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**The Causal Effect of Parents' Childhood Environment  
and Education on Their Children's Education\***

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## **Abstract**

This paper examines the extent to which intergenerational correlations in educational attainment (and income) in Israel are due to nature versus nurture. Parents' age on arrival in Israel as child immigrants was used as an instrumental variable, focusing on the mass immigration from Asia and Africa immediately following the establishment of the State in 1948. This wave of immigration was largely non-selective and the age of the child immigrants on arrival was independent of their families' socioeconomic characteristics and their cognitive abilities.

Based on a rich data set, the study shows that the older the children were on arrival in Israel, the lower their level of educational attainment, which reflects the advantage very young immigrants had in achieving a successful absorption.

Our main finding is that there is no causal effect between, on the one hand, the environment in which parents from Asia-Africa grew up and their educational attainment, and their children's educational attainment on the other. The intergenerational correlation in years of schooling, however, was statistically significant at about 0.2, and may be the result of non-environmental effects, such as heredity. Nevertheless, we cannot rule out the possibility that affirmative action policies in allocating resources within the education system weakened the intergenerational causal correlation estimated in the study.

**JEL classification codes:** I20, J62

**Keywords:** intergenerational correlation, causation, education

## **ההשפעה הסיבתית של סביבת גידול ההורים והשכלתם על השכלת ילדיהם**

**נעם זוסמן ורוני פריש**

**תקציר**

המחקר בחן באיזו מידה המתאמים הבין-דוריים בהשכלה (ובהכנסה) בישראל משקפים קשר סביבתי-סיבתי, להבדיל מתרומת התורשה. לצורך כך נעשה שימוש במשתנה העוזר גיל העלייה לארץ של ההורים בשעה שהם היו ילדים צעירים, תוך התמקדות בהמוני ילדים-עולים שהגיעו לארץ מאסיה-אפריקה מיד לאחר קום המדינה. מדובר על עלייה שהייתה ברובה לא-סלקטיבית, וגיל העלייה בלתי תלוי במאפייני העולים ומשפחותיהם.

בהתבסס על מקורות מידע מגוונים המחקר מעלה כי ככל שאותם ילדים-עולים מארצות האיסלם הגיעו לארץ בגיל מבוגר יותר כך הם רכשו פחות השכלה, וזאת בשל היתרון של עולים צעירים מאוד ברכישת שפת המקום ובהתערות בארץ.

הממצא המרכזי הוא שלא ניתן להצביע על קשר סיבתי בין סביבת גידולם של ההורים יוצאי אסיה-אפריקה והשכלתם לבין השכלת ילדיהם. לעומת זאת, המתאם הבין-דורי הפשוט במספר שנות הלימוד של אותה קבוצה מובהק ועומד על כ-0.2. מכאן שהמתאם הבין-דורי הפשוט אינו נובע מהשפעת הסביבה. ואולם, לא ניתן לשלול את האפשרות שמדיניות העדפה מתקנת במשאבים במערכת החינוך בתוך הקבוצה הנחקרת פעלה להחלשת הקשר הבין-דורי הסיבתי הנאמד במחקר.

## **1. Introduction**

Many studies have shown the existence of a positive correlation between parents' education and income and their children's education. The intergenerational correlation works through two main channels: nature and nurture. The former is based on the idea that parents with a high level of ability will have a greater tendency to acquire education and this ability is genetically passed on to their children. The latter is based on the idea that parents with a high level of education and income will invest more resources in their children's education. This study investigates to what extent the intergenerational correlation in education and income observed in Israel reflects a causal environmental effect.

The issue is relevant for policy formulation since if the effect is causal then preferential allocation of public resources to the education of students from weak socioeconomic backgrounds will bear fruit in future generations and will reduce inequality over time; however, if the correlation is through nature, as opposed to nurture, then this policy will have an effect only in the current generation.

Conventional methods for isolating the effect of the environment from that of heredity involve either comparisons of identical twins or of adopted children to biological children, or the use of instrumental variables (such as compulsory schooling age).

This study adopts the instrumental variable method and uses age of parents on arrival in Israel as immigrants (up to age 12) in order to test the causal relation between, on the one hand, parents' childhood environment and their education, and the education of their children, on the other. The study focuses on the wave of immigration from Asia-Africa during 1949–51, following the establishment of the State, which involved a largely non-selective immigration of whole Jewish communities.

Studies in Israel and worldwide have shown that young immigrants have an advantage in acquiring the local language and in social integration relative to older ones, and thus have higher level of education. Such a phenomenon can be observed among immigrants to Israel from Moslem countries. Therefore the age on arrival in Israel, which is independent of parents' characteristics and their individual abilities, can be used as an instrumental variable for estimating the causal effect of parents' education and their childhood environment on the one hand and the education of their children on the other.

The main finding of the study is the apparent lack of causal relation between the childhood environment and education of the parents born in Asia-Africa and the education (and wages) of their children. In contrast, the intergenerational correlation in years of schooling is statistically significant and equal to about 0.2, and thus may be a result of non-environmental causes, such as heredity. However, one cannot rule out the possibility that affirmative action in the allocation of resources within the education system in favor of the children weakened the intergenerational causal effect estimated in the study. It should be emphasized that the main finding is not necessarily valid for populations with stronger socioeconomic backgrounds or for other periods.

The study is organized as follows: Section 2 presents a survey of the literature. Section 3 describes immigration to Israel following the establishment of the State. Section 4 discusses methodology and Section 5 describes the database. Section 6 presents the results of the estimation and is followed by the Conclusion.

## **2. Survey of the Literature**

In order to identify the causal relation between parents' education and that of their children, researchers have used the following main methods:<sup>1</sup> 1) Inclusion of variables representing parents' ability in the estimations. 2) Twin parents (or siblings). 3) Adopted children. 4) Panel data for parents who went back to school and subsequently gave birth again. 5) Instrumental variables. Method 2 utilizes identical twins, who have the same genetic makeup, and tests the relation between their levels of education and those of their children who grew up in separate homes (Behrman and Rosenzweig, 2002; Antonovics and Goldenberger, 2005). Method 3 tests the relationship between parents' education and that of their adopted children in comparison to their biological children, and in this way isolates the influence of heredity from that of a common childhood environment (Bjorklund et al. 2004, 2006; Plug, 2004; Sacerdote, 2004; and Liu and Zeng, 2009). Method 4 identifies mothers who gave birth before acquiring additional education and had more children subsequently, thus making it possible to neutralize the effect of the mothers' cognitive and other traits (Rosenzweig and Wolpin, 1994). The general

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<sup>1</sup> For a brief survey of the various methods see Harmon and Walker (1995), Oreopoulos et al. (2003) and Holmlund et al. (2008).

conclusion from the studies using Methods 1-4 is that heredity explains the lion's share of intergenerational correlation in education.

### Instrumental Variables

One common method for identifying the causal relation between parents' education and that of their children is instrumental variables (see section 4 for further discussion of the methodology).

Changes in the compulsory schooling age is a widely accepted instrumental variable. Black et al. (2003) found that in Denmark each additional year of parents' schooling increases their children's years of schooling by between 0.04 and 0.11 years. However, the effect was significant only between uneducated mothers and their sons and had a magnitude of only 0.12 in that case. Similar results (a correlation of 0.06 for uneducated mothers) were found for Sweden by Holmlund et al. (2008). Oreopoulos et al. (2003) concluded that in the US an increase of one year in parents' schooling reduces the probability that their children up to the age of 15 will stay behind a year in school by between 2 and 7 percentage points and reduces dropping out from school at older ages. Chevalier (2004) found that in Britain each additional year of a mother's schooling raises the chance of her children staying in school after the compulsory schooling age (i.e. 16) by 4 to 8 percentage points; however, he did not find a similar effect in the case of the father. Maurin and McNally (2005) used a one-time lowering of criteria for acceptance into universities in France in 1968, due to the student riots, as an instrumental variable. The authors found that each additional year of the father's schooling reduced the number of repeated years for their 15-year-olds children by 0.3 of a standard deviation.<sup>2</sup>

Beenstock (2002) estimated the intergenerational relation in education (income) for Israel by using parents' continent of origin, among others variables, as an instrumental variable for estimating their level of education. He found that an additional 10 percent in parents' education (income) leads to an increase of 0.25 (1.0) percent in the education (income) of their children.

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<sup>2</sup> Currie and Moretti (2003) used the opening of colleges nearby, which increased accessibility to the higher education system, as an instrumental variable, and found a positive contribution of the mother's education to the health status of her children. Another method used by the authors involves testing for differences in the health status of children born to those same mothers before and after they obtained additional education, as in method 4 mentioned above.

In most of the studies, it was found that the influence of the mother's education on the education of her children was larger than that of the father. The studies also show that the intergenerational correlation in education is stronger between mothers and their daughters and between fathers and their sons, which is a result of role model considerations.

#### Age on Arrival as an Instrumental Variable

Studies have shown that the scholastic achievement of immigrants declines as age on arrival increases, primarily because the ability to acquire the local language declines with age due to cognitive and biological factors. Some of the studies point to the existence of a certain threshold age beyond which there is a drastic drop-off in the ability to acquire a new language and estimates of this age vary widely from 5 to 15 years; In contrast, other studies indicate a monotonic drop with age in the ability to acquire a new language and therefore also in the level of education (Schaafsma and Sweetman, 2001; Hakuta et al., 2003; Bohlmark, 2008; Chiswick and Miller, 2008). Overall, no major differences were found between girls and boys, and in addition the drop-off in scholastic achievement in math was less than that in other areas, such as verbal comprehension, which requires a higher level of fluency in the local language.

Chan et al. (2001) showed that for Israeli Grade 8 immigrant students—both girls and boys—during the period 1966–70, the older a child is on arrival (beyond age 6–7) the lower are his scores on nationwide exams (which are similar to the international exams, such as PISA). This was especially true on verbal exams relative to others exams, such as math, and there was a considerable drop in scores among individuals who had immigrated to Israel at age 12–13.

Levin et al. (2003) showed that among immigrants from the Former Soviet Union who arrived to Israel in the early 1990s and who were tested by the authors in Grade 9, there is a drop in scholastic achievement as age on arrival increases. The drop in achievement on the Hebrew (math) exam was particularly pronounced among children who arrived at the age of 10 (12) or later.

We chose to focus on immigrants from Asia-Africa who arrived in Israel as children immediately following the establishment of the State in 1948. The reason for this, which will be discussed at greater length in the following section, is that for the most part

immigrants from Asia-Africa arrived in Israel as part of whole Jewish communities and their age on arrival was independent of their individual characteristics. The study did not include immigrants from Europe during that period since they were mainly Holocaust survivors and the extent of their exposure to the Holocaust, which may have had a significant effect on their life outcomes and those of their children, is unknown to us.<sup>3</sup>

Table 1 presents statistics on levels of education, wages and fertility among parents born during the period 1938–51, who immigrated to Israel from Asia-Africa during the period 1949–51, broken down by age on arrival, and the level of their children's education. The level of education among both fathers and mothers declines as age on arrival increases, particularly in the 10–12 age group, as does their monthly wage. Fertility among mothers increases with age on arrival, which is notable among women who arrived at the age of 10-12 (see also Okun, 1997).

The older parents from Asia-Africa were on arrival in Israel, particularly 10–12 years old, the lower is the proportion of their children who hold a first degree or higher. However, children of parents who arrived in Israel at a later age were on average born earlier and therefore entered the education system before the children of younger immigrants, during a period in which the proportion of students in higher education was relatively low. In order to reduce the effect of the upward trend over time in the proportion of students in higher education, we focus on children born during the period 1965–74. In that group the older were the mothers on arrival, the lower was the proportion of their daughters who attained a higher education. Such a phenomenon was not observed among their sons, but the proportion achieving matriculation declines somewhat.

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<sup>3</sup> Immigration to Israel from other continents was negligible during the years following the establishment of the State.



**Table 1. Education, wages and number of children for immigrants to Israel and their children's level of education, according to age on arrival<sup>1</sup>**

		<b>1-3</b>	<b>4-6</b>	<b>7-9</b>	<b>10-12</b>
Years of schooling	Fathers	10.6	10.5	10.3	9.5
	Mothers	10.5	9.8	8.8	7.2
High school graduates or higher (percent)	Fathers	51.4	50.2	48.0	40.5
	Mothers	50.6	41.4	32.3	22.9
Monthly wage in 1995 (thousands of shekels)	Fathers	4.6	5.2	4.2	3.9
	Mothers	2.9	2.8	2.5	2.3
Number of children	Mothers	3.6	3.9	3.9	4.3
	Education of children, According to mother's age on arrival				
Years of schooling for those born prior to 1976	Sons	13.4	13.1	13.1	13.0
	Daughters	13.8	13.6	13.6	13.4
University graduates for those born prior to 1976 (percent)	Sons	17.8	17.2	18.3	16.7
	Daughters	30.0	26.8	26.4	21.4
Years of schooling for those born during 1965–1974	Sons	13.3	13.1	13.1	13.1
	Daughters	13.7	13.6	13.6	13.4
University graduates for those born during 1965–74 (percent)	Sons	19.2	18.0	19.8	19.3
	Daughters	29.8	28.9	28.5	26.5
Matriculation certificates for those born during 1965–74 (percent)	Sons	49.8	44.6	46.9	43.7
	Daughters	57.5	54.6	54.8	54.6

**Source:** The Central Bureau of Statistics and authors' calculations.

1) Immigrants who were born during 1938–51 and arrived in Israel during 1949–51.

Parents' age on arrival affects not only their level of education but also their welfare. The reason is that immigrants who arrived at a young age—and particularly those from Third World countries such as those in Asia-Africa—were exposed for a longer period to an environment in Israel which for most of them was superior in terms of quality of public services (such as education and health services) and living conditions to that in their country of origin, particularly since conditions in Israel improved significantly over time (see section 3). Furthermore, their prolonged exposure to the Hebrew language, and fast socialization process, assisted them in a variety of areas, such as employment opportunities, and even significantly raised their chances of marrying a native Israeli or an immigrant from Europe-America whose socioeconomic status was in general superior to their own.

The influence of child's environment on his development and behavior patterns has received renewed interest among researchers during the last decade as a result of the

Moving to Opportunity program implemented in the US. As part of the program, families with a low socioeconomic status who live in public housing in disadvantaged neighborhoods participate in a lottery for rent subsidies in better neighborhoods. Evaluation Studies indicate that the movement to a better neighborhood led to an improvement in health and behavior among the children and a reduction in their exposure to crime (Katz, Kling, and Liebman, 2001; Ludwig, Duncan and Hirschfield, 2001). However, the results for the children's levels of scholastic achievement were mixed: Ludwig, Ladd and Duncan (2001) found a positive effect two to three years after the start of the program among elementary school children in Baltimore, as did Leventhal and Gunn-Brooks (2004) among boys in elementary school in the New York program, but Sanbonmatsu et al. (2006) did not find any effect four to seven years after the start of the program in all locations in the US and at all levels of education.

Gould, Lavy and Paserman (2008) found that among children who immigrated from Yemen to Israel during the years 1949–50, those who grew up in Israel under relatively good conditions (in terms of sanitation and residence in an urban area and not among the Yemenite community) obtained a higher level of education in the long run. They also married at an older age and had fewer children, had higher rates of employment and were more likely to be working in a white-collar occupation. Their children attained a higher level of education than the children of immigrants who grew up under inferior conditions.

Parents' childhood environment may have a significant impact on fertility and therefore on the life outcomes of their children. Until recently, findings indicated that there is a negative correlation between number of siblings and a child's life outcome (given birth order), primarily because the competition among the children for the family's resources is more intense. Current studies have looked at the *causal* effect of family size on the success of children according to various measures, such as level of education and wage. The various studies (Black et al., 2005; Caceres-Delpiano, 2006; Conley and Glauber, 2006; Angrist et al. 2008) found at most only a weak relation between family size and the children's success in life.

### **3. Immigration to Israel following the establishment of the State**

Prior to the establishment of the State, the Jewish population in Israel numbered more than 600 thousand, 90 percent of whom were of Eastern European origin. During the period 1948–1952, following independence, more than 700 thousand immigrants arrived in Israel. Most of them came from Moslem countries or were Holocaust survivors from Europe.

There were about one million Jews living in the Moslem countries prior to the establishment of the State. They immigrated to Israel for a number of reasons: the awakening of Arab nationalism and the conflict with the Zionist movement and later with the State of Israel; the process of modernization which affected their means of livelihood; and Zionist and religious motives. During the period 1949–51, about 330 thousand immigrants came to Israel from Asia and Africa, primarily from the following countries (in thousands): Asia – Iraq (123), Yemen (40), Turkey (30) and Iran (22); Africa – Morocco, Algeria and Tunisia (39) and Egypt and Libya (39). The rescue operations from Iraq and Yemen brought almost the whole Jewish community in those countries to Israel. In contrast, it was mainly Jews from low socioeconomic backgrounds who immigrated to Israel from among the half a million Jews in North Africa. As a result, in late 1951 restrictions were imposed on immigration from there. Two additional waves of immigration from North Africa were in 1954–56 and in the early 1960s.

Following the Holocaust, there remained about one million Jewish survivors in Europe, of whom about 250 thousand immigrated to Israel during the period 1949–51.

For a number of reasons this study focuses on immigrants who arrived during the period 1949–51: First, during the War of Independence, which ended in January 1949, there was full military mobilization and disruptions in the routine of the civilian population, which affected the process of absorbing immigrants; second, as already mentioned, the immigration of individuals from a low socioeconomic background was restricted in late 1951; and third, during the subsequent period, the policy of population dispersal was accelerated (see Lipshitz, 1998), which had significant negative effects on the future of those being settled in the periphery.

Immigrant families from Asia-Africa had a lower socioeconomic status than immigrants from Europe (see Table 2) – they had larger families, the parents had less

education, a relatively small proportion of the men had skilled occupations in their country of origin and they had lower rates of employment.

Immigrants from Europe were excluded from the research primarily because they were mainly Holocaust survivors and we do not possess information on the extent of their exposure to the Holocaust, which is likely to have affected their life outcomes in Israel and those of their children.

**Table 2. Socioeconomic characteristics of immigrants who arrived to Israel during 1948–52 (percent)**

		Asia-Africa	Europe
Family size		4.0	2.8 <sup>1</sup>
Children under the age of 14		37.5	28.4 <sup>1</sup>
High school graduates or higher	Men	8.5	23.1
	Women	3.0	21.2
Occupation of the men in their country of origin <sup>2</sup>	Administrative	12.8	13.2
	Professionals <sup>3</sup>	4.5	9.8
Income earners		44.6	73.0

**Source:** Sicon (1957a, 1957b), Yablonka (2001).

1) Including a negligible number of immigrants from America.

2) Immigrants who arrived during 1948–50.

3) Medicine, education and engineering.

During the 1950s, there was a significant improvement in the accessibility to and quality of various public services. The rates of attendance in Jewish high schools increased, particularly in academic schools and among girls, and the proportion of students achieving matriculation rose dramatically. There was a sharp drop in morbidity, including, for example, from infectious diseases such as dysentery and typhus, and in mortality, including infant and child mortality. There was also a rapid expansion in the supply of health services, such as the growth in the number of hospital beds per thousand residents, the rate of membership in the health funds and the distribution and use of baby clinics.

Similarly, there was a significant improvement in housing conditions, primarily due to the accelerated closing of transit camps starting in 1952 and the large-scale construction of urban neighborhoods and expansion of development towns and communal settlements.

The result of the abovementioned process was that immigrants who arrived at a young age were not just exposed to better public services and living conditions than in their country of origin but in addition the environmental conditions in which they grew up were in a continual process of rapid improvement.

#### 4. Methodology

A typical equation of intergenerational relation between parents' education and that of their children takes the following form:

$$(1) \quad S_i^C = \alpha + \beta S_i^P + \alpha_1 X_i^C + \alpha_2 X_i^P + \varepsilon_i$$

Where:

$S_i^C$  – Education of a child in family i

$S_i^P$  – Education of the child's parents

$X_i^C$  – Basic characteristics of the child such as gender and age

$X_i^P$  – Basic characteristics of the child's parents such as gender and age

The estimate  $\beta$  represents the correlation between parents' education and that of their children. However, this estimate is not evidence of causality and therefore age on arrival in Israel is used as an instrumental variable.

The study focuses on Jewish parents born during the period 1938–1951, who immigrated to Israel during the years 1949–1951, i.e. who were aged 0–12 on arrival, and their children. These immigrants did not choose the timing of their immigration and from their point of view their age on arrival in Israel is an exogenous variable. As explained in detail above, immigration from Asia-Africa during this period involved for the most part whole communities and therefore was mainly non-selective.

There are two reasons for choosing immigrants who were aged 0–12 on arrival: 1) Studies carried out in Israel (Staub, 1990; Chan et al., 2001; Levine, 2003) have shown that, as mentioned above, the age of young children on arrival in Israel has an effect on their scholastic achievement; and 2) The vast majority of immigrants who arrived at the age of 13 or older essentially completed their studies before immigrating and therefore

their age on arrival had only a minor effect, if any, on their acquisition of education in Israel. The reason for this is that the Compulsory Education Law during that period only applied until the end of elementary school (i.e. Grade 8 or until the age of 13–14) and as a result only about 60 percent of the relevant age cohort attended Grade 8 during the 1951–2 school year. In Grade 9, only about 40 percent attended school and this figure declined significantly for higher grades.

Following is a formal presentation of the Two-Stages Least Squares (TSLS) estimation used to test the effect of parents' education and childhood environment on the education of their children. The instrumental variable used is age on arrival in Israel.

The first-stage equation for parents' (P) education in family  $i$  is as follows:

$$(2) \quad S_i^P = \alpha + \beta AGE_i^P + \gamma X_i^P + \delta IM_i^P + \varepsilon_i$$

Where:

$S^P$  – Parent's education

$AGE^P$  – Parent's age on arrival in Israel

$X^P$  – Parent's basic characteristics such as gender and country of origin

$IM^P$  – Parent's year of arrival

The inclusion of age on arrival in Israel for immigrants who arrived during the period 1949–51, and were aged 0–12 at the time, essentially controls for year of birth and therefore also for the upward trend in the quality of public services and living conditions over time. This trend is likely to have a positive effect not only on the acquisition of education by the parents but also on additional aspects of their lives, as will be described below.

The second-stage equation for a child's (C) education in family  $i$  is as follows

$$(3) \quad S_i^C = \alpha + \lambda \hat{S}_i^P + \eta X_i^C + \mu BIRTH_i^C + \varepsilon_i$$

Where:

$S^C$  – Child's level of education

$\hat{S}^P$  – Predicted level of parent's education (from the first-stage equation)

$X^C$  – Child's gender

$BIRTH^C$  – Child's year of birth (time trend)

The inclusion of the child's year of birth in the second stage makes it possible to control for a time trend in the development of the education system (as well as other public services and environmental conditions) which had an effect on the children's education. Notice that the estimation does not include variables that are likely to explain children's education but which are also likely to be correlated with their parents' education (such as number of siblings and parents' income) since we are interested in the estimation of the overall environmental influence of parents' education on the education of their children, which includes the effect through intermediary variables.

Another issue that arises in the second-stage estimation is the inclusion of the other spouse's education. If it is omitted from the estimation, the estimate of the parent's education includes its direct effect and an indirect effect that is the result of the correlation due to assortative mating.

## 5. Data

The study's population consists of individuals born between 1938 and 1951 in Israel and who arrived in Israel during the period 1949–51 and were aged 0–12 on their arrival (herein: the parents). In the second stage, the 2004 Population Registry was used to locate their children aged 7–29 in 1983 who were alive at 2004 and at least one of their parents had answered a full questionnaire during the Population and Housing Census in 1983 and/or 1995 which was carried out randomly among one-fifth of households.<sup>4</sup> The selection of individuals who were at least 7 years old in 1983 is meant to ensure that at the end of the sample period, i.e. 2004, when they were 28 years old, almost all of them would have had enough time to complete their education. The maximum age of the

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<sup>4</sup> A description of the process of collation between the Population Registry and the censuses can be found in Agnrist et al. (2008).

children in 1983 is 29 since their parents would have been born no earlier than the late 1930s. The sample includes about half a million daughters and sons and about the same number of mothers and fathers.

Parents' and children's socioeconomic characteristics, including education and income, were obtained from the census. Demographic information was also obtained from the Population Registry.

Additional information on the children's education was obtained from two sources: the Education Registry which includes the highest degree obtained by graduates of Israeli higher education institutions from 1989 onward, and the Ministry of Education file of pupils for the years 2005–6 which provided the children's years of schooling, according to their oldest sons or daughters report.

It should be mentioned that one of the most common problems in estimating the intergenerational correlation in education is measurement error in the level of education, which usually is based on self-reporting. In contrast, the Education Registry is not subject to measurement error. Moreover, children's education is almost free of truncation problem.

## **6. Estimation results**

This section presents the results for the estimation of the causal intergenerational relation in education between Jewish parents born during the period 1938–51, who immigrated from Asia-Africa during the period 1949–51, and their children's education, using age on arrival in Israel as an instrumental variable. First, the results of the first-stage estimation will be presented for parents' education and fertility.

Table 3 shows that an increase of one year in age on arrival reduces the mother's years of schooling by an average of 0.3 years (Model 1) and this effect is stronger when the age on arrival is 10–12. Mothers who arrived in this age group have about 3 years less schooling than mothers who arrived at age 1–3 (Model 2). The specific year of arrival during the period 1949–51 has no significant influence on years of schooling. Among fathers, the age on arrival has a much weaker effect on years of schooling than among mothers.



The instrumental variable's explanatory power is strong – the difference between the adjusted  $R^2$  and the adjusted  $R^2$  for estimation without age on arrival is much larger than the required value, and the value of the F-test for age on arrival is much larger than 10 (Bound et al., 1995).

**Table 3. First-stage equation:**

**The effect of age on arrival on years of schooling among immigrants from Asia-Africa during 1949–51 (standard deviation in parentheses)<sup>1</sup>**

		Mothers		Fathers	
		Model 1	Model 2	Model 1	Model 2
Age on arrival		-0.322*** (0.014)		-0.139*** (0.013)	
Age on arrival – grouped (relative to ages 1-3)	4-6		-0.618*** (0.131)		-0.022 (0.127)
	7-9		-1.490*** (0.136)		-0.440*** (0.131)
	10-12		-2.926*** (0.133)		-1.232*** (0.127)
Year of immigration (relative to 1949)	1950	0.067 (0.146)	0.063 (0.146)	-0.179 (0.139)	-0.186 (0.139)
	1951	-0.087 (0.160)	-0.131 (0.160)	-0.113 (0.152)	-0.128 (0.152)
Country of origin		V	V	V	V
Constant		11.519*** (0.184)	10.722*** (0.180)	11.532*** (0.173)	11.053*** (0.172)
Number of observations		6,285	6,285	5,954	5,954
Adjusted $R^2$		0.096	0.095	0.032	0.037
Adjusted $R^2$ without age on arrival		0.017	0.017	0.014	0.014
F-test: parent's age on arrival = 0		506	169	111	43

Source: Central Bureau of Statistics and authors' calculations.

1) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.

Age on arrival in Israel affected not only parents' education but also their fertility. Table 4 shows that increase of one year in the mother's age on arrival raises her average fertility by about 0.06 children (Model 1). The effect was even more pronounced among those aged 10–12 on arrival who had 0.67 more children relative to mothers who were aged 1–3 on arrival (Model 2).

Adding the father's characteristics to the estimation essentially takes into account the correlation due to assortative mating and the direct effect that the father may have on

family size. As a result, the contribution of the mother's age on arrival to fertility is weakened. An F-test shows that the explanatory power of the instrumental variable, i.e. age on arrival, is reduced significantly.

Tables 5 and 6 present the results of the reduced form estimation for the relation between the parents' age on arrival in Israel and their children's years of schooling.

Estimation of this relation between mothers and their children (Table 5), without taking into account the children's year of birth, shows a negative correlation, in particular among children of mothers who were aged 10–12 on arrival in Israel. However, when the children's year of birth is added to the estimation, such that the upward trend in rates of school attendance over time is taken into account, the effect of mother's age on arrival on her children's education disappears. The exception is daughters of mothers who were 10–12 years old on arrival. If we focus on children born during the period 1955–74 and omit the small number of children born to very old or very young mothers, the effect among this latter group also disappears. A similar picture is obtained from Table 6 which relates to fathers and their children.

Similar reduced form estimations using ordered probit method, in which the dependent variable is the children's years of schooling category (for example, 12 years or less, 13–15 and 16 years or more), also indicated that that parents' age on arrival did not have an effect on their children's education.<sup>5</sup>

In addition, the first-stage and reduced form equations were estimated for immigrants from *Iraq* only, who constituted about one-third of total immigrants during the period 1949–51. This eliminated the need to deal with the possibility of heterogeneity in the effect of age on arrival according to country of origin. Table A1 (Part A) in the Appendix shows that the older were immigrant children from Iraq on arrival in Israel, the less education they acquired, especially so for mothers, and in this case as well the age on arrival did not have an effect on children's education (Part B of the table).

The above results imply that among immigrants from Asia-Africa who arrived at a young age immediately following the establishment of the State, there is no causal intergenerational relation between their education (and their childhood environment) and their children's education.

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<sup>5</sup> The results are available from the authors.

For purposes of comparison, the correlation in years of schooling between immigrants and their children is in the range of 0.16–0.19 (Table 7) and therefore may be a result of non-environmental factors, such as heredity.

Children's schooling doesn't reflect differences in the quality of education which may affect children's income. Therefore, a reduced form equation was estimated for the log of the children's monthly wage for 2003 and 2004 separately and for the average over the period 1999–2004. The results imply that the children's income was not affected by their parents' age on arrival in Israel either.<sup>6</sup>

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<sup>6</sup> The results are available from the authors.

**Table 4. First-stage equation:**

**The effect of age on arrival on fertility among immigrants from Asia-Africa during 1949–51 (standard deviations in parentheses)<sup>1,2</sup>**

		<i>Without fathers' characteristics</i>		<i>With father's characteristics</i>	
		Model 1	Model 2	Model 1	Model 2
Age on arrival		0.062*** (0.006)		0.029** (0.012)	
Age on arrival – grouped (relative to ages 1–3)	4-6		0.274*** (0.061)		0.155* (0.083)
	7-9		0.247*** (0.064)		0.034 (0.097)
	10-12		0.663*** (0.062)		0.332*** (0.108)
Year of immigration (relative to 1949)	1950	-0.028 (0.068)	-0.027 (0.068)	-0.076 (0.093)	-0.076 (0.093)
	1951	0.085 (0.075)	0.094 (0.074)	0.043 (0.101)	0.051 (0.101)
Country of origin		V	V	V	V
<b>Father's characteristics:</b>					
Age				-0.014 (0.010)	-0.013 (0.010)
Continent of origin	Asia- Africa			0.356 (0.525)	0.334 (0.524)
	Europe- America			-0.094 (0.545)	-0.118 (0.544)
Age on arrival x Asia-Africa				0.013 (0.008)	0.013 (0.008)
Age on arrival x Europe-America				-0.009 (0.014)	-0.009 (0.014)
Years of schooling				-0.073*** (0.009)	-0.074*** (0.009)
Monthly wage (in 1995)				-8.1 E-7** (3.6 E-7)	-7.7 E-7** (3.7 E-7)
Constant		3.265*** (0.085)	3.336*** (0.083)	4.260*** (0.451)	4.630*** (0.770)
Number of observations		5,346	5,346	2,493	2,493
Adjusted R <sup>2</sup>		0.071	0.075	0.133	0.136
Adjusted R <sup>2</sup> without mothers' age on arrival		0.055	0.055	0.132	0.132
F-test: mothers' age on arrival = 0		92	39	6	5

**Source:** Central Bureau of Statistics and authors' calculations.

1) On the basis of the 1995 Population and Housing Census at the time of which all the mothers were 44 years old or older.

2) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.

**Table 5. Reduced form:**

**The effect of the *mother's* age on arrival on her children's years of schooling –**

**Immigrant mother from Asia-Africa during 1949–51**

(standard deviations in parentheses)<sup>1</sup>

		Sons			Daughters		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
		Total	Total	Born in 1955-74	Total	Total	Born in 1955-74
Age on arrival – grouped (relative to ages 1–3)	4-6	-0.292*** (0.113)	-0.073 (0.114)	-0.086 (0.117)	-0.174** (0.087)	-0.041 (0.087)	0.038 (0.092)
	7-9	-0.246** (0.113)	0.088 (0.116)	0.097 (0.119)	-0.167* (0.088)	0.018 (0.090)	0.060 (0.095)
	10-12	-0.398*** (0.109)	-0.011 (0.117)	-0.007 (0.120)	-0.449*** (0.085)	-0.204** (0.092)	-0.138 (0.096)
Child's year of birth <sup>2</sup>			V	V		V	V
Mother's country of origin		V	V	V	V	V	V
Mother's year of arrival		V	V	V	V	V	V
Constant		13.52*** (0.146)	12.00*** (1.51)	13.92*** (0.155)	13.82*** (0.12)	13.61*** (1.13)	13.85*** (0.124)
Number of observations		5,670	5,670	5,495	6,085	6,085	5,679
Adjusted R <sup>2</sup>		0.007	0.035	0.027	0.010	0.026	0.017

**Source:** Central Bureau of Statistics and authors' calculations.

1) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.

2) A dummy variable for date of birth during 1955–59, 1960–64, ..., 1975–79.

**Table 6. Reduced form:**

**The effect of the *father's* age on arrival on his children's years of schooling –**

**Immigrant fathers from Asia-Africa during 1949–51**

(standard deviations in parentheses)<sup>1</sup>

		Sons			Daughters		
		Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
		Total	Total	Born in 1955-74	Total	Total	Born in 1955-74
Age on arrival – grouped (relative to ages 1–3)	4-6	0.014 (0.104)	0.137 (0.104)	0.131 (0.167)	-0.154 (0.157)	0.189 (0.157)	0.246 (0.116)
	7-9	-0.052 (0.100)	0.195 (0.103)	0.267 (0.165)	-0.214 (0.152)	0.328** (0.156)	0.316 (0.115)
	10-12	-0.362*** (0.097)	-0.007 (0.104)	0.081 (0.163)	-0.643*** (0.144)	0.098 (0.154)	0.131 (0.114)
Child's year of birth <sup>2</sup>			V	V		V	V
Father's country of origin			V	V	V	V	V
Father's year of arrival			V	V	V	V	V
Constant			14.57 (0.151)	13.97 (0.193)	13.97 (0.193)	14.39 (0.157)	13.95 (0.142)
Number of observations			4,985	3,842	3,842	4,068	4,397
Adjusted R <sup>2</sup>			0.030	0.041	0.041	0.052	0.026

**Source:** Central Bureau of Statistics and authors' calculations.

1) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.

2) A dummy variable for date of birth during 1955–59, 1960–64, ..., 1975–79.

**Table 7. Correlation between parents' years of schooling and that of their children – immigrant parents from Asia-Africa who arrived during 1949–51<sup>1</sup>**

(standard deviations in parentheses)<sup>2</sup>

	Mothers		Fathers	
	Sons	Daughters	Sons	Daughters
<b>Parent's years of schooling</b>	0.162*** (0.008)	0.163*** (0.007)	0.180*** (0.008)	0.187*** (0.011)
Child's year of birth <sup>3</sup>	V	V	V	V
Parent's country of origin	V	V	V	V
Parent's year of arrival	V	V	V	V
Constant	11.399*** (1.458)	12.814*** (1.079)	12.364*** (0.169)	12.903*** (1.789)
Number of observations	5,670	6,085	4,985	4,068
Adjusted R <sup>2</sup>	0.093	0.105	0.108	0.115

**Source:** Central Bureau of Statistics and authors' calculations.

1) Aged 0–12 on arrival in Israel.

2) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.

3) A dummy variable for date of birth during 1955-59, 1960-64, ..., 1975-79.

## 7. Conclusion

Many studies have found a positive correlation between parents' education and that of their children. This study examined to what extent this correlation in Israel reflects a causal environmental effect, rather than heredity, using a variety of data bases, such as the Population and Housing Census, Population Registry and registry of graduates of higher education institutions.

In order to estimate the causal effect of parents' education on their children's education, the hereditary component's contribution to the intergenerational correlation must be neutralized since parents' innate abilities are not observable and contribute to the acquisition of education by parents and are also passed on genetically to their children. The study made use of parents' age on arrival in Israel as young children as an instrumental variable, and focused on immigrants up to the age of 12 who arrived in Israel from Asia-Africa during the period 1949–51. This wave of immigration was non-selective and encompassed whole Jewish communities.

The study revealed that immigrant children who arrived in Israel at a later age – an age that is exogenous from their point of view and independent of the characteristics of their families and personal abilities – acquired less education and had more children, particularly in the case of immigrants who arrived between the ages of 10 and 12. This result is not surprising since immigration at a late age increases the difficulty in acquiring the local language and integrating into a new society. Immigration at a late age also reduces the number of childhood years during which the immigrants are exposed to an environment which was better than that in their country of origin, and that was in a continual process of improvement. Thus, the age on arrival in Israel can be used as an instrumental variable for parents' childhood environment and their education.

The main result is that no causal intergenerational effect could be found between the childhood environment of parents born in Asia-Africa and their level of education on the one hand and the education (and income) of their children on the other. Nonetheless, one cannot rule out the existence of such effect, which may have been offset by affirmative action in the education system among the children of immigrants from the Moslem countries, according to the socioeconomic characteristics of their parents which include their level of education.

Finally, no conclusion can be drawn with respect to the intensity of the intergenerational relation in education with respect to other periods or other populations due the possible differences in circumstances.



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**Table A1: First stage and reduced form equations for immigrants from Iraq during 1949–51** (standard deviations in parentheses)

**a. First-stage equation: Effect of age on arrival on years of schooling**

		Mothers		Fathers	
		Model 1	Model 2	Model 1	Model 2
Age on arrival		-0.316*** (0.023)		-0.110*** (0.021)	
Age on arrival – grouped (relative to ages 1–3)	4-6		-0.560*** (0.214)		0.143 (0.206)
	7-9		-1.532*** (0.228)		0.096 (0.217)
	10-12		-2.791*** (0.219)		-0.963*** (0.207)
Year of arrival (relative to 1949)	1950	-0.653 (0.588)	-0.679 (0.589)	-0.179 (0.139)	-0.077 (0.496)
	1951	-0.913 (0.576)	-0.987 (0.576)	-0.113 (0.152)	-0.121 (0.486)
Constant		12.265*** (0.588)	11.490*** (0.180)	11.532*** (0.173)	10.771*** (0.498)
Number of observations		2,485	2,485	2,441	2,441
Adjusted R <sup>2</sup>		0.073	0.072	0.010	0.016
Adjusted R <sup>2</sup> without age on arrival		0.002	0.002	-0.001	-0.001
F-test: parent's age on arrival = 0		26	14	180	60

**b. Reduced form equation: Effect of age on arrival on children's years of schooling<sup>1</sup>**

		Mothers		Fathers	
		Sons	Daughters	Sons	Daughters
Age on arrival – grouped (relative to ages 1–3)	4-6	-0.412* (0.211)	0.096 (0.156)	-0.097 (0.321)	0.047 (0.203)
	7-9	0.091 (0.218)	0.002 (0.162)	-0.118 (0.317)	0.267 (0.201)
	10-12	0.018 (0.215)	0.050 (0.166)	-0.232 (0.312)	0.136 (0.198)
Child's year of birth <sup>2</sup>		V	V	V	V
Mother's year of arrival		V	V	V	V
Constant		14.408*** (0.456)	13.721*** (0.380)	14.449*** (0.537)	14.520*** (0.376)
Number of observations		2,031	2,164	1,370	1,631
Adjusted R <sup>2</sup>		0.030	0.003	0.055	0.016

**Source:** Central Bureau of Statistics and authors' calculations.

- 1) \*, \*\*, \*\*\* – significant at 10, 5 and 1 percent levels, respectively.  
 2) A dummy variable for date of birth during 1955–59, 1960–64, ..., 1975–79.