).

The short-term and long-term effects of preschool on children's cognitive and academic achievements

In the last 20 years, the number of empirical studies (mostly by international researchers and, on rare occasions, Slovenian researchers) that have investigated the short-term and long-term effects of preschool on various areas of children's development and learning have dramatically increased. These studies can be divided into two groups: studies that examine the effect of preschool on children's

development and learning usually in connection with the quality of the preschool and the family environment, and studies that focus on examining the compensatory effect of intervention programs mostly dedicated to marginal groups of children.

The findings of some studies are presented below, especially the findings showing the effects of preschool assessed in the cognitive area and regarding children's learning achievements.

The length of preschool attendance and the age at which children were enrolled in preschool have often been identified as important predictors of children's academic performance (e.g., Andersson 1989; O'Brien Caughy et al. 1994). Based on the data collected in one of the largest European longitudinal studies, the EPPE (Effective Provision of Pre-School Education), Sylva et al. (2004) determined that the combined variables of preschool quality and length of preschool attendance had the strongest effect on children's achievements on standardized reading and mathematics tests at ages six and seven. Early enrollment in preschool (i.e., at age two or three) was also correlated with higher intellectual achievements, and children were more sociable.

Researchers (e.g., Broberg et al. 1997; Marjanovič Umek and Fekonja 2008) emphasize that longer preschool attendance does not automatically have positive effects on children's cognitive abilities and that the quality of preschool is important. This has also been confirmed by the findings of many recent studies, in which researchers (e.g., Belsky et al. 2007; Burchinal et al. 2000a, 2000b; Melhuish et al. 2010; Sylva et al. 2004) highlight a greater role of structural and procedural indicators of quality in confirming the short-term and long-term positive effect of preschool on children coming from socially less stimulating environments compared to other children. The authors of "Starting Strong II OECD" (2006) and "Starting Strong III OECD" (2012), and the NICHD study (1999) emphasize the following as important and generally accepted structural indicators of preschool quality: the teachers' education level, the number of children in a group, the ratio between the number of adults and children in a group, the size of the indoor and outdoor play areas, and the preschool education curriculum.

Based on the data collected in the largest American longitudinal study, the NICHD SECCYD (National Institute of Child Health and Human Development Study of Early Child Care and Youth Development), McCartney et al. (2007) examined the effect of the interaction between preschool quality and family socioeconomic status (SES) on children's language competence and their school readiness. The authors determined that preschool has a compensatory effect on the development of children from families with a low SES. When preschool children were compared to children who did not attend preschool, the positive effect of low-quality preschools was shown only to some degree for children coming from families with an extremely low SES, although even with this group of children the effect of preschool on their achievements increased with the quality of the preschool.

Slovenian researchers (Marjanovič Umek et al. 2008) and many other researchers (e.g., Dearing et al. 2009; Peisner-Feinberg et al. 2001) report that to some extent preschool helps reduce the effect of parental education and family SES on children's school readiness and their academic achievements in middle

childhood. Children's initial school readiness when they enter primary school has a great effect on their future academic performance because individual differences in the children's cognitive abilities at school entry can increase during the first school years. Valenti and Tracy (2009) confirmed the Matthew effect¹ in their study, in which they explored how preschool attendance affects first graders' reading skills. The results show that children who attended a full-day preschool program had better reading skills when they entered primary school than children who did not attend preschool, and that these differences increased even further from September to January.

Researchers who studied the long-term effect of preschool on cognitive and academic abilities – which means that they monitored the children throughout compulsory education or longer – report attending a good-quality preschool has a positive effect. For example, as part of the extensive longitudinal NICHD study (which lasted 15 years) Lowe Vandell et al. (2010) established that children who receive a good-quality preschool education up to age four and a half see a significant effect on their early academic abilities at age four and a half and that the size of the effect remains the same even after 10 years. The children studied attended various types and forms of care and education (not only preschool) from birth to age four and a half at least 10 hours a week. The results showed that, regardless of the type and form of care and education the children received, they achieved higher scores on academic ability tests (math, reading and writing, and vocabulary tests) as 15-year-olds if they had received better-quality preschool care or education than their peers who had received poor-quality preschool education. The Danish researchers Bauchmüller et al. (2011) studied whether any of the preschool quality indicators are significantly correlated with the cognitive abilities of 16-year-olds when they complete primary school. The authors used data from Danish registers. The results show that the following quality indicators significantly contributed to 16-year-olds' higher scores while controlling for the children's family factors: a more favorable ratio between teachers and children in the group, a larger percentage of male teachers, a larger number of adequately trained teachers, and a larger number of teachers from other cultural and linguistic environments. The researchers believe that the negative predispositions of children from families with a low SES can be compensated by enabling children from all social environments to attend high-quality preschools.

Children from various marginal groups (e.g., children from socially, economically, and culturally less stimulating environments; children whose native language is not the language of instruction in preschool or school) often have fewer opportunities to realize their development potential and to learn, and consequently fewer opportunities to develop a good starting position before entering school. To compensate for certain developmental deficiencies, various intervention programs such as "Head Start" were developed as early as the 1970s; they most frequently achieved high but short-term effects on the development of children's cognitive and/or initial academic abilities. Only in the 1990s and later did researchers (e.g.,

¹ One speaks of the Matthew effect when the negative effects of children's poor reading strategies on their academic performance accumulate during their schooling (Stanovich 2000).

Barnett 2008; McCartney et al. 2007) begin to study the quality of intervention programs in greater detail and their short-term and long-term effects in connection with their quality. In a large meta-analytical study, American researchers (Camilli et al. 2010) used 123 studies that had been performed on intervention programs from 1960 to 2000 and in which the authors reported on important effects of intervention programs aimed at stimulating children's thinking and speech (e.g., "Head Start", "Abecedarian").² The meta-analysis included studies in which researchers examined the effect of intervention programs that included three- to five-year-old children (when they were still in preschool or before the beginning of compulsory education). All programs were intended directly for children (studies meant to educate parents on stimulating their children's development were excluded) and lasted at least 2 months, 10 hours a week. The researchers studied the short-term effects (5 to 10 years after the end of the program) and long-term effects (more than 10 years after the end of the program) of these types of programs in three areas of children's development and academic performance: cognition, academic progress, and social interaction.³ The researchers conducting the meta-analysis conclude that the intervention programs in which the children participated in at preschool are effective because the programs show positive short-term and long-term effects on various areas of children's development and school/academic performance. The greatest effects were observed in cognitive development, even though inclusion in these types of programs also significantly increases children's social skills and positively affects children's academic progress. What researchers especially emphasize based on an analysis of all studies is the importance of carrying out programs in groups with a smaller number of children (10) and a favorable ratio between the number of adults and children in the group (five children per adult) – this enables greater individualization in working with children. In the analysis published in "Preschool Policy Matters", Barnett et al. (2004) draw attention to the relationship between preschool quality and effectiveness, in which they consider the ratio between the number of children and adults in the group the key indicator of quality. The authors believe that based on studies to date reducing the number of children in a group to at most 15 – in which the adult-child ratio in the group is also important – has important effects on the academic achievements of children participating in intervention programs. The authors conclude that larger financial investment in intervention programs in which children from marginal groups are included is also of key importance because a more favorable ratio between the number of children and adults in the

² The predominant teaching approach in these programs was direct teaching. This refers to activities directed by the teacher, the purpose of which is to provide information and develop specific skills (e.g., learning letters).

³ The studies that examined the effect of intervention programs in cognition included output variables/measures such as intelligence quotient, and children's achievements on reading, writing, math, and school-readiness tests (97 studies of this type were included); regarding academic progress, the output variables/measures included school grades, secondary-school graduation, and enrollment in tertiary education (32 studies of this type were included); regarding socio-emotional development, the output variables/measures included children's aspirations regarding further education, school adaptability, self-image, and aggressive and antisocial behavior (43 studies of this type were included).

group represents an important change in the opportunity for the children in these types of programs to achieve better academic performance.

Taking into account the findings of many empirical studies that confirm the positive effect of (high-quality) preschool on children's cognitive development and academic performance, this study analyzes in greater detail the relationship between 15-year-olds' reading achievements on PISA 2009 and certain indicators of preschool education, related to the social, economic, and cultural status of the students' families. The focus is the extent to which the differences in the reading achievements of 15-year-olds on PISA 2009 in selected countries can be explained by the children's preschool attendance and certain structural indicators of preschool quality that were assessed in PISA 2009 or other parallel studies.

Method

This study involves a secondary analysis of 15-year-olds' reading literacy achievements on PISA 2009.⁴ In addition to the students' reading achievements, information on their preschool attendance and their families' socioeconomic background, which the students provided in the "Student Questionnaire" as part of the 2009 PISA study, was also used for the secondary analysis. To assess individual preschool quality indicators, data were used that researchers (for more, see Pisa 2009 in Focus 1 ... 2011) obtained from other international databases or publications such as the "OECD Family Database", Education at a Glance 2009", and "Education at a Glance 2010", or that they collected on their own; for example, in the study "Working for Inclusion" (2010) and the "2011/12 Statistical Information". Further analyses were mostly conducted on all European countries included in the 2009 PISA study (33 countries); if individual analyses were conducted on a smaller number of countries, the criteria for selecting these countries are provided with the results.

Results and interpretation

15-year-olds' reading achievements and preschool attendance

In the secondary analysis, the students' reading achievements on PISA 2009 were first compared according to their preschool attendance. To analyze the effect of preschool on the achievements, the OECD researchers divided the students into three groups: students who had not attended preschool, students who had attended preschool for 1 year or less, and students who had attended preschool for more than 1 year (PISA 2009 results ... 2010, pp. 95–98, 190–192).

⁴ In 2009, 470,000 students from all over the world participated in the "Programme for International Student Assessment" (PISA), headed by the OECD; this is a representative sample for approximately 26 million 15-year-olds from 65 countries. In Slovenia, 7,764 secondary-school students and 46 students from 24 primary schools participated in the study.

Figure 1 shows the students' achievements on PISA 2009 according to preschool attendance for all European countries included in the study (OECD members and partner countries).

Figure 1 shows that, in most European countries, students who attended preschool scored higher in reading literacy than their peers who did not attend preschool. However, the length of attendance is also important because the differences in reading literacy between students who attended preschool for more than 1 year and those who did not attend preschool are greater than the differ-

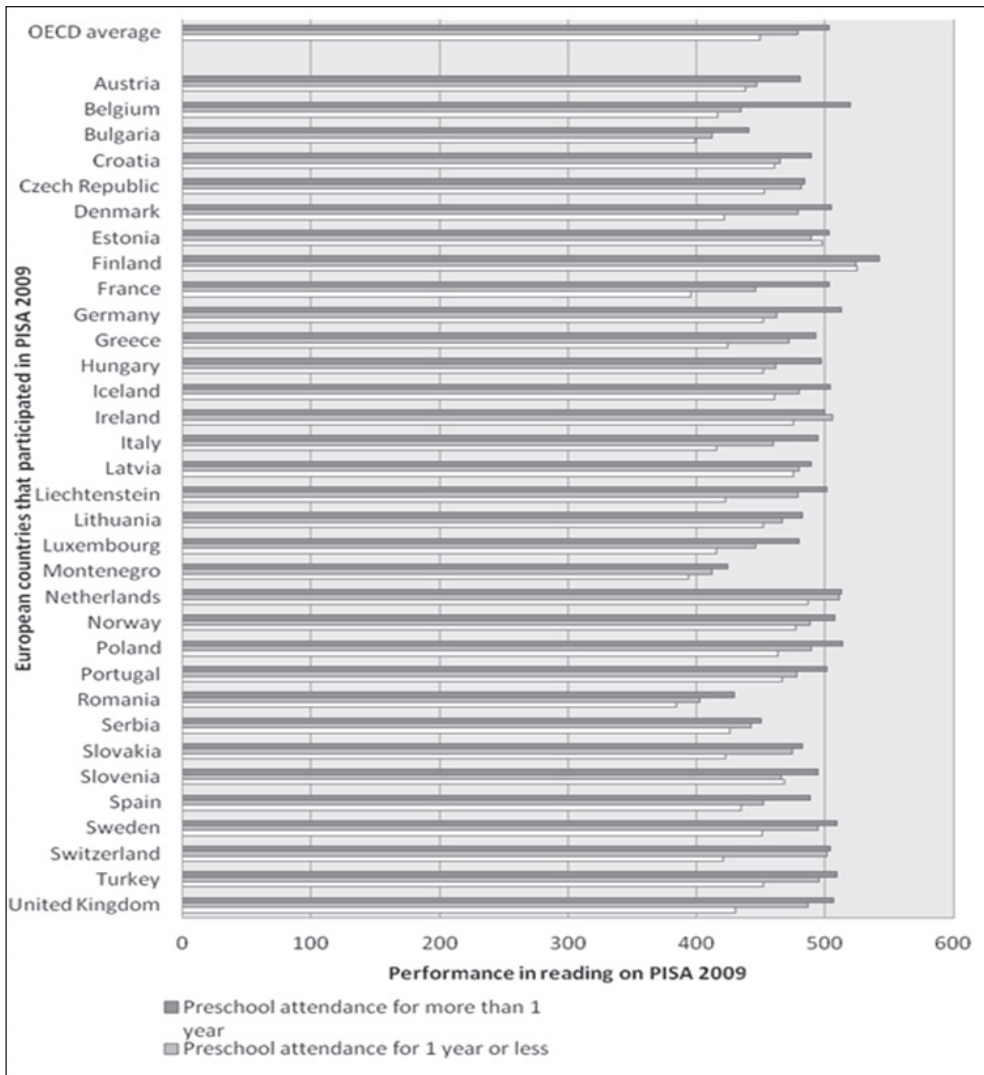


Figure 1. Average performance in reading on PISA 2009 according to the length of preschool education (PISA 2009 Results ... 2010, Table II.5.5, p. 190)

ences between students who attended preschool for 1 year or less and those who did not attend preschool. This applies to the majority of the countries included in the study. Exceptions include Ireland, where students who attended preschool for 1 year or less scored the highest in reading literacy, and Slovenia and Estonia, where students who did not attend preschool scored higher than students who attended preschool for 1 year or less. OECD researchers conclude that preschool attendance is an advantage in terms of 15-year-olds' reading literacy achievements (PISA 2009 in focus 1 ... 2011, p. 1).

Because in the majority of countries there were great differences between the reading achievements of students who attended preschool and those who did not, the question is what indicators of preschool education contribute to these differences. For example, in Israel, Belgium, and France, the difference between students who did not attend preschool and those who attended for more than 1 year was more than 100 points, whereas in Estonia the difference was only six points.

One of the indicators of high-quality preschool education is the percentage of children attending preschool. Therefore, the percentages of students were first compared according to the length of attendance in all European countries included in PISA 2009. The data are shown in Table 1.

Table 1 shows that, in most countries, the percentage of students who attended preschool for more than 1 year is the highest, and the percentage of students who did not attend preschool is the lowest. At the level of the OECD average, the percentage of students who did not attend preschool is 8%, the percentage of those who attended preschool for 1 year or less is 20%, and the percentage of those who attended preschool for more than 1 year is 72%. In Norway, Slovenia, Croatia, Lithuania, Latvia, and Montenegro, the percentage of students who did not attend preschool is larger than the percentage of students who attended preschool for 1 year or less. Only in Turkey is the percentage of students who did not attend preschool larger than the percentage of students who either attended preschool for 1 year or less or for more than 1 year. In Turkey, 72% of students reported that they did not attend preschool. Countries with the highest percentages of several years of preschool attendance (more than 90% of students) include Belgium, France, Hungary, Iceland, the Netherlands, and Liechtenstein.

OECD researchers have estimated that a 40-point difference in students' reading achievements is equivalent to approximately 1 year of formal education (PISA 2009 results ... 2010, p. 49; PISA 2009 in focus 1 ... 2011, p. 1). Therefore, only European countries in which the difference between the reading achievements of students who attended preschool for more than 1 year and students who did not attend preschool is more than 40 points were selected. For these countries, we determined the percentage of students who attended preschool for more than 1 year. The data are shown in Figure 2, in which countries are presented in descending order according to the differences in students' reading achievements. The differences in students' achievements are provided in parentheses next to the name of the country and show by how many points on average the students who attended preschool for more than 1 year outscored those who did not attend preschool.

	No preschool attendance (%)	Preschool attendance for 1 year or less (%)	Preschool attendance for more than 1 year (%)
OECD average	8.3	19.5	72.2
Austria	2.3	12.5	85.2
Belgium	2.5	3.8	93.6
Bulgaria	11.4	14.8	73.8
Croatia	26.8	21.2	52.1
Czech Republic	3.9	9.5	86.6
Denmark	2.2	28.1	69.8
Estonia	10.3	10.0	79.7
Finland	5.0	28.9	66.1
France	1.7	5.2	93.1
Germany	4.9	10.4	84.7
Greece	5.4	28.5	66.1
Hungary	1.4	4.1	94.5
Iceland	3.0	3.6	93.4
Ireland	17.4	41.5	41.2
Italy	5.2	8.7	86.1
Latvia	21.5	12.8	65.7
Liechtenstein	1.2	6.1	92.7
Lithuania	37.6	11.8	50.6
Luxembourg	4.5	10.4	85.0
Montenegro	35.8	22.3	41.9
Netherlands	3.5	1.9	94.6
Norway	9.3	6.4	84.3
Poland	2.3	47.8	49.9
Portugal	19.1	20.7	60.2
Romania	4.8	7.6	87.6
Slovakia	5.0	12.2	82.8
Slovenia	17.3	14.3	68.4
Serbia	13.0	50.1	36.9
Spain	4.6	8.5	86.8
Sweden	9.8	24.1	66.1
Switzerland	2.3	26.5	71.3
Turkey	71.6	20.2	8.2

Table 1: Percentage of students by length of preschool attendance (PISA 2009 results ... 2010, Table II.5.5, p. 190)

Figure 2 shows that the point difference in reading achievements between students who attended preschool for more than 1 year and those who did not attend preschool cannot be explained merely by looking at the percentages of students who attended preschool. For example, Iceland and France have comparable percentages of students who attended preschool for more than 1 year (both approximately 93%), but in France students who attended preschool for more than 1 year scored an average of 108 points more in reading literacy than their peers who did not attend preschool; in Iceland, the difference between these two groups is 44 points. A similar discrepancy can be seen when comparing Turkey and Sweden. In both countries, students who attended preschool for more than 1 year scored an average of 58 points more than students who did not attend preschool; the percentages of students who attended preschool for more than 1 year are 8% (Turkey) and 66% (Sweden). In Slovenia, the difference between the scores of students who attended preschool for more than 1 year and those who did not attend was 26 points, and the percentage of students who attended preschool for more than 1 year was 68%.

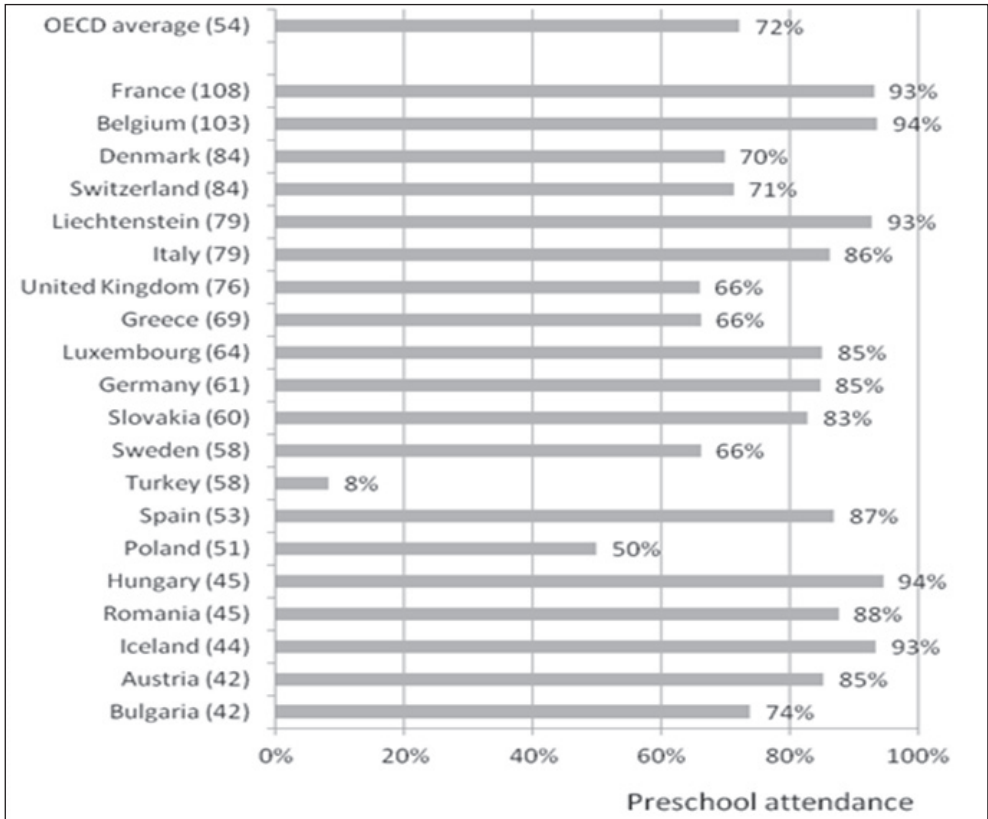


Figure 2: Percentage of students who attended preschool for more than 1 year in countries in which the average difference between students who attended preschool for more than 1 year and those who did not attend is more than 40 points (PISA 2009 results ... 2010, Table II. A, p. 16 and II.5.5. p. 190).

A comparison between the percentages of students who attended preschool for more than 1 year and the average score in reading literacy in countries in which the students' average scores are significantly higher than the OECD average is presented below. The countries are presented in descending order according to the students' average reading scores in reading literacy on PISA 2009 (the scores are provided in parentheses next to the name of the country).

The data in Figure 3 show that even after the countries were selected based on the second criterion (i.e., countries' achievements above the OECD average), the differences in the achievements cannot be explained by students' several years of preschool attendance. For example, students in Finland and Poland achieve significantly higher scores than the OECD average, even though the number of children who attend preschool for several years is below average in these two countries.

15-year-olds' reading achievements and preschool quality

In parallel studies, OECD researchers (PISA 2009 results ... 2010, pp. 98 and 192) examined which indicators of preschool quality explain the differences in the reading literacy scores of 15-year-olds on PISA 2009. Based on regression analyses, the researchers defined four systemic preschool quality indicators that significantly determine the correlation between students' preschool attendance and their reading achievements on PISA 2009:

- Average amount of preschool education;
- Average ratio between the number of teachers and children in the groups;
- Government (public) funding for preschool education per child; and
- Percentage of students who attended preschool.

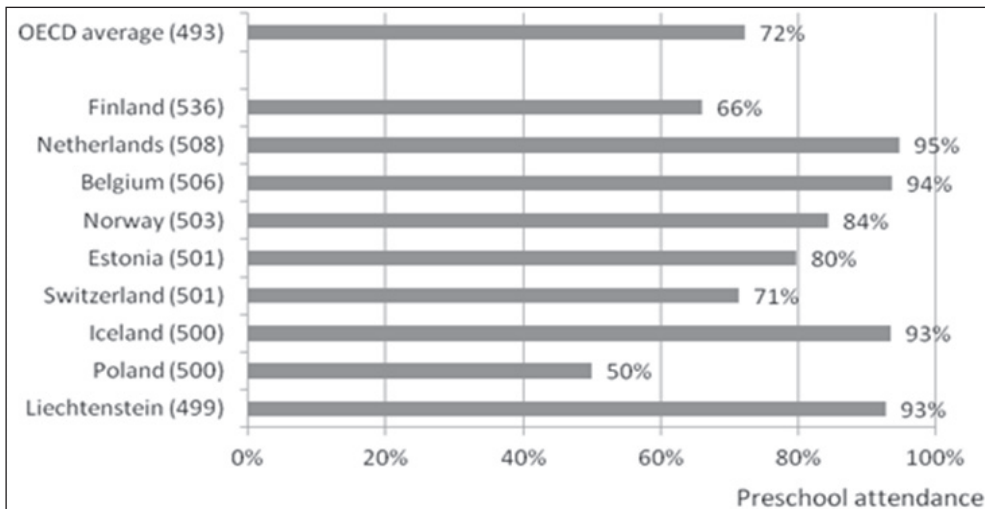


Figure 3: Percentage of students who attended preschool for more than 1 year for countries whose mean performance was above the OECD average (PISA 2009 results ... 2010, Table II. A, p. 16 and II.5.5, p. 190).

The authors conclude that the correlation between preschool attendance and reading literacy scores of 15-year-olds is higher in countries in which the percentage of students who attended preschool is higher, preschool education lasts several years before school enrollment, there is a lower teacher-child ratio in preschool classes, and government funding for preschool education is high (PISA 2009 results ... 2010, p. 98; PISA 2009 in focus 1 ... 2011, p. 3).

In an additional study published in »PISA in focus I« (2011), researchers showed the first three among the systemic quality indicators listed, the difference in the achievements of students who attended preschool for more than 1 year and those who did not attend, and the information on the social inclusion⁵ of children in preschool for two selected countries (France and the U.S.; PISA 2009 in focus 1 ... 2011, pp. 3 and 4). The researchers used the data obtained in PISA 2009 (reading achievements and social inclusion) as well as data collected from various databases. The data from other databases refer to different years: the data on the average length of preschool education apply to 2008 and are taken from the "OECD Family database" (PF3.2A indicator), the data on the teacher-child ratio in preschool groups apply to 2007 and are taken from the publication "Education at a Glance 2009" (2009, Table D2.2: *Ratio of students to teaching staff in educational institutions*), and the data on government funding for preschool education also apply to 2007 and are taken from the publication "Education at a Glance 2010" (2010, Table B1.1a: *Annual expenditure by educational institutions per student for all services*).

In addition to the two countries mentioned above, data were also obtained⁶ for Slovenia, Norway⁷, Finland,⁸ and Poland⁹; they are shown in Table 2. The indicators applied refer to various types of preschools intended for children between age three and enrollment in school. The average reading scores of secondary-school students are provided in parentheses next to the name of the country; the countries are presented in descending order by their average scores.

Although the indicators presented in Table 2 have proven to be key predictors of students' reading achievements, the examples of the countries presented show that these predictors cannot fully explain the differences in student reading achievement between individual countries. For example, students in Finland scored the highest in the 2009 PISA study, with the government providing lower funds than, for instance, in the U.S. or Slovenia. However, students in France and Slovenia scored relatively low although individual indicators were favorable: an early start in preschool in France and the favorable teacher-child ratio in preschool in Slovenia. However, one needs to be cautious when interpreting these data. The

⁵ Social inclusion was defined based on the percentage of children attending preschool who come from less socially, economically, and culturally stimulating environments.

⁶ The data were obtained through personal correspondence with the OECD statistical center (Miyako.IKEDA@oecd.org).

⁷ Norway has combined daycare and preschool.

⁸ Finland has combined daycare and preschool, and students achieve the highest reading literacy scores among the European countries in the 2009 PISA study.

⁹ Poland made dramatic progress in students' average scores in 2006 and achieved results above the OECD average in 2009.

	Differences in the scores (points) of students who attended and did not attend preschool	Average length of preschool education ^a	Average pupil-to-teacher ratio in preschools ^b	Public expenditure on preschool per student
Finland (536)	5	2.2 years	11.4	USD 4,789
Norway (503)	18	2.8 years	no data	USD 5,886
Poland (500)	30	1.4 years	18.6	USD 4,658
USA (500)	12	1.8 years	13.8	USD 9,394
France (496)	65	3.0 years	19.2	USD 5,527
Slovenia (483)	7	2.3 years	9.4	USD 8,464

Table 2: Some structural indicators of preschool education quality

Notes: The data in columns 2–4 refer to children who attended preschool from age three until they entered primary school.

^a The differences in scores are shown while controlling for socioeconomic and cultural background. All the differences in scores are statistically significant, except in Finland.

data based on which OECD researchers calculated the described structural indicators of quality are taken from various databases that include data for various years: the data on the average length of preschool education are calculated based on children's preschool attendance in 2008, and the data on the adult-child ratio in the group apply to 2007, just like the data on the funding per preschool child. The data on whether and how long 15-year-olds attended preschool were collected retroactively – that is, the students provided these data from memory for 10 or more years back. The data on preschool attendance collected this way thus apply to the period between 1995 and 2000 and are likely to be considerably lower in all countries than in 2009. However, the data for all the countries included were collected the same way, which means that the same methodology was used for collecting data. Nonetheless, one needs to be cautious even with this “same methodology,” especially when collecting and comparing data on preschools that are set up differently in different countries and for which it is difficult to find a common denominator. To focus on a specific datum provided for Slovenia in Table 2: the average adult-child ratio in preschool groups of children older than three is 9.4 (compared to the data for other countries, this is a favorable ratio). The datum was taken from “Education at a Glance 2010” (2010), and a similar one can also be found in the publication “Starting Strong III” (2012) as well as the “2011/12 Statistical Information”.¹⁰ However, this datum is accurate for only 4 hours a day, when the teacher and teaching assistant are working simultaneously in the group, whereas on average there are 18 children in a group or 18 children per teacher in the upper age group (Kos Kecojević et al. 2012). It is unknown how accurately the data on the adult-children ratio in preschool groups were calculated in other

¹⁰ This datum was conveyed from Slovenia, and it seems that it was calculated by dividing the number of children who attended preschool in the upper age period/group by the number of teachers and teaching assistants working with the children in the upper age group. The simultaneous presence of the teacher and the teacher's assistant (which is specific for preschools and is practiced for a specific number of hours) was not appropriately taken into account.

countries, but some countries specifically state in their notes how long (how many hours) the data provided apply. Not necessarily “comparable” and not even necessarily sufficiently accurate data can render conceptual interpretation extremely difficult; in this case, this involves interpreting important indicators of preschool quality within the context of 15-year-olds’ reading achievements on PISA 2009.

Based on the comparisons presented to date, the effect of preschool on the reading literacy of 15-year-olds cannot be explained with individual systemic indicators of preschool quality. Researchers (e.g., Barnett 2008; Lowe Vandell et al. 2010) especially emphasize that the interactive effects of systemic and procedural (the quality of teaching in preschool) indicators as well as the effect of the socioeconomic factors of an individual’s family environment must be taken into account when determining the short-term and long-term effects of an early start at preschool. We were also interested in the extent to which the effect of preschool on the reading achievements of secondary-school students can be explained in relation to their socioeconomic background.

15-year-olds’ reading achievements and children’s social inclusion in preschool

The 2009 PISA results show that students’ socioeconomic backgrounds have an important effect on their achievements (PISA 2009 results ... 2010). In the 2009 PISA study, the socioeconomic background is measured using the index of economic, social, and cultural status (ESCS), which is determined by the education and profession of the students’ parents and the family property (i.e., books, computer, dishwasher, car, etc.) (ibid. p. 29). At the level of the OECD average, differences in the ESCS can be used to explain 14% of the differences in the reading achievements of 15-year-olds (ibid., pp. 34 and 54).

Table 3 shows the average ESCS indexes of students who did not attend preschool, those who attended preschool for 1 year or less, and those who attended preschool for more than 1 year.

Table 3 shows that in all countries presented students who attended preschool for more than 1 year come from families with a higher ESCS than students who did not attend preschool or attended for only 1 year or less. OECD researchers conclude that to some extent the differences in reading literacy scores between students who attended preschool for more than 1 year and those that did not attend preschool originate in the students’ socioeconomic status. However, additional estimates show that the differences remain even if students have the same ESCS (ibid., p. 98). When controlling for the ESCS, students at the OECD average who attended preschool for more than 1 year scored 33 points higher in reading than students who did not attend preschool (see Figure 4).

	No preschool attendance	Preschool attendance for 1 year or less	Preschool attendance for more than 1 year
	Mean index	Mean index	Mean index
OECD average	-0.41	-0.13	0.13
Austria	-0.30	-0.17	0.14
Belgium	-0.34	-0.02	0.26
Czech Republic	-0.22	-0.16	-0.05
Denmark	-0.31	0.18	0.36
Estonia	-0.06	-0.07	0.21
Finland	0.07	0.19	0.47
France	-0.78	-0.42	-0.10
Germany	-0.22	-0.10	0.27
Greece	-0.62	-0.09	0.06
Hungary	-0.35	-0.44	-0.18
Iceland	0.13	0.41	0.75
Ireland	-0.22	0.02	0.19
Italy	-0.50	-0.19	-0.09
Luxembourg	-0.43	-0.03	0.25
Netherlands	0.00	0.26	0.31
Norway	0.16	0.26	0.52
Poland	-0.52	-0.59	0.03
Portugal	-0.81	-0.54	-0.08
Slovakia	-0.56	-0.20	-0.04
Slovenia	-0.30	-0.06	0.21
Spain	-0.74	-0.54	-0.26
Sweden	0.02	0.27	0.40
Switzerland	-0.47	0.02	0.12
Turkey	-1.53	-0.37	0.21
United Kingdom	-0.14	0.12	0.27
Bulgaria	-0.40	-0.16	0.05
Croatia	-0.63	-0.38	0.14
Latvia	-0.39	-0.31	0.00
Liechtenstein	-0.84	0.09	0.10
Lithuania	-0.40	-0.01	0.22
Montenegro	-0.64	-0.21	0.11
Romania	-0.85	-0.52	-0.30
Serbia	-0.25	0.03	0.26

Table 3: Students' PISA index of economic, social, and cultural status (ESCS) (PISA 2009 results ... 2010, Table II.5.5, p. 190)

Note. The ESCS index is standardized (converted into z values) such that the OECD average equals 0 and the standard deviation equals 1. The theoretical values range from -3 to +3, in which 68.24% (two-thirds) of the entire population is in the interval between -1 and +1. A student with an ESCS value of -1 thus had a lower social, economic, and cultural status than five-sixths of students, whereas a student with an ESCS value of +1 is more privileged in terms of his or her social, economic, and cultural status than five-sixths of students (*ibid.*, pp. 29 and 53).

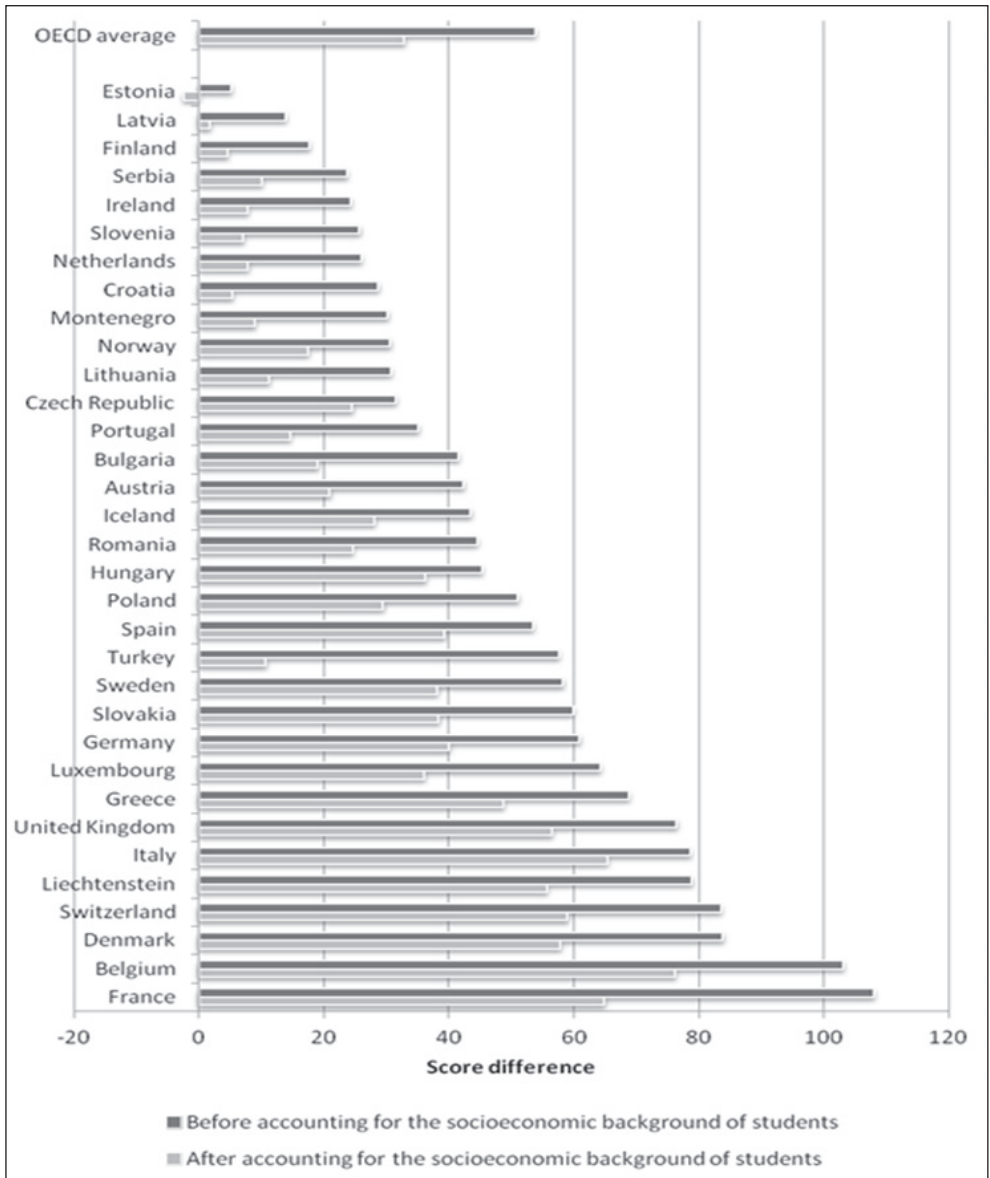


Figure 4: Differences in student reading literacy achievements on PISA 2009 between students who attended preschool for more than 1 year and those who did not attend before and after controlling for their socioeconomic background (PISA 2009 results ... 2010, Table II.5.5., p. 190)

OECD researchers (PISA 2009 in focus 1 ... 2011, p. 3) also established that the school systems in which students have the highest average reading scores are also the systems that ensure inclusive access to preschools for all preschool children, regardless of their social status. In countries such as Japan, Korea, Estonia,

Iceland, and Hong Kong, in which students have above-average reading scores, the differences in the ESCS between students who did or did not attend preschool are lower than the OECD average. To compare the percentages of the socially strongest and weakest students who attended preschool, OECD researchers (OECD 2011) divided the students into four groups (quartiles) according to the ESCS and then determined the percentage of students who had attended preschool from the first quartile (low ESCS; socioeconomically disadvantaged students) and fourth quartile (high ESCS; socioeconomically advantaged students) (*ibid.*).

Table 4 shows the percentage of students in the selected countries who attended preschool from the first and fourth quartiles. The countries are the same as in Table 3. The students' average reading scores and their rank compared to the OECD average (i.e., above or below) are provided in parentheses next to the name of the country.

	Differences in the scores (points) of students who attended and did not attend preschool	Preschool attendance (%) among socio-economically advantaged students	Preschool attendance (%) among socio-economically disadvantaged students
Finland (536, above OECD average)	5	75%	53%
Norway (503, above OECD average)	18	91%	75%
Poland (500, above OECD average)	30	74%	28%
France (496, in the range of OECD average)	12	96%	89%
USA (500, in the range of OECD average)	65	82%	59%
Slovenia (483, below OECD average)	7	79%	54%

Table 4: Preschool attendance according to students' ESCS

The results in Table 4 show large differences between the countries presented in terms of percentages of students with a low or high ESCS, an indicator of students' high or low preschool attendance. Even the most effective school systems or countries in which students had the highest reading scores in Europe in the 2009 PISA study do not report high social inclusion at the preschool level. For example, in Finland the percentage of students with a high ESCS among those who attended preschool is much higher than the percentage of students with a low ESCS (a 75% to 53% ratio). However, the data on social inclusion gathered in the PISA study and the data gathered in other studies such as "Working for Inclusion" (2010) are not the same. For example, they show that Finland, similar to other northern European countries such as Denmark and Sweden, attains a high level of social inclusion. The data from this study show that in Finland the percentages

among the percentages of toddlers attending preschool are 22%:22%:25% in terms of maternal education, which means that preschool is attended by 22% of toddlers whose mothers have an education below secondary school, 22% of those whose mothers have a secondary-school education, and 25% of those whose mothers have an education higher than secondary school (ibid.). The case of France also shows one should be cautious in interpreting the data presented in Table 4. The data show that the percentages of students with a high and low ESCS are comparable: their relationship is 96%:89%, which suggests high social inclusion of students in terms of their preschool attendance; however, at the same time the data on students' reading literacy in the 2009 PISA study do not confirm the high effectiveness of their school system. If one also looks at the French data on preschool attendance in the "Working for Inclusion" study, toddlers with high maternal education predominate among the toddlers attending preschool; the relationship between low, medium, and high maternal education is 17%:30%:48%. The reason for this discrepancy regarding children's preschool attendance according to their family social background lies in the various approaches to collecting data (questionnaires, statistical databases), the reference years, and the method of forming social-status groups. The ESCS index used in the PISA study includes paternal education and profession, and family assets, whereas the researchers working on the "Working for Inclusion" (ibid.) project used only maternal education as a social status indicator. The data on preschool attendance obtained as part of the Working for Inclusion" (ibid.) research project were taken from the 2005 statistical databases; the data in the 2009 PISA study were obtained through a questionnaire that included a question about preschool attendance, to which 15-year-old students provided their answers. In this way, the students answered in retrospect, reaching back more than 10 years in their memories.

Looking at the Slovenian data on social inclusion in preschools, the data obtained in the 2009 PISA study and the "Working for Inclusion" (ibid.) study match to a high degree. A considerably lower percentage of students/toddlers with low social status attend preschool than those with high social status, which points to the unfairness of the school system, which could also at least partly explain the below-average reading achievements of Slovenian 15-year-olds. The results (Table 4) show that among Slovenian students who attended preschool the percentage of students with a low ESCS is 25% lower than the percentage of students with a high ESCS; the data from the "Working for Inclusion" study show that in 2005 the percentage of preschool-attending toddlers with low maternal education was 11% lower than the percentage of toddlers with high maternal education. Even later on, in the 2007/2008 school year, in which the percentage of children attending preschool (especially toddlers) was significantly higher than in 2005, this ratio between the preschool-attending toddlers in terms of their social background, which is not exactly the most appropriate, remained the same. The percentage of toddlers with low maternal education was 20% lower than the percentage of toddlers with high maternal education. Somewhat more encouraging are the data for 2010 concerning older preschoolers between ages three and six, which show that the relationship between the children in terms of

their maternal education was 82%:86%:91% (low:medium:high maternal education; Podlesek et al. 2010).

Even if the data on social inclusion were the same, they could not entirely explain why a highly effective school system is also not the most just in terms of social inclusion at the preschool level. Questions that remain open include whether the countries with low social inclusion of children at the preschool level have adopted suitable systemic measures to enable parents with low education to include their children in preschool early on, whether all parents, including those living in the countryside and in less stimulating social and cultural environments, are familiar with the advantages of enrolling their children in preschool, whether a preschool network is in place that “reaches” children (parents) in all environments, and whether parents decide on their own to include their children in other forms of care (which may even have more favorable structural indicators than preschools). In addition, these types of interpretations completely exclude the comparison of school systems in various countries that can relatively (un) successfully overcome the low social inclusion of children at the preschool level.

Conclusions

Based on the analysis of the data collected as part of the 2009 PISA study, in the majority of countries included in the study 15-year-old secondary-school students who attended preschool score higher in reading literacy than their peers who did not attend preschool, and that students who have higher reading scores usually come from a socially, economically, and culturally more stimulating family environment and started preschool earlier than their peers who have lower reading scores, come from a less stimulating family environment, and attended preschool for only 1 year or less or did not attend preschool at all.

Additional secondary analyses that OECD researchers conducted as part of the 2009 PISA study, our additional analyses of the reading achievements of 15-year-olds, and the findings of specific other empirical studies show that preschool attendance does not automatically have a positive effect on children’s current and later cognitive skills and academic abilities. The length of preschool attendance and the quality of the preschool education are also important. The results of the 2009 PISA study show that in Slovenia students who had attended preschool for more than 1 year scored 16 points higher on reading literacy tests as part of the 2009 PISA study (a statistically significantly higher achievement) than their peers who had not attended preschool. Taking into account the ESCS, the difference in the achievements between these two groups of students was considerably smaller (seven points), although still statistically significant. Preschool attendance thus had a significant effect on the reading literacy of 15-year-olds, but nonetheless a lower one than in the majority of European countries included in the 2009 PISA study.

The indicators of quality in Slovenian preschools (e.g., the length of preschool education, the adult-child ratio in the group) included in secondary comparative

analyses and other systemic indicators (e.g., education of the teaching staff, the number of children in a group) referring to upper age groups are comparable with preschools in the Nordic countries, which have combined daycare and preschool for children from the end of maternity leave until entry into school, just like in Slovenia. Nonetheless, the 2009 PISA results show that preschools in Slovenia did not have as strong an effect on the reading achievements of 15-year-olds as, for instance, in Denmark, Sweden, and Norway. Especially compared to Finland, where 15-year-olds achieve the highest reading scores among the European countries included in the 2009 PISA study, it seems important to include a high percentage of children in preschools, but this is not automatic enough. Taking into account the findings of a longitudinal study on the effect of preschool on children's development and learning (e.g., Marjanovič Umek and Fekonja Peklaj 2008), we believe that Slovenia needs to introduce specific systemic solutions to ensure greater accessibility of preschools to all children, including those from socially, economically, and culturally less stimulating environments.¹¹ The conceptualization of preschools in the new "White Book on Early Education in Slovenia" (Marjanovič Umek et al. 2011) offers some solutions that could contribute to greater fairness of preschools. They include the following: in addition to disabled children, children from socially and culturally less stimulating environments take priority in preschool enrollment; during the children's preschool education, the preschool must offer additional classes in Slovenian and the children's native language (with the help of suitably qualified professionals) for children whose native language is not Slovenian; if many children in a class or preschool come from a socially disadvantaged environment and therefore have problems with language development, the preschool must provide additional language development stimulation (with the help of a qualified teacher). If these solutions were implemented in practice and if additional efforts were made to encourage as many parents with low education to enroll their children in preschool, they would contribute to the greater fairness of preschools and at least partially to greater effectiveness of the school system.

The analyses and explanations of the effectiveness of an individual level of education based on systemic solutions are vital, but by no means sufficient. There is a high correlation between the structural and procedural quality of preschool, and thus, the explanation of the effect of preschool on the reading achievements of 15-year-olds in the PISA study lacks certain key conceptual data such as curricular solutions in preschools, the quality of carrying out the curriculum, and primary

¹¹ In May 2011, the Council of the European Union (*Council conclusions on early childhood education and care* 2011) adopted a recommendation, according to which 95% of children between age four and enrollment in school should attend preschool by 2020 in all member states. The Council of Ministers emphasized they want to provide high-quality preschool education to make it possible for all children to develop their potential in the early developmental stages; in this regard, they specifically discussed children of migrant families and children from families with low socioeconomic status. In Slovenia, the percentage of children attending preschool is relatively high and continues to rise. In the 2011/12 school year, 55.7% of children in the lower age group and 92% of children in the upper age group attended preschool (Statistične informacije 2012). This means that with the 93.6% of children attending preschool between age four and entry into primary school, Slovenia has already nearly attained the council's recommendation.

school analysis; together with systemic and conceptual solutions, such analysis can establish a level of effectiveness and justice of education comparable to that of preschool, correct any weaknesses of the preschools, or develop less favorable solutions from the viewpoint of effectiveness and/or justice than those in preschool. The effects of preschool on the reading achievements of 15-year-olds thus cannot be interpreted directly and unilaterally. However, as seems especially important in all international comparative studies of knowledge in terms of educational policies, the data can be compared between countries, and the findings of secondary analyses of basic and supporting data from a large sample of participants (at the national and international levels) can be used to explain the effects of various factors of knowledge and identify any critical factors as well as their stability and variability through time.

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