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Preparing the ground

The importance of early learning activities at home for fourth grade student achievement

SUMMARY

- Analyses of TIMSS and PIRLS data indicate that early learning activities can help to lay the foundation for positive schooling outcomes in the future.
- Prior research shows that establishing early literacy and numeracy skills may help children to achieve better outcomes in later schooling.
- Children from socially disadvantaged backgrounds tend to experience less stimulating educational activities at home and have poorer access to institutional early childhood provision (e.g., kindergarten or pre-school) than their more advantaged peers.
- Measures that enhance the engagement of parents in early learning activities, or facilitate easy access to adequate complementary provisions, will help to prepare the ground for better school results and may reduce the effect of social background on educational inequality.

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IMPLICATIONS

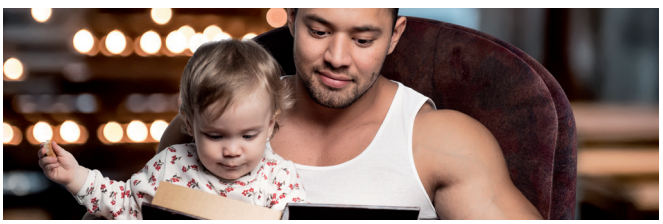
- TIMSS and PIRLS have shown participation in high-quality pre-primary programs can help to prepare the ground for children's future learning at school and has the potential to mitigate social inequalities created by diverse family backgrounds.
- Enhancing parental and child engagement with stimulating activities at home can contribute to improved child development and school outcomes, in particular for disadvantaged children.
- Interventions designed to support parents or caregivers and teach them how to be more responsive to their children's early learning needs would be particularly beneficial for children from families with lower levels of parental education.
- As providing early learning opportunities at the institutional level can contribute to child development and improved schooling outcomes, efforts should be made to increase participation, in particular for disadvantaged children.

INTRODUCTION: STIMULATING EARLY LEARNING PROCESSES

In 2015, United Nations (UN) member states adopted a new set of ambitious goals to address various development challenges by 2030. The Sustainable Development Goals (SDGs) proposed a comprehensive framework to ensure no one is left behind. Specifically, targets within SDG4 (Ensure inclusive and quality education for all and promote lifelong learning) state that children should have access to quality early childhood development, care and pre-primary education, including the experience of positive and stimulating learning environments. These targets were set in response to numerous studies pointing to the importance of the early years for all areas of child development. Stakeholders, such as policymakers or national and international organizations active in the field of educational research, are increasingly recognizing early education of children as a prospective field of action (OECD [Organisation for Economic Cooperation and Development], 2012; Stancel-Piątak & Hencke, 2014), indicating a need for further research into the factors contributing to improving children's learning outcomes. Acquisition of early literacy skills is crucial for child development and achievement in reading literacy (Bingham, 2007; NELP [National Early Literacy Panel], 2008; Shanahan & Lonigan 2010), and reading literacy provides a foundation for skill acquisition in other content areas (Anders et al., 2012; Doig, McCrae, & Rowe, 2003).

Parents and preschools can both contribute to enhancing children's development by implementing early learning activities (Gelfand & Teti, 1990; Hart & Risley, 2003; NELP, 2008; Mullis, Martin, Foy, & Arora, 2012a; Mullis, Martin, Foy, & Drucker, 2012b; Murray, 1997; Murray & Cooper, 1997; Webster-Stratton & Hammond, 1988). Although children from socially and economically disadvantaged families may benefit from greater developmental support, they may also have less access to stimulating learning activities than their more advantaged peers (Farkas & Beron, 2004; Raikes et al., 2006). A positive nurturing environment at home or in institutionalized early childhood education and care settings has been found to be important for child development, in particular the role of early learning in promoting good outcomes in later schooling and mitigating the learning gaps between socially disadvantaged and advantaged children.

In this brief, we present results from in-depth analysis using international large-scale assessment data, which demonstrate that social inequalities and their relationship to learning outcomes commence in early childhood. The evidence from this study suggests that investment in children's early learning skills can be an important factor in establishing positive future learning outcomes.



WHAT WE LEARNED FROM PRIDI

The Regional Project on Child Development Indicators (PRIDI)[1] was a study conducted over the course of 2013 and 2014 using nationally representative samples from four Latin American countries (Costa Rica, Nicaragua, Paraguay, and Peru). PRIDI provided important insights into four domains of child development that build the foundation for future learning outcomes: cognition, language and communication, socioemotional development, and motor skills. PRIDI identified and substantiated the importance of a measure that was termed "the nurturing environment"[2] for child development. Cognition, language and communication, and socioemotional development, showed stronger positive associations with this measure than motor skills.

PRIDI data revealed that social inequalities in child development could appear when a child was only 24 months old, and increased with age, taking three factors into consideration: the socioeconomic endowment of the home, maternal education, and the nurturing environment. Parents with more resources, including education and wealth, invested with greater frequency and intensity in supporting their children's development than parents facing financial and educational limitations. According to the study, by 59 months, the development of a poor and under-nurtured child lagged by as much as 18 months behind richer and more nurtured peers. The under-nurtured child may be unable to recognize basic shapes like triangles or squares, count to 20, or understand temporal sequences (i.e., a sequence of happenings in a space of time). They may also have gaps in their basic executive functioning[3] and socioemotional skills, including empathy and autonomy. An under-nurtured child is unlikely be as ready for school as their peers, and may not have success once there. Notably, however, PRIDI also found that if children from disadvantaged households had access to a nurturing environment, their level of development rose toward levels found in children from richer, but less nurtured

1 In Spanish, the PRIDI acronym stands for Proyecto Regional de Indicadores de Desarrollo Infantil (see https://www.iadb.org/en/pridi for a comprehensive summary of this regional project)

2 The PRIDI measure for nurturing environment was composed of: (1) the number of books for children in the home, (2) the number of adults who interacted with the child (playing, singing, drawing, telling stories), (3) the frequency of adult-child interaction and routines implemented in the home, and (4) basic hygiene routines practiced by the child.

3 Executive functions are generally understood as the skills allowing children to manage their thoughts, actions and emotions, such as paying attention, organizing and planning, initiating tasks and staying focused, regulating emotions and self-monitoring.

households (Verdisco, Cueto, & Thompson, 2016).

TIMSS AND PIRLS DATA

While PRIDI provides high quality data on the early learning context of children, it does not connect this context to future school achievement. Moreover, the PRIDI data is limited to four Latin American countries. Inspired by the PRIDI findings, we analyzed data from two international large-scale assessments: the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS). Both studies contribute in a unique way to enhancing the empirical evidence on the significance of early learning activities, an important aspect of creating a nurturing environment.

IEA's TIMSS and PIRLS assessments provide powerful data sources for the analysis of relationships between achievement and the contexts of learning. The studies implement ability tests for fourth-grade students, allowing for inferences on the achievement of students in reading (PIRLS), mathematics and science (TIMSS) in participating countries. The results of these tests are complemented by background information collected from the students themselves, and their schools, teachers and parents, including retrospective information on early family habits related to early learning activities[4]. Our analysis used data from TIMSS 2011, TIMSS 2015 and PIRLS 2011 including more than 30 educational systems which participated in all three studies, and comparing results from two cycles of TIMSS to analyze trends over time.

We explored (1) the engagement in early literacy activities of parents from different educational backgrounds; (2) the relationship between this engagement and later student achievement in primary school for children from diverse socioeconomic backgrounds; and (3) the relationship between children's attendance of institutional early childhood provision and parents' educational background.

RESULTS

MORE HIGHLY EDUCATED PARENTS ENGAGE MORE OFTEN IN NUMERACY AND LITERACY RELATED ACTIVITIES

Previous research showed that parents with more resources, including education and wealth, generally invest with greater frequency and intensity to support their child's development than parents facing financial and educational limitations (Verdisco et al., 2016). PIRLS and TIMSS data tend to confirm similar patterns of inequality in the majority of the participating education systems, with some variations across them. To investigate how often parents with different education levels engaged in learning activities with their child, we used information collected via questionnaires completed by parents or caregivers (see Appendix, Figure A1). Their responses were used to create two indexes of early learning activities, one related to literacy and another to numeracy (for a full description of these scales, see Martin & Mullis, 2011). Our analysis revealed that, on average, parents with higher educational levels reported more frequent engagement in early learning activities during their children's pre-primary years than those with lower levels of education (Table 1). This finding was generally consistent for all 30 educational systems that participated in TIMSS 2011, 2015 and PIRLS 2011 (see Appendix, Table A1, for further information). Unsurprisingly, we found a very similar pattern for early numeracy activities[5].

Table 1: Frequency of engagement in early literacy activities by parents or caregivers with different education levels indicated by the average scale score on the TIMSS and PIRLS early literacy activities scale.

Parents' highest education level	TIMSS / PIRLS 2011	TIMSS 2015
	Average score on the early literacy activities scale	Average score on the early literacy activities scale
University or higher	10.4 (0.06)	10.5 (0.06)
Post-secondary but not university	10.1 (0.08)	10.2 (0.09)
Upper secondary	9.9 (0.08)	9.9 (0.08)
Lower secondary	9.5 (0.15)	9.6 (0.16)
Some primary, lower secondary or no school	8.9 (0.21)	9.0 (0.22)

Notes: Scale has a mean of 10 and the standard deviation is one. Standard errors appear in parentheses. Parents with a university degree or higher qualification reported engaging more often in early literacy activities with their children than parents with lower levels of education. The larger standard errors for parents with lower levels of education ("lower secondary" and "some primary, lower secondary or no school") indicate that their play habits are more diverse than those of parents with higher education levels.

4 Data and documentation are available: http://www.iea.nl/our-data

5 Table can be provided by the authors on request

Although our analysis showed consistently that more highly educated parents tend to play developmentally stimulating games more frequently with their children, these differences are not equally pronounced across countries (details in Appendix, Table A1). For example, in Chinese Taipei, Hong Kong (SAR), and Singapore, parents with higher levels of education reported significantly higher frequency of engagement in early learning activities than parents with lower levels of education. This suggests that, in these countries, the environment supportive of school success is systematically related to socioeconomic family background. In contrast, in countries such as the Czech Republic, Finland, Hungary, or Germany, parents from diverse socioeconomic backgrounds reported almost negligible differences in the frequency of their engagement. Evidently, in some countries, socioeconomic family background is less closely associated with the frequency of parental engagement in early learning activities than in others.

The importance of the problem is underlined by the percentages of children whose parents had low levels of education (see Appendix, Table A1): a relatively large proportion of children were affected by the lack of a stimulating nurturing environment. Larger differences in engagement in learning activities were linked to populations with low proportions of highly educated parents. For example, in Hong Kong (SAR), significantly fewer grade four students have parents with a university degree than in Finland (18% versus 43%).

EARLY LEARNING ACTIVITIES ARE RELATED TO STUDENTS' ACHIEVEMENT IN LATER SCHOOLING

The PIRLS and TIMSS data contain empirical evidence that, in the majority of education systems, children from different socioeconomic and educational family backgrounds have varying levels of exposure to early learning activities, but why does this matter? In other words, how does the home environment influence child development and learning outcomes at school? To analyze this question, we conducted a regression analysis of the PIRLS and TIMSS data, predicting a student's outcomes at grade four by the frequency of early learning activities at home (using retrospective information from the parental questionnaires), while controlling for parents' highest educational level (Tables 2 and 3).

The analyses revealed positive associations between the reported frequency of early learning activities at home and children's outcomes at school in mathematics, science and reading literacy. The relationship is relatively small, but statistically significant in almost all participating education systems. Notably, the association holds when controlling for parental education[6], which indicates that early learning activities have their own effect on child development, confirming findings from PRIDI and other studies, as presented in the introduction. On a more detailed level, in many countries, early literacy activities tend to have a slightly stronger association with reading achievement than with science achievement, while the association with mathematics achievement is less pronounced than either of the other two subjects. However, the association of early numeracy activities with achievement is very similar for all three subjects. Moreover, associations vary across different educational systems. In countries of the Gulf region, such as Oman, Saudi Arabia, Iran, Qatar and the United Arab Emirates, there are relatively large associations between early literacy activities and achievement; note that, in these countries, relatively few children attend pre-primary education programs for three or more years (Mullis et al., 2012a, b).

In reviewing our findings, we conclude that early learning activities may stimulate child development and educational achievement in later years. Our longitudinal analysis of the TIMSS data did not reveal any consistent shifts towards reducing patterns of inequality between 2011 and 2015, however some changes occurred in certain education systems. For instance, the strength of the relationship between early learning activities and student outcomes increased significantly in some countries in the Gulf region, such as Oman, Qatar and the United Arab Emirates. In the majority of education systems, the overall pattern remained similar for all subjects and did not change substantially between 2011 and 2015).

6 In this analysis, the parental educational level is artificially set to a constant for all students, consequently revealing the "true" effect of early learning activities, independent of parental education (i.e., we assumed that the parental educational level was equal for all students). Unsurprisingly, this association is low because there are many other important factors that influence a student's school performance.

Table 2: Relationship between student achievement and frequency of early literacy activities in the home after controlling for highest education level of parents (grade 4, not standardized regression coefficients)

Country	The relationship between early literacy activities and:				
	TIMSS 2011 Mathematics achievement score	TIMSS 2015 Mathematics achievement score	TIMSS 2011 Science achievement score	TIMSS 2015 Science achievement score	PIRLS 2011 Reading achievement score
Australia[1]	5.2 (1.1) *	3.5 (1.2) *	6.8 (1.0) *	5.6 (1.2) *	6.6 (1.0) *
Chinese Taipei	4.9 (0.7) *	3.5 (0.8) *	4.6 (0.7) *	4.2 (0.6) *	4.9 (0.7) *
Croatia	4.0 (0.7) *	4.2 (0.6) *	4.0 (0.6) *	5.2 (0.5) *	4.8 (0.6) *
Czech Republic	3.5 (0.9) *	3.0 (0.7) *	3.3 (0.9) *	3.3 (0.7) *	4.6 (0.8) *
Finland	3.8 (1.0) *	3.7 (0.9) *	4.2 (1.1) *	6.1 (0.8) *	5.8 (1.1) *
Georgia	2.4 (1.4) *	1.8 (1.1)	4.3 (1.3) *	4.3 (1.1) *	5.3 (1.1) *
Germany[1]	1.7 (0.8) *	1.8 (0.8) *	2.8 (0.8) *	2.6 (0.9) *	4.0 (0.9) *
Hong Kong, SAR	3.3 (0.8) *	3.9 (1.0) *	4.5 (1.0) *	5.1 (1.1) *	4.5 (1.1) *
Hungary	5.6 (1.5) *	4.1 (1.2) *	4.4 (1.7) *	4.2 (1.3) *	6.3 (1.4) *
Iran, Islamic Rep. of	3.6 (1.0) *	5.9 (1.7) *	5.0 (1.2) *	6.4 (1.9) *	4.7 (1.0) *
Ireland	5.5 (0.8) *	4.6 (0.7) *	6.1 (0.7) *	5.4 (0.7) *	6.4 (0.7) *
Italy	3.2 (1.0) *	3.2 (0.7) *	4.6 (0.9) *	3.7 (0.7) *	5.4 (0.8) *
Lithuania	5.0 (0.9) *	2.4 (0.8) *	4.2 (0.8) *	2.6 (0.8) *	5.6 (0.9) *
Morocco[1]	-4.2 (2.3)	0.8 (1.5)	-1.0 (2.6)	4.6 (1.9) *	2.1 (2.3)
Northern Ireland[1]	4.3 (1.4) *	3.7 (1.2) *	4.1 (1.0) *	4.6 (1.0) *	6.4 (1.3) *
Norway	3.9 (1.0) *	5.1 (1.2) *	6.0 (0.9) *	5.4 (1.1) *	6.6 (0.9) *
Oman	11.1 (0.8) *	6.6 (1.0) *	13.7 (0.9) *	10.7 (1.1) *	11.9 (0.9) *
Poland	5.9 (0.8) *	3.6 (0.6) *	6.5 (0.9) *	4.0 (0.6) *	8.4 (0.8) *
Portugal	1.4 (0.9)	2.8 (0.9) *	3.2 (1.0) *	3.9 (0.8) *	3.4 (0.9) *
Qatar[2]	5.8 (1.6) *	9.6 (1.2) *	10.2 (1.5) *	11.6 (1.2) *	9.0 (1.5) *
Russian Federation	3.5 (0.8) *	2.6 (0.8) *	3.9 (1.0) *	3.9 (0.8) *	5.2 (0.8) *
Saudi Arabia	7.6 (2.0) *	0.6 (1.1)	8.6 (1.9) *	2.4 (1.8)	9.7 (1.5) *
Singapore	2.4 (0.7) *	3.3 (0.5) *	4.5 (0.6) *	4.8 (0.6) *	5.3 (0.6) *
Slovak Republic	2.8 (1.3) *	3.2 (1.1) *	3.3 (1.2) *	3.0 (1.3) *	5.1 (1.0) *
Slovenia[1]	2.8 (0.8) *	2.6 (0.9) *	4.0 (0.9) *	3.2 (0.9) *	5.7 (0.8) *
Spain	4.8 (0.9) *	3.9 (0.7) *	6.3 (0.9) *	5.0 (0.9) *	6.2 (1.0) *
Sweden	4.7 (1.0) *	4.5 (0.8) *	6.3 (1.0) *	4.8 (0.9) *	7.2 (1.0) *
United Arab Emirates	8.9 (0.9) *	7.9 (0.7) *	11.4 (0.9) *	10.2 (0.7) *	12.5 (0.8) *
Benchmarking participants					
Quebec, Canada[2]	2.2 (0.8) *	3.5 (0.8) *	4.4 (0.9) *	5.0 (0.8) *	6.9 (0.9) *
Abu Dhabi, UAE	9.4 (1.5) *	7.3 (1.6) *	12.4 (1.4) *	9.8 (1.4) *	13.1 (1.3) *
Dubai, UAE	11.2 (1.3) *	8.3 (0.7) *	13.5 (1.2) *	9.6 (0.8) *	14.9 (1.2) *
International average	**4.5 (1.1) ***	**4.1 (1.0) ***	**5.8 (1.1) ***	**5.3 (1.0) ***	**6.7 (1.0) ***

Notes:

*Significant coefficients (one-tailed t-test; significance level α = 0.05); Bars are only shown for significant coefficients. UAE = United Arab Emirates.

[1]Data are available for at least 50% but less than 70% of the students in at least one survey.

[2]Data are available for at least 70% but less than 85% of the students in at least one survey.

In interpreting this table, consider the example of Australia. With a one-point increase on the early literacy activity scale (mean = 10, SD = 1), the TIMSS 2011 mathematics achievement increased by 5.2 points (scale mean = 500, standard deviation = 100).

Table 3: Relationship between student achievement and frequency of early numeracy activities in the home after controlling for highest education level of parents (grade 4, not standardized regression coefficients)

Country	The relationship between early numeracy activities and:				
	TIMSS 2011 Mathematics achievement score	TIMSS 2015 Mathematics achievement score	TIMSS 2011 Science achievement score	TIMSS 2015 Science achievement score	PIRLS 2011 Reading achievement score
Australia[1]	5.6 (1.4) *	4.5 (1.1) *	6.2 (1.1) *	4.6 (1.2) *	5.1 (1.1) *
Chinese Taipei	5.5 (0.5) *	3.6 (0.6) *	4.4 (0.6) *	3.0 (0.6) *	3.3 (0.6) *
Croatia	5.0 (0.8) *	5.3 (0.7) *	4.2 (0.7) *	4.9 (0.7) *	3.1 (0.7) *
Czech Republic	2.6 (0.9) *	1.9 (0.7) *	1.4 (1.0) *	0.3 (0.8)	1.5 (0.8) *
Finland	5.3 (1.0) *	3.5 (1.0) *	3.2 (1.2) *	3.5 (1.0) *	2.1 (1.1) *
Georgia	4.3 (1.4) *	3.0 (1.0) *	5.1 (1.1) *	4.3 (1.0) *	5.4 (1.0) *
Germany[1]	2.7 (0.7) *	2.0 (1.0) *	2.8 (0.9) *	1.4 (0.9)	2.6 (0.8) *
Hong Kong, SAR	3.5 (0.7) *	4.7 (0.7) *	3.5 (0.8) *	4.4 (0.7) *	2.7 (1.0) *
Hungary	8.8 (1.3) *	4.9 (1.1) *	5.8 (1.4) *	3.7 (1.4) *	6.1 (1.3) *
Iran, Islamic Rep. of	5.6 (1.1) *	7.0 (1.9) *	7.3 (1.3) *	7.2 (2.2) *	6.2 (1.2) *
Ireland	5.3 (1.0) *	5.0 (0.7) *	6.2 (0.9) *	4.3 (0.7) *	5.5 (0.9) *
Italy	3.1 (1.1) *	3.1 (0.8) *	2.9 (0.8) *	3.3 (0.7) *	2.3 (0.7) *
Lithuania	5.0 (1.0) *	4.1 (0.9) *	2.9 (1.0) *	1.9 (1.0) *	2.5 (0.8) *
Morocco[1]	-2.7 (2.2)	1.7 (1.6)	0.1 (2.5) *	5.6 (2.0) *	3.3 (2.0) *
Northern Ireland[1]	4.6 (1.2) *	4.6 (1.2) *	3.6 (1.0) *	3.9 (1.1) *	5.5 (1.2) *
Norway	5.2 (1.1) *	4.7 (1.5) *	4.4 (0.9) *	2.6 (1.3) *	3.8 (1.1) *
Oman	8.2 (0.7) *	6.6 (1.0) *	10.4 (0.9) *	9.3 (1.1) *	9.1 (0.9) *
Poland	5.5 (0.9) *	2.3 (0.8) *	4.6 (1.0) *	1.9 (0.7) *	5.6 (0.8) *
Portugal	2.5 (1.0) *	3.9 (0.8) *	3.6 (0.9) *	3.4 (0.6) *	2.5 (1.0) *
Qatar[2]	6.1 (1.3) *	7.6 (1.1) *	8.4 (1.3) *	8.1 (1.2) *	6.2 (1.2) *
Russian Federation	2.4 (0.9) *	2.1 (0.7) *	3.1 (1.1) *	2.9 (0.9) *	3.5 (0.8) *
Saudi Arabia	5.8 (1.9) *	0.8 (1.0)	6.8 (1.8) *	3.8 (1.6) *	7.6 (1.4) *
Singapore	2.6 (0.6) *	3.8 (0.6) *	3.7 (0.6) *	3.7 (0.6) *	3.9 (0.6) *
Slovak Republic	3.0 (1.1) *	3.4 (1.2) *	2.0 (1.1) *	2.1 (1.3)	3.7 (1.0) *
Slovenia[1]	1.9 (0.7) *	1.9 (1.0)	1.4 (0.9) *	1.5 (0.8)	2.5 (0.8) *
Spain	4.3 (1.1) *	4.7 (0.7) *	4.6 (1.0) *	4.5 (1.0) *	3.6 (1.0) *
Sweden	4.1 (0.9) *	3.4 (0.7) *	3.8 (1.0) *	2.1 (0.9) *	3.3 (0.9) *
United Arab Emirates	7.2 (0.8) *	5.9 (0.6) *	8.9 (0.8) *	6.5 (0.5) *	8.9 (0.7) *
Benchmarking participants					
Quebec, Canada[2]	2.4 (0.9) *	5.0 (1.0) *	2.5 (0.9) *	4.7 (1.0) *	3.0 (0.9) *
Abu Dhabi, UAE	8.2 (1.4) *	4.8 (1.2) *	10.2 (1.3) *	5.6 (1.2) *	9.9 (1.2) *
Dubai, UAE	9.9 (1.2) *	6.6 (0.7) *	10.9 (1.0) *	6.4 (0.7) *	11.2 (0.9) *
International average	**4.6 (1.1) ***	**4.1 (0.9) ***	**4.8 (1.1) ***	**4.0 (1.0) ***	**4.7 (1.0) ***

Notes:

*Significant coefficients (one-tailed t-test; significance level α = 0.05); bars are only shown for significant coefficients. UAE = United Arab Emirates.

[1]Data are available for at least 50% but less than 70% of the students in at least one survey.

[2]Data are available for at least 70% but less than 85% of the students in at least one survey.

In interpreting this table, consider the example of Australia. With a one-point increase on the early numeracy activity scale (mean = 10, SD = 1), the TIMSS 2011 mathematics achievement increased by 5.6 points (scale mean = 500, SD = 100).

CHILDREN WHOSE PARENTS HAVE LOWER EDUCATIONAL LEVELS ARE LESS LIKELY TO ATTEND INSTITUTIONALIZED EARLY CHILDHOOD PROGRAMS REGULARLY, AND OFTEN ATTEND FOR A SHORTER PERIOD OF TIME

Pre-school programs have the potential to mitigate differences in the availability of early childhood activities in the home and their related effects on later success at school. Across all countries, there was a relationship between student attendance in pre-primary education and their later achievement at grade 4. In the vast majority of countries, length of time spent in pre-primary education was directly and positively related to mathematics and science achievement (Figure 1; see Mullis, Martin, Foy, & Hooper, 2016).

In most countries, students with parents with higher educational levels also generally attended pre-school more often and for a longer period of time (Figure 2; see also Appendix, Table A2), however, the extent varied greatly.

For children attending pre-primary education for more than three years, there were large differences related to parental education levels. In Bulgaria, Croatia, Georgia, Lithuania, Morocco, Poland, Serbia and Turkey, the attendance rate of students with parents holding a university degree was more than 20 percent higher than for those whose parents had a lower educational level. At the other end of the spectrum, parental education was generally unrelated to attendance rates in Denmark, France, Hungary, Italy, Korea, the Netherlands and Dubai; most of these countries reported very high pre-school attendance figures for all children.

Figure 1: Cross-national average student mathematics achievement at grade 4 versus years of attendance in pre-primary education

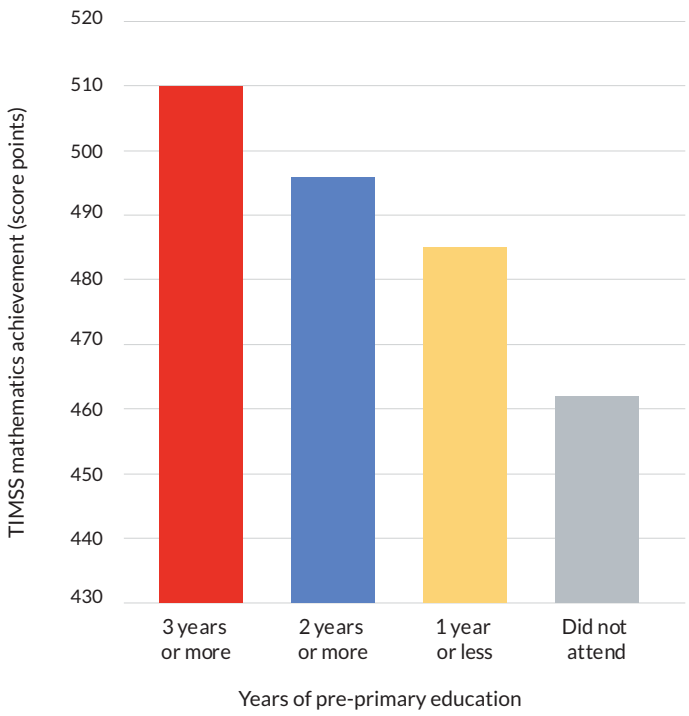
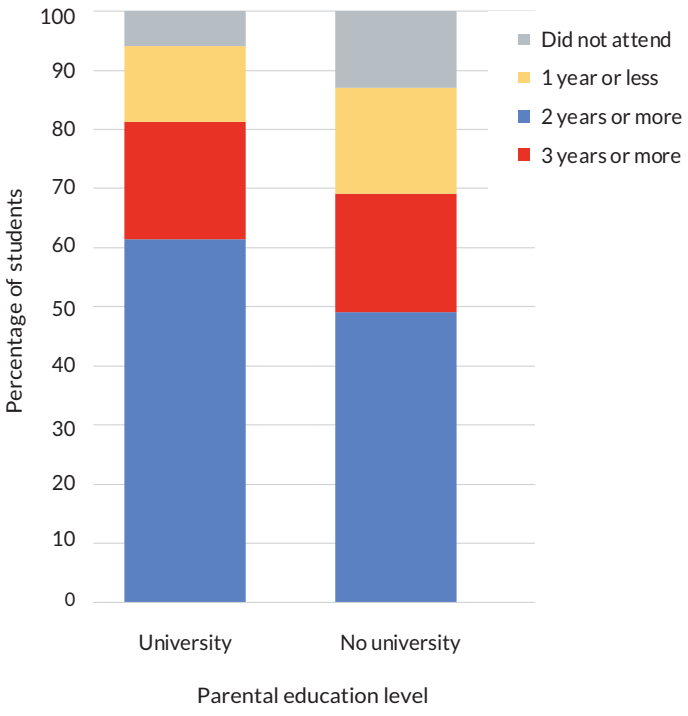


Figure 2: Percentage of children who attended pre-primary education by parental education level (international average)



Source: http://timssandpirls.bc.edu/timss2015/international-results/timss-2015/mathematics/home-environment-support/students-attended-preprimary-education/ (see Mullis, Martin, Foy, & Hooper, 2016).

CONCLUSIONS

EARLY LEARNING ACTIVITIES CAN MITIGATE SOCIAL INEQUALITIES

Enhancing parental and child engagement with stimulating pre-school activities at home can contribute to improve child development and school outcomes, in particular when children come from socioeconomically disadvantaged backgrounds.

Our analyses suggest that early learning activities have some effect on student achievement in later schooling. Further, in some education systems, parental engagement with children on stimulating learning activities is unequal across families from different educational backgrounds. Better educated parents tend to support their child's development with greater frequency and intensity than parents with financial and educational limitations. In this regard, policy action could be directed toward enhancing the nurturing environments of young children. Drawing on the regional PRIDI results, we can also conclude that a useful approach would be to raise awareness of the lifelong impact of pre-school education, and to offer parents or caregivers opportunities to learn how to be more responsive to their children's needs. Included here would be teaching parents or caregivers how to listen, understand and communicate more effectively with their children. Our analysis indicates that interventions would be most beneficial for children from families where the parents have lower levels of education.

Providing early learning opportunities at the institutional level can contribute to child development and improve schooling outcomes, thus efforts should be made to increase participation in those programs, especially for disadvantaged children. It may be beneficial to provide systematic learning opportunities for children at the institutional level, to mitigate the effects for children whose parents or caregivers, for whatever reason, are unable to provide optimal levels of pre-school support. Earlier analyses, presented in the international reports of TIMSS and PIRLS, have shown clear positive relationships between attendance of children in pre-primary programs and their later school outcomes (Mullis et al., 2012a, 2012b, 2016); in the vast majority of countries, the data indicated that the longer children attended these programs, the larger was the subsequent effect on their later educational outcomes. Hence, participation in high-quality early education programs can help to prepare the ground for children's future schooling outcomes and has the potential to mitigate the socioeconomic and educational inequalities of diverse family backgrounds. Interventions that compensate for a lack of early learning activities in the home should be implemented as early as possible for all children, as later measures are likely to be more costly, challenging and less efficient at achieving the desired outcomes.

LIMITATIONS OF THIS STUDY

Our work draws on international large-scale assessment data and provides a cross-national perspective for two different cycles of TIMSS. Due to the cross-sectional nature of the data, causal inferences about the effects of the nurturing environment on child development and school performance are limited. Moreover, the study considers only one aspect of the nurturing environment focusing on early learning activities. Further studies on the nurturing environment might provide a more comprehensive understanding of its significance for child development. Future research could include non-cognitive areas of child development, such as socio-emotional development. Finally, information about students' early learning activities was collected from their parents retrospectively, which may also put some caveats on the results. Further studies are needed to confirm and extend empirical evidence on the effects of a good nurturing environment on child development.

> "BETTER EDUCATED PARENTS TEND TO SUPPORT THEIR CHILD'S DEVELOPMENT WITH GREATER FREQUENCY AND INTENSITY THAN PARENTS WITH FINANCIAL AND EDUCATIONAL LIMITATIONS."

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HELPFUL RESOURCES

Bertram, T, & Pascal, C. (2016). *Early Childhood Policies and Systems in Eight Countries. Findings from IEA's Early Childhood Education Study*. Cham: Springer International Publishing. Retrieved from http://www.springer.com/gp/book/9783319398464

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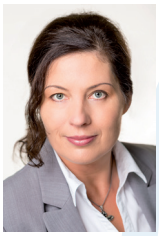

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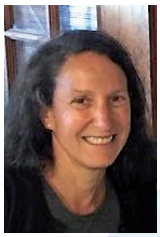

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IEA COMPASS

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The International Association for the Evaluation of Educational Achievement, known as IEA, is an independent, international consortium of national research institutions and governmental agencies, with headquarters in Amsterdam. Its primary purpose is to conduct large-scale comparative studies of educational achievement with the the aim of gaining more in-depth understanding of the effects of policies and practices within and across systems of education.

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