



Do ‘Skills Beget Skills’? Evidence on the effect of kindergarten entrance age on the evolution of cognitive and non-cognitive skill gaps in childhood



Darren Lubotsky^{a,b,*}, Robert Kaestner^{a,b}

^a Institute of Government and Public Affairs, University of Illinois, Department of Economics, University of Illinois at Chicago, 601 South Morgan Street, Chicago, IL 60607, United States

^b National Bureau of Economic Research, 1050 Massachusetts Avenue, Cambridge, MA 02138, United States

ARTICLE INFO

Article history:

Received 11 March 2015

Revised 31 March 2016

Accepted 1 April 2016

Available online 19 April 2016

JEL codes:

I21

J24

Keywords:

Human capital

School entrance age

Dynamic complementarities

Non-cognitive skills

ABSTRACT

We use exogenous variation in the skills that children have at the beginning of kindergarten to measure the extent to which “skills beget skills” in this context. Children who are relatively older when they begin kindergarten score higher on measures of cognitive and non-cognitive achievement at the beginning of kindergarten. Their scores on cognitive assessments grow faster during kindergarten and first grade. However, after first grade the scores of younger entrants catch up. We find no evidence that the growth in non-cognitive measures differs between older and younger entrants. Finally, we provide evidence suggesting that schools are not the cause of the younger students’ faster growth after first grade.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

This paper assesses whether children who have a greater stock of cognitive and non-cognitive skills at the beginning of kindergarten experience greater gains in these skills in subsequent years. There is good reason to suspect that they may: A growing literature that posits that the human capital production function is characterized by complementarities within and between skills (Aizer & Cunha, 2012; Cunha & Heckman, 2007; Cunha, Heckman, Masterov, & Lochner, 2006). Complementarity within skill

implies that the return to investments in skill, for example cognitive functioning, is higher for those with a higher initial level of skill. Complementarity between skills, for example between cognitive and non-cognitive functioning, implies that the return to investments in skill is higher for those with a higher initial level of a different, but complementary skill. The importance for public policy of whether human capital accumulation is characterized by such complementarities has been made convincingly by Heckman and colleagues.¹ If there are such complementarities in the production of human capital, then early investment in children’s skill development will have large returns because they raise the return to future investments. This may be especially true for early investments in children from disadvantaged families. Despite its importance, the

* Corresponding author at: Institute of Government and Public Affairs, University of Illinois, Department of Economics, University of Illinois at Chicago, 601 South Morgan Street, Chicago, IL 60607, United States. Tel.: +13129966240.

E-mail addresses: lubotsky@uic.edu (D. Lubotsky), kaestner@uic.edu (R. Kaestner).

¹ See, for example, studies listed at <http://www.heckmanequation.org>.

empirical literature on complementarities in skill production is limited because of the difficulty in identifying exogenous sources of variation in skills and because these effects may be context specific.

We use exogenous variation in cognitive and non-cognitive skills at the beginning of kindergarten that are driven by differences in children's kindergarten entrance age to directly assess whether students who enjoy an initial skill advantage accumulate additional skills at a faster rate. Those who are older when they begin formal schooling do so with a larger accumulated stock of human capital and at a more advanced developmental stage, and as a result, score higher on assessments of cognitive and non-cognitive ability at the time of entry.² If children's learning process is characterized by complementarities between existing skills and the ability to acquire new skills, then one might expect that older entrants will learn more during kindergarten and each subsequent grade, in which case age-related differences in cognitive skills (and perhaps non-cognitive skills) grow as children progress through school.

Consider estimates in Fig. 1, which shows the percentile score on reading (Panel A) and math (Panel B) tests from kindergarten through eighth grades for a sample selected from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) cohort. Separate lines are shown for the top and bottom quartile of kindergarten entrance age and the top and bottom quartile of family income.³ The large differences in test scores between children from richer and poorer families have justly received volumes of attention. Notably, differences in kindergarten test scores between older and younger entrants are on the order of one-third (for reading) to one-half (for math) the size of the differences in scores between the richest and poorest children. In reading, the difference in scores between children from the richest and poorest quartiles of family income is 28 percentile points. The gap between the youngest and oldest quartile of children is nine percentile points. In math, the gap in scores between the richest and poorest quartiles is 31 percentile points, while the gap between the oldest and youngest quartiles of children is 14 percentile points.

Just as the difference in test scores between children from rich and poor families reflects differences in skills, differences in test scores between older and younger entrants also reflect differences in skill. Older entrants had an extra year to experience investments (both directly from their parents and from preschool and other

activities). However, unlike differences in skills due to income, differences in skills with respect to entrance age are plausibly exogenous and unrelated to differences in family income or other determinants of achievement. This exogeneity of school entry age provides a credible and innovative way to assess whether a higher initial skill level leads to a more or less rapid accumulation of skills.

Fig. 1 also shows how achievement changes over time. After kindergarten, the age-related gaps clearly get smaller while the income-related gaps persist (and perhaps diverge slightly). The convergence in achievement between older and younger school entrants as children progress through school reflected in Fig. 1 is consistent with existing evidence that indicates that there is little or no long-term economic payoff to being older at kindergarten entry.⁴ This fade out is seemingly inconsistent with the hypothesis of complementarities in the production of human capital, although we argue below that complementarities may be masked or undone by children's developmental processes or by compensating investment decisions by parents, teachers, or schools.

In this paper we investigate the effect of entrance age on cognitive and non-cognitive skills through the lens of an economic model of complementarities in human capital acquisition (Cunha & Heckman, 2007). The inclusion of non-cognitive outcomes is a notable contribution of our research.⁵ This is an important gap in knowledge because of the growing evidence that socio-emotional attributes (e.g., impulse control, self-regulation) of a child are associated with adult outcomes (Heckman, 2007; Heckman, Pinto, & Savelyev, 2013; Kaestner & Callison, 2011). Indeed, the potential importance of socio-emotional attributes during childhood is underscored by the inability of traditional human capital theory to explain the failure of many families and children to invest in schooling and other forms of human capital that have documented, large benefits. It is unlikely that financial barriers prevent such investment, which opens up the possibility that non-monetary costs of investment, which may depend on behavioral traits such as impulse control, are an explanation for this lack of investment. In addition, the “dynamic complementarity” hypothesis applies to both within-skill and between-skill complementarities, and by examining both types of skill, we provide a more comprehensive assessment of the hypothesis.

To accomplish the goals of our study, we use data from the Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) and the National Longitudinal Survey of Youth (children of 1979 cohort), and a research design that exploits the discontinuity in age at school entry that

² Most of the variation in children's age on the first day of kindergarten is driven by the combination of when their birthday happens to fall within the year and the school or state's kindergarten entrance cut-off. The remaining variation in entrance age is driven by the small fraction of children whose parents hold them back a year or have them start earlier than proscribed by their school or state's entrance law. This type of non-random variation in entrance age is easily accounted for by the instrumental variables strategy we describe below.

³ More precisely, these are the top and bottom quartile of predicted entrance age, the age a child would enter kindergarten if she entered when first allowed to do so according to the state kindergarten entrance cut-off. The sample construction and variable creation is discussed in detail below.

⁴ See Black et al. (2011) and Dobkin and Ferreira (2010). Bedard and Dhuey (2012), by contrast, argue that entrance age has a modest effect on adult wages, but not educational attainment. The literature on the effect of entrance age on test scores is large and generally concludes that older children score higher and this effect is particularly large in early grades. See Bedard and Dhuey (2006), Elder and Lubotsky (2009), and Fletcher and Kim (2016).

⁵ Coincident with our work, Dee and Sievertsen (2015) also investigate the relationship between school starting age and several mental health measures.

Download English Version:

<https://daneshyari.com/en/article/354281>

Download Persian Version:

<https://daneshyari.com/article/354281>

[Daneshyari.com](https://daneshyari.com)