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Shoresh Research Paper

The Impact of Preschool Entry Age on Student Achievement

A comparison of Israel with leading countries in the PISA exams, 2015–2022

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Abstract

The educational continuum begins in preschool. Using data from PISA exams conducted between 2015 and 2022, this study examines the link between preschool entry age and subsequent student achievements, comparing this relationship in Israel with that found in countries with the highest student achievements. The findings show that entering preschool before age 5 improves scholastic outcomes. However, among Israeli students – particularly in the religious education stream – the achievement gaps between early entrants and those who started at the age of 5 or older are notably substantial. While in leading countries the gaps are larger among students whose mothers have academic degrees, in Israel no such correlation was found.

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Introduction

Early childhood is a critical period for cognitive and communication development, and for acquiring abilities that support problem-solving (U.S. Council of Economic Advisers, 2015) – in other words, skills essential for life success. The environment a child is exposed to in early childhood can significantly affect the development of these skills. In fact, it is important to maximize exposure to a nurturing environment, since the window for early learning narrows significantly as the child grows older, due to a sharp decline in brain plasticity at that stage (World Bank, 2018).

Preschools, as structured educational frameworks, serve as important social agents and play a central role in shaping child development. They can complement the investment parents make in educating their children by providing a diverse learning environment that supports holistic development – yielding significant benefits for the children, their parents, and society. Some benefits – such as higher parental employment and income – may be immediate, while others – such as improved scholastic achievement and higher future earnings – are realized in the longer term (U.S. Council of Economic Advisers, 2015). Preschools offer a cost-effective and efficient way to reduce achievement gaps before they solidify and widen, potentially mitigating the need for costly remedial education or other similar services. These services are designed to close these gaps but come at a higher expense (OECD, 2025).

Shavit et al. (2018) noted that lack of exposure to experiences and learning – often due to low socioeconomic status in early childhood – can lead to suboptimal sensory input that impairs brain development and cognitive development, leading to lower future scholastic achievements. They also argued that early, intensive intervention is far more effective than later efforts. Thus, human development may be viewed as a pyramid, with early childhood as the bedrock. This underscores the importance of early childhood education research, which is critical for identifying the roots of inequality in society.

A substantial body of literature documents the effects of early entry into the education system, attendance duration, and quality on later achievements. Del Boca et al. (2022) found that preschool attendance correlates with higher PISA scores at age 15, though the improvement peaks after 3-5 years of attendance.

Li et al. (2020) analyzed 67 evaluation studies from 1960 to 2007 and found that younger preschool entry age had significant positive effects, and that the effects were greater in early childhood programs with a shorter duration of attendance compared to programs with a longer duration.

Zontag et al. (2020) examined both duration and age of preschool attendance, finding that in Israel, more years in early childhood frameworks correlated with higher scholastic achievements through elementary, middle, and early high school. Furthermore, they found that entry into educational settings at very early ages (before age two) does not significantly contribute to future achievements, especially for Arab-Israeli children. Esping-Andersen et al. (2012) found that in Denmark, enrolling in high-quality frameworks at age 3 is associated with better cognitive achievements at age 11.

Several studies have explored the impact of preschools conditional on family socioeconomic status. Schweinhart et al. (2005) found that early childhood frameworks especially benefit children from disadvantaged backgrounds – in terms of intellectual and social development, school admission, crime reduction, and future economic success. Dietrichson et al. (2018) reported similar findings.

Esping-Andersen et al. (2012) reported that in Denmark, benefits were greater for disadvantaged children, whereas in the U.S., benefits for poor children faded by age 11 – likely due to poorer program quality.

Zontag et al. (2020) also found that in Israel, years spent in early childhood frameworks had a stronger effect for children whose mothers lacked academic degrees. Yet children from low-

income families may attend lower-quality programs or ones with fewer staff – due to costs or limited availability – potentially entrenching inequality (OECD, 2025).

Thus, the research findings in Israel and globally lead to two principal insights. The first is that investment in early childhood education yields substantial long run returns, reducing the need for greater future expenditures on welfare, remedial education and law enforcement. The second is that higher-quality preschools are a critical determinant in a child's future – leading to a higher likelihood of scholastic success and better jobs in the future, alongside a reduced probability of engaging in criminal activity or requiring welfare assistance.

These insights have elevated early childhood education to becoming a top priority for policymakers aiming to increase economic growth, enhance social mobility, and reduce inequality (OECD, 2019). Consequently, over the past two decades, many countries have substantially increased their investment in early childhood education and adopted curricula that foster children's development and well-being (OECD, 2025).

This study examines the link between student achievements and preschool entry age. The question is explored by comparing PISA scores of students entering preschool at different ages, with a separate focus on different education streams in Israel and comparisons with countries that lead in student achievements. The study also examines whether the importance of entry age varies with maternal education levels.

The importance of assessing literacy and educational outcomes, as measured by PISA tests, is twofold. First, in the current era, characterized not only by an abundance of information but also by high accessibility to it, acquiring tools and skills for information retrieval, filtering, and acquisition becomes a central pillar of the educational process. Second, as Barcelevsky et al. (2019) note, this literacy may be linked to students' future economic success, the type of employment they secure, and in a broader sense – impacting not just the individual, but the entire society and the nature of the country in which they live.

Data

In addition to data on the achievement scores, this study utilizes data based on background questionnaires accompanying the PISA exams.[1] The primary data point is based on students' responses to the question: "At what age did you begin attending preschool?"[2]. This question appeared in various formulations across different PISA cycles over the years. The analysis in this study uses data from the three most recent cycles – 2015, 2018, and 2022 – in which the wording of the question was identical (the majority of participants were born in 1999, 2002 and 2006, respectively).

Additionally, each student tested in Israel is linked to their respective school supervisory stream: secular (*mamlachti*), religious (*mamlachti-dati*), Arab-Israeli, Haredi, or Ministry of Labor supervision. This analysis focuses on the first three streams only. The latter two were excluded due to a relatively small number of observations, which do not allow for reliable analysis.

The five countries with the highest achievement levels in the PISA tests – Canada, Estonia, Finland, Japan, and Taiwan – were grouped together to provide a benchmark for comparison with Israel's findings. Each of these countries, in every one of the years, ranked among the top ten in average performance on the PISA exams. The average results of these five countries, heretofore referred to as the "leading countries," were also selected for comparison in a previous study (Savin, Kimhi, and Ben-David, 2023).

Approximately 19% of the Israeli students in the secular, religious, and Arab-Israeli education streams did not answer the question about preschool entry age, or responded that they did not remember. They were excluded from this study.

In the first stage of analysis, students were divided into two groups: those who entered preschool before age 5, and those who entered at age 5 or older – the age at which mandatory education in Israel began, prior to legal changes in 2012 that extended compulsory education to

[1] A detailed description of the PISA exams can be found in the Appendix.
[2] Not including daycares and home-based childcare.

ages 3-4. In the second stage, students were further divided based on their mother's education level.[3]

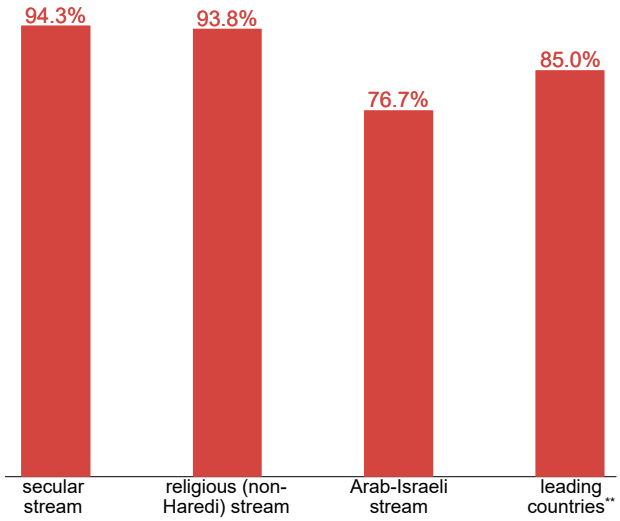
Preschool entry age and PISA achievement

Figure 1 shows that while the proportion of students who entered preschool before age 5 is particularly high among students in the secular and religious streams (approximately 94%), this proportion is lower among students in the leading countries (85%) and even lower among students in the Arab-Israeli stream in Israel (around 77%).

Figure 1

Share entering pre-K before age 5*

PISA exams, 2015-2022



* Percentages from complete sample.
** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Figure 2 presents the differences in average PISA scores between students who entered preschool before age 5 and those who entered at age 5 or later, shown in three ways and according to the target populations defined in this study. The left bar of each cluster shows the score gaps in the full sample before controlling for explanatory variables. The bar on the right reflects the score gaps after controlling for relevant explanatory variables, based on multivariate statistical analysis.

[3] An attempt was made to divide the sample into three groups based on age of entry into preschool: entry by age two, entry at ages three to four, and entry from age five and on. The coefficients for entry at ages three to four were statistically significant at the 1% level. In contrast, the coefficients for entry at ages one to two were significant only at the 5% and 10% levels for students in the religious and secular education streams, respectively, and were not significant at all for students in the top-performing countries and the Arab-Israeli education stream. Therefore, it was decided to group preschool entry age into only two categories, in which case all the coefficients were significant at the 1% level.

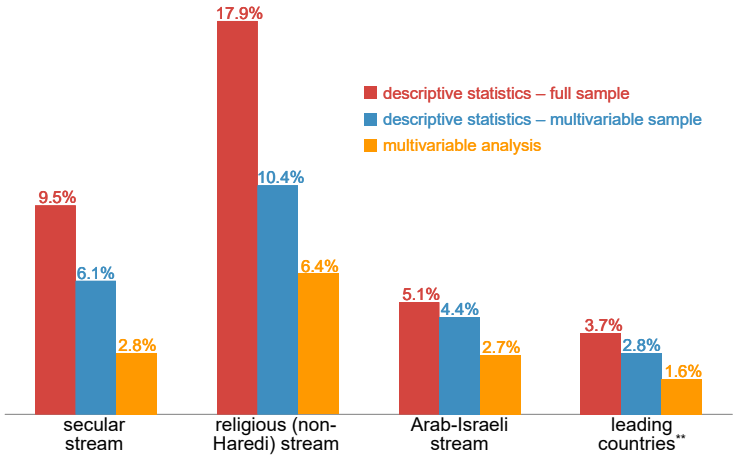
This analysis accounts for possible effects of socioeconomic and family background factors that may also influence student achievements (e.g., parents' education, number of books and computers at home, parents' countries of birth, etc.), as well as the relationship between preschool entry age and PISA scores.[4] The multivariate approach resulted in a significantly reduced sample size. Therefore, the middle bar in the figure represents descriptive score gaps in the reduced sample before controlling for these variables.

As shown in Figure 2, students entering preschool before age 5 had significantly higher average PISA scores than those who entered at age 5 or later. This gap is present across all three Israeli population groups, as well as the leading countries. The smallest gaps were found among students in the leading countries and the Arab-Israeli stream, while the largest gaps were among students in the religious stream.

Figure 2

Achievement gaps between those entering pre-K before age 5 and those beginning kindergarten at age 5 and up

PISA exams, 2015-2022*



* In the multi-variable analysis, all the coefficients are significant at the 1% level.

** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

The test was repeated with the reduced sample to allow for multivariate analysis. Here, before controlling for explanatory variables, the achievement gap among religious students was about 10% – nearly double that of secular stream students (6%), and about three times that of students in the leading countries (3%).[5] When comparing the full sample to the reduced sample, the gaps narrowed – especially for students in the religious stream.

[4] The descriptive statistics of the control variables are presented in Table A.1 in the appendix, and the full regression results are presented in Table A.2.

[5] The multivariate analysis was also conducted separately for each of the five countries, and the conclusion remained unchanged. In Taiwan, Canada, and Finland, the coefficients obtained were lower than those for the three supervision streams in Israel. In Japan and Estonia, the coefficients were higher than those obtained for the Arab-Israeli and secular streams, but lower than the coefficient for the religious stream.

Even after controlling for additional explanatory variables, the positive association between entering preschool before age 5 and PISA achievement persists.[6] The finding that this relationship is stronger among Israeli students from all three school streams than among students in leading countries did not change.[7] However, the estimated effect of age at preschool entry on achievement is smaller after controlling for additional variables across all population groups. This is likely because these variables are correlated with the age of preschool entry.

The conclusion: entering preschool before age 5 contributes to higher scholastic achievements, as reflected in PISA exam results. In other words, encouraging families from population segments whose children tend to have lower educational outcomes to enroll them in preschool before age 5 could help reduce nation-wide disparities.

Additional explanations for score gaps

The multivariate analysis revealed significant relationships between student achievements and explanatory variables such as parental education, the number of computers, and the number of books in the student's home. Notably, the link between student achievements and maternal education was more pronounced among students in the secular stream than among those in the religious stream.

As shown in Figure 3, the gap in average scores between students whose mothers had an academic degree and those whose mothers did not finish high school was 13% in the secular stream. By contrast, in the religious stream, this gap was not statistically significant and stood at just 3.5% – similar to the gap observed among students in the leading countries (4.0%, which was statistically significant). Even students whose mothers completed high school score higher than those whose mothers did not, though their performance is slightly lower than that of students whose mothers hold an academic degree.

[6] The analysis was conducted using a linear regression of the log of the average score. The regression coefficients represent the percentage difference in the log of the score between students who entered preschool before age 5 and those who entered at age 5 or older.

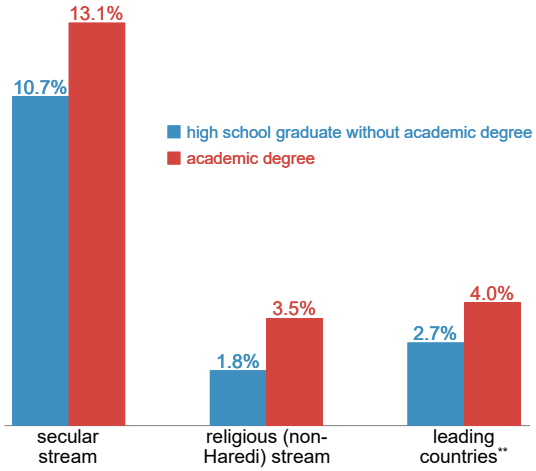
[7] The relevant coefficients are statistically significant at the 1% level across all four population groups.

Furthermore, the greater the number of books (Figure 4) and computers (Figure 5) at home, the higher the average PISA scores tended to be in all four population groups. This association was stronger among students in the secular and religious streams than among those in the leading countries.

Figure 3

Achievement gaps according to maternal education, relative to pupils whose mothers did not complete high school

controlling for additional explanatory variables, PISA exams, 2015-2022*



* The coefficients are significant at the 1% level in the case of the leading countries and in the secular stream. They are not significant for the religious stream.

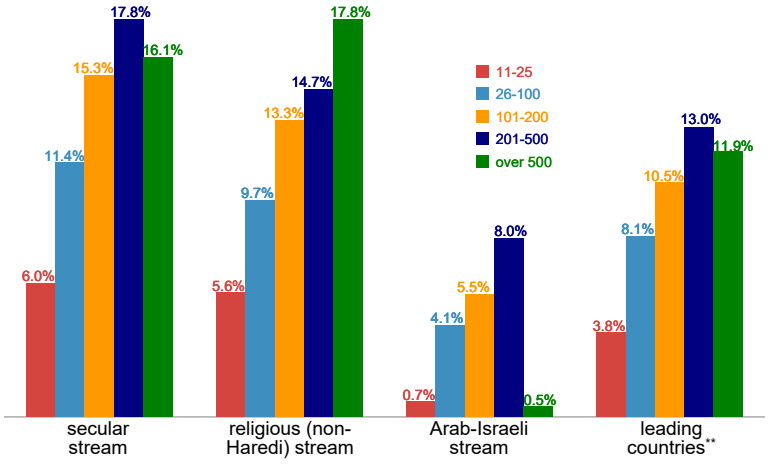
** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Figure 4

Achievement gaps according to number of books in home, relative to pupils reporting that there are less than 10 books in their home

controlling for additional explanatory variables, PISA exams, 2015-2022*



* Coefficients are significant at the 1% level in all but the following, which are not significant: religious stream with 11-25 books; Arab-Israeli stream with 11-25 books and over 500 books.

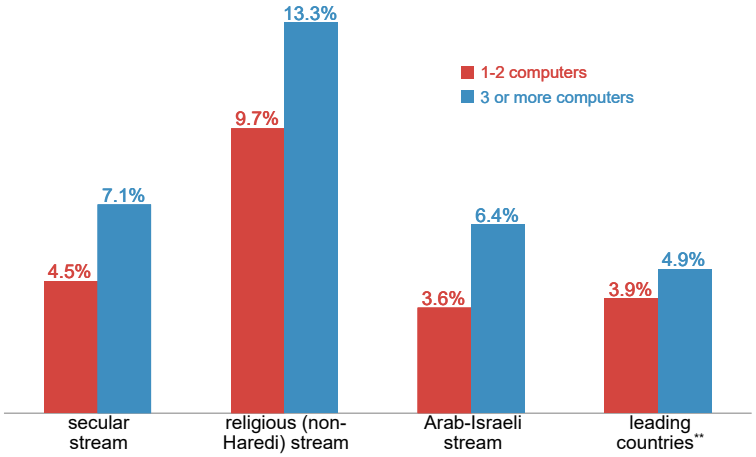
** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Figure 5

Achievement gaps according to number of computers in home, relative to pupils reporting that there are no computers in their home

controlling for additional explanatory variables, PISA exams, 2015-2022*



* Nearly all the coefficients are significant at 1% level while the remainder are significant at the 5% level.

** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Preschool entry age, mother's education, and PISA achievement

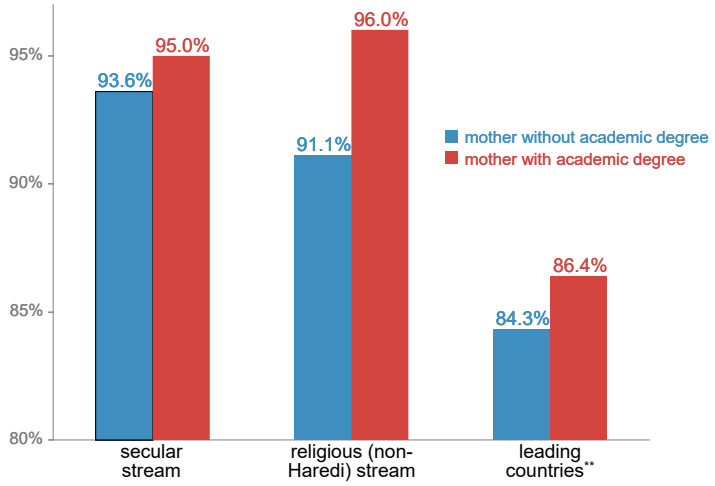
The results of the multivariate analysis described in Figure 3, as well as previous research on the subject (Savin, Kimhi, and Ben-David, 2023), highlight the link between parental education and students' achievements in the PISA exam. This raises the question of whether the age of preschool entry yields different outcomes for students whose mothers have an academic degree compared to those whose mothers do not. Students in the Arab-Israeli education stream were not included in this analysis due to large discrepancies between what students in this stream reported regarding their parents' education levels and administrative data reported by the Central Bureau of Statistics (Savin, Kimhi, and Ben-David, 2023).

Figure 6 shows that the percentage of students who entered preschool before age 5 is higher among students whose mothers hold academic degrees compared to students whose mothers do not, across all population groups. The largest gap – about 5 percentage points – was observed among students in the religious stream.

Figure 6

Share entering pre-K before age 5 according to maternal education*

PISA exams, 2015-2022



* Percentages based on the full complete sample.
** Finland, Japan, Taiwan, Canada and Estonia

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Figure 7 presents the average score gaps on PISA tests between students who entered preschool before age 5 and those who began at age 5, according to mother's education, in three ways: for the full sample, the reduced sample (i.e. just those observations included in the smaller multivariate analysis), and after controlling for characteristics using multivariate analysis.[8]

As shown in Figure 7, in all three population groups and across the three sample

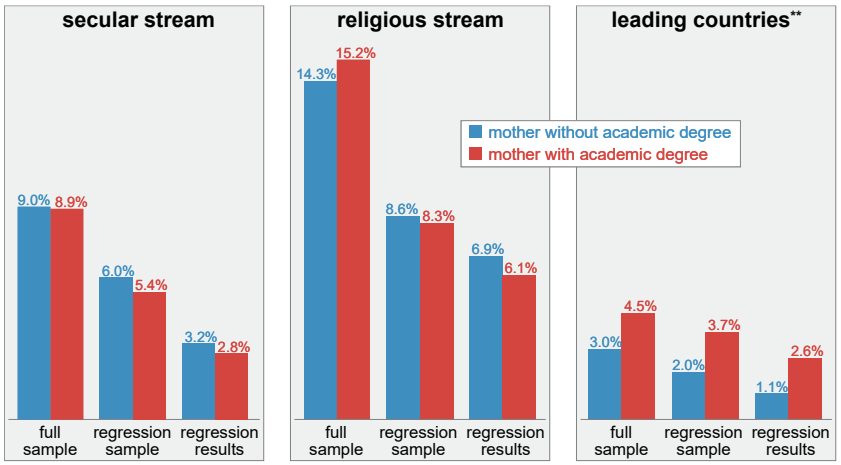
[8] Full results of the multivariate analysis appear in Table A.3.

cuts, the average achievements of students who entered preschool before age 5 are higher than those who began at age 5 – both among students with academically educated mothers and those without. Moreover, while among students in the leading countries, the achievement gaps – based on age of preschool entry – are larger among students with mothers holding academic degrees, the gaps tend to be greater among students whose mothers lack academic qualifications in the secular and religious streams. However, the differences between the groups are smaller.[9]

Figure 7

Achievement gaps between those entering pre-K before age 5 and those beginning kindergarten at age 5 and up

on basis of maternal education, PISA exams, 2015-2022*



* The multivariable (regression analysis is based on the reduced sample. The results reflect controls for additional variables.

** Nearly all the coefficients are significant at 1% level while the remainder are significant at the 5% or 10% levels.

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

In fact, the difference in achievement gaps based on age of preschool entry between students with academic mothers and those without is not statistically significant among Israeli students, whereas it is significant among students in the leading countries. These results differ from a widely accepted conclusion in the literature, which states that preschool attendance tends to be more beneficial for students from poor families (Dietrichson et al., 2018; Schweinhart et al., 2005).

[9] The multivariate analysis was also conducted separately for each of the leading countries. In each of the five countries, the coefficient was higher for students whose mothers have an academic background than for those whose mothers do not.

Summary

PISA test scores are higher among students who entered preschool before age 5, both in the leading countries and in Israel. The contribution of early preschool entry to student achievements is more pronounced in Israel – especially among students in the religious stream – than in the leading countries. While the achievement gaps (after controlling for explanatory variables) between those who entered before age 5 and those who started at age 5 are 1.6% in the leading countries, they are 2.7% and 2.8% in the secular and Arab-Israeli education streams, respectively, and reach 6.4% in the religious stream.

These differences may stem from the fact that socioeconomic gaps in Israel are larger than in the leading countries, and the cultural and linguistic diversity is greater. In such cases, preschool may compensate for educational and social disadvantages and offer early exposure to the prevailing culture and language, thereby helping to effectively navigate these challenges.

Another possible explanation lies in the differences between early childhood education frameworks in Israel and and those other countries. These include, for example, differences in the number of hours and days children spend in preschools, the age of transition from preschool to school, the curriculum, and the quality of the frameworks, such as the skills of the educational staff.

In the leading countries, early preschool entry yields greater benefits for students whose mothers hold academic degrees, whereas in Israel, the relationship between student achievements and age of preschool entry is not significantly differentiated between students with mothers with non-academic and academic backgrounds.[10] This study's findings highlight the importance of

[10] This result contrasts with the one of the analyses conducted by Zontag et al. (2020), which found that the positive effect of the number of years spent in early childhood education settings is stronger among children whose mothers do not have an academic education than among those whose mothers are academically educated. The data used in the study by Zontag et al. (2020) were based only on PISA test result from 2018 and did not distinguish between students in the secular stream and those in the religious stream. Furthermore, their data omitted students tested in grades other than 9th and 10th grades, and the dependent variable was the reading score alone. In both the Zontag et al. study and this one, Haredi students were not included. However, this study includes students tested in two additional PISA cycles (2015 and 2022), regardless of the grade level at the time of testing, and it distinguishes between students in the secular stream and those in the religious stream. As such, a broader dataset was used here, enabling analysis across a larger number of observations and educational institutions. In addition, the dependent variable in the current study was the average score across all three literacy domains, in order to analyze the full range of students' abilities.

participation in pre-school educational frameworks. Israeli students who entered preschool before age 5 scored higher on PISA tests, regardless of their background characteristics. This conclusion reinforces the importance of reforms that promote access to early childhood education across all population groups.

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Appendix: PISA exams

The international PISA exams focus on three core literacy areas: reading, mathematics, and science. The tested population is a representative sample of 15-year-old students.[11] The main goal of the PISA exam, as noted by Barcelevsky et al. (2019), is to evaluate the extent to which students can apply the knowledge and skills they have acquired to face challenges that they will encounter later in life. The exams also enable each country to assess the outcomes of its education system and to evaluate its students' achievements within a common international framework.

Since 2000, eight exam cycles have been conducted – one every three years.[12] (The exam results are calibrated to allow comparisons over time. As mentioned, the main explanatory variable in this study – the age of preschool entry – is based on answers provided by students in the background questionnaire in which they were asked at what age they started attending preschool. The study is based on data from the three most recent cycles – 2015, 2018, and 2022 – during which the wording of this question remained unchanged. However, the wording of other questions used as explanatory variables in the regressions changed over these years. These include, for example, parental education and the number of household electronic devices such as televisions and computers. For the purposes of the study, categories were unified to create a common scale for these questions.

[11] A detailed description of the exam can be found in http://www.oecd.org/pisa/aboutpisa

[12] Except for the most recent exam in 2022, which was delayed by the Covid pandemic.

Table A.1

Descriptive statistics (2015-2022)

regression sample

	leading countries	secular stream	religious stream	Arab-Israeli stream
average PISA score	534	513	508	402
preschool entry age				
one to four	86.1%	95.2%	96.2%	77.8%
five or more (benchmark group)	13.9%	4.8%	3.8%	22.3%
gender				
boys (benchmark group)	46.3%	46.2%	54.1%	44.8%
girls	53.7%	53.8%	45.9%	55.2%
mother's education				
did not completed high school (benchmark group)	3.9%	2.4%	5.0%	12.7%
completed high school, but no academic degree	62.2%	37.8%	31.9%	55.1%
academic degree	33.9%	59.8%	63.1%	32.3%
father's education				
did not completed high school (benchmark group)	5.5%	3.7%	6.4%	17.1%
completed high school, but no academic degree	50.8%	46.9%	38.7%	54.1%
academic degree	43.7%	49.4%	54.9%	28.8%
educational software				
yes (benchmark group)	44.6%	64.1%	58.1%	76.4%
no	55.4%	35.9%	41.9%	23.6%
internet connection				
yes (benchmark group)	95.4%	98.7%	96.1%	92.5%
no	4.6%	1.3%	3.9%	7.5%
dictionary				
yes (benchmark group)	94.1%	96.1%	95.7%	93.0%
no	5.9%	3.9%	4.3%	7.0%
works of art				
yes (benchmark group)	46.8%	72.2%	69.9%	60.4%
no	53.2%	27.8%	30.1%	39.6%
television				
none (benchmark group)	0.9%	1.5%	30.3%	2.5%
one-two	61.2%	27.9%	42.0%	51.0%
three or more	37.9%	70.6%	27.7%	46.5%
number of cell phones in student's home				
none (benchmark group)	0.6%	0.3%	1.2%	2.9%
one-two	9.7%	4.1%	8.7%	13.5%
three or more	89.7%	95.6%	90.1%	83.6%
number of computers in student's home				
none (benchmark group)	6.5%	1.1%	2.2%	8.3%
one-two	56.8%	33.2%	43.6%	51.1%
three or more	36.7%	65.7%	54.2%	40.6%
number of books in home				
0-10 (benchmark group)	11.0%	13.2%	6.7%	16.1%
15-25	14.8%	16.8%	7.5%	21.5%
26-100	33.6%	30.4%	20.5%	31.4%
101-200	18.7%	20.0%	18.1%	15.5%
201-500	14.9%	13.4%	20.9%	8.0%
more than 500	7.0%	6.1%	26.3%	7.5%
native-born student				
yes (benchmark group)	96.1%	95.0%	93.1%	97.4%
no	3.9%	5.0%	6.9%	2.6%
native-born mother				
yes (benchmark group)	90.4%	73.7%	73.2%	94.5%
no	9.6%	26.3%	26.8%	5.5%
native-born father				
yes (benchmark group)	91.7%	74.3%	70.6%	95.0%
no	8.3%	25.7%	29.4%	5.0%
country				
Canada (benchmark group)	18.7%			
Estonia	0.7%			
Finland	3.4%			
Japan	64.5%			
Taiwan	12.7%			
weighted number of observations	3,511,250	109,123	40,261	54,987

Table A.2

Regression results (2015-2022)

The natural logarithm of each student's average score as a function of age at entry into preschool and the control variables

	leading countries		secular stream		religious stream		Arab-Israeli stream	
preschool entry age								
before age five	0.016	***	0.028	***	0.064	***	0.027	***
gender								
girls	0.001		-0.006		0.003		0.064	***
mother's education								
completed high school, but no academic degree	0.027	***	0.107	***	0.018		0.009	
academic degree	0.040	***	0.131	***	0.035		0.053	***
father's education								
completed high school, but no academic degree	0.032	***	0.022	*	0.033		0.009	
academic degree	0.076	***	0.047	***	0.069	***	0.011	
educational software								
none	-0.008	***	0.002		0.004		-0.004	
internet connection								
none	-0.050	***	-0.117	***	-0.039	*	-0.053	***
dictionary								
none	-0.055	***	-0.024	**	-0.004		-0.093	***
works of art								
none	-0.001		-0.019	***	-0.010		-0.012	*
television								
one-two	-0.008		0.006		-0.025	**	0.016	
three or more	-0.041	***	-0.026		-0.074	***	-0.003	
cell phones								
one-two	0.020	***	0.015		-0.062		0.053	**
three or more	0.034	***	0.065		-0.056		0.121	***
computers								
one-two	0.039	***	0.045	**	0.097	***	0.036	***
three or more	0.049	***	0.071	***	0.133	***	0.064	***
number of books in home								
11-25	0.038	***	0.060	***	0.056	**	0.007	
26-100	0.081	***	0.114	***	0.097	***	0.041	***
101-200	0.105	***	0.153	***	0.133	***	0.055	***
201-500	0.130	***	0.178	***	0.147	***	0.080	***
more than 500	0.119	***	0.161	***	0.178	***	0.005	
native-born student								
none	-0.029	***	-0.041	***	-0.040	**	-0.088	***
native-born mother								
none	0.007	***	-0.002		-0.012		-0.021	
native-born father								
none	-0.008	***	-0.013	**	-0.024	**	0.020	
country								
Estonia	-0.006							
Finland	-0.016	***						
Japan	0.010	***						
Taiwan	0.032	***						
year								
2018	-0.017	***	-0.009	*	-0.031	***	-0.030	***
2022	-0.004	***	-0.029	***	-0.036	***	-0.014	
intercept	6.049	***	5.856	***	5.954	***	5.733	***
R2	0.161		0.221		0.243		0.194	
number of observations	94,326		6,315		1,837		3,244	
weighted number of observations	3,511,250		109,123		40,261		54,987	

statistical significance: * 10% level ** 5% level *** 1% level

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA

Table A.3

Regression results (2015-2022)

The natural logarithm of each student's average score as a function of age at entry into preschool interacted with the mother's level of education, and the control variables.

	leading countries		secular stream		religious stream		Arab-Israeli stream	
preschool entry age								
before age five	0.011	***	0.032	**	0.069	**	0.029	***
preschool entry before age 5 * mother has academic degree	0.015	***	-0.005		-0.008		-0.005	
gender								
girls	0.001		-0.005		0.003		0.064	***
mother's education (base group = no degree)								
academic degree	0.001		0.033		0.026		0.049	***
father's education								
completed high school, but no academic degree	0.038	***	0.042	***	0.039	**	0.011	
academic degree	0.082	***	0.066	***	0.074	***	0.012	
educational software								
none	-0.008	***	0.002		0.004		-0.004	
internet connection								
none	-0.050	***	-0.117	***	-0.039	*	-0.054	***
dictionary				***				
none	-0.055	***	-0.024	**	-0.005		-0.093	***
works of art								
none	-0.001		-0.019	***	-0.010		-0.012	*
television								
one-two	-0.008		0.005		-0.025	**	0.017	
three or more	-0.042	***	-0.027		-0.074	***	-0.003	
cell phones								
one-two	0.020	***	0.029		-0.062		0.053	**
three or more	0.035	***	0.078	*	-0.056		0.121	***
computers								
one-two	0.039	***	0.047	**	0.100	***	0.036	***
three or more	0.049	***	0.074	***	0.136	***	0.064	***
number of books in home								
11-25	0.039	***	0.061	***	0.056	**	0.007	
26-100	0.082	***	0.116	***	0.098	***	0.041	***
101-200	0.105	***	0.154	***	0.134	***	0.055	***
201-500	0.131	***	0.180	***	0.148	***	0.080	***
more than 500	0.119	***	0.162	***	0.179	***	0.005	
native-born student								
none	-0.028	***	-0.043	***	-0.041	**	-0.087	***
native-born mother								
none	0.004		-0.003		-0.013		-0.022	
native-born father								
none	-0.006	**	-0.014	**	-0.025		0.019	
country								
Estonia	-0.007							
Finland	-0.016	***						
Japan	0.010	***						
Taiwan	0.029	***						
year								
2018	-0.016	***	-0.009	*	-0.030	***	-0.030	***
2022	-0.003	**	-0.028	***	-0.036	***	-0.013	
intercept	6.071	***	5.918	***	5.956	***	5.737	***
R2	0.161		0.214		0.243		0.194	
number of observations	94,326		6,315		1,837		3,244	
weighted number of observations	3,511,250		109,123		40,261		54,987	

statistical significance: * 10% level ** 5% level *** 1% level

Source: Ayal Kimhi, Dan Ben-David and Ariela Savin, Shoresh Institution
Data: PISA