

# All I Really Need to Know I Learned In Kindergarten? Evidence from the Philippines\*

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## Abstract

Although there is broad agreement that investments in early childhood education are important, questions about the effectiveness of different types of programs persist. We study the effects of two distinct types of kindergarten programs in the Philippines: the Jumpstart kindergarten program, implemented by a local faith-based NGO between 2005 and 2017, and a government-sponsored kindergarten program mandated nation-wide beginning in 2012. Exploiting the timing of the roll-out of these two programs, we find large effects on primary school academic performance due to attending Jumpstart and much smaller effects from attending the government kindergarten. We then examine mediating characteristics that may explain these differential effects. Although we find strong evidence of positive effects on socio-emotional outcomes such as grit, peer affiliation, self-control, openness, and conscientiousness among children who attended Jumpstart, we find none of these effects among children who attended the government kindergarten. Our results confirm other research that highlights the importance of the development of socio-emotional skills and character formation in the pre-elementary grade levels not only as ends in themselves but as mediators to better academic performance.

**Keywords:** Early childhood education, socio-emotional skills, cognitive traits, human development, academic motivation, kindergarten

**JEL Codes:** I21, I24, I25, I28, O22

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“All I really need to know I learned in kindergarten. All I really need to know about how to live and what to do and how to be I learned in kindergarten. Wisdom was not at the top of the graduate-school mountain, but there in the sandpile at school.” - Robert Fulghum (1986) *All I Really Need to Know I Learned in Kindergarten*

## 1 Introduction

Investments in early childhood education matter. These investments often not only lead to higher educational attainment, and in some cases increased learning, but also enable other positive outcomes. Preparing and motivating young children to learn is fundamental for the success of other economic development policies and programs.<sup>1</sup> An extensive empirical literature suggests that interventions in early childhood—in particular through preschool and kindergarten education programs—can have large, positive, and lasting effects across a diverse set of contexts (Currie 2001; Behrman et al. 2004; Cunha et al. 2006; Heckman 2006; Berlinski et al. 2008; Berlinski et al. 2009; Chetty et al. 2011; Rao et al. 2012; Heckman et al. 2013; Gertler et al. 2014; and Araujo et al. 2016). Although these views are shared broadly by policymakers and researchers, several important caveats exist.

First, the effectiveness of early childhood education interventions ultimately hinge on the behavioral response of parents (Das et al. 2013, Heckman et al. 2006). For various reasons, parents may either be unwilling to send their children to, or may not value, early childhood education (Bouguen et al. 2018). Moreover, if these beliefs and the parental response to available preschool or kindergarten programs are positively correlated with lower levels of early childhood investment, then the very children who may need preschool or kindergarten the most may not be enrolled (Blau and Currie 2006; Cornellissen et al. 2016). Second, there is less agreement about the most effective and efficient ways to design interventions to assist disadvantaged youth. Across a variety of countries, early childhood education programs may focus on several different factors of human development, such as: academic skills, nutrition, physical health, mental health, or social and emotional development (Nores and Barnett 2010). Therefore, a critical and persistent question for policymakers is: what types of early childhood education programs are most effective?

In this paper we examine the effectiveness of two distinct kindergarten programs in rural Philippine villages. The first program is the Jumpstart kindergarten program implemented by International Care Ministries (ICM), a faith-based NGO operating in the Philippines. This program aims

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<sup>1</sup>See a discussion of this idea in the 2018 World Development Report, “Learning to Realize Education’s Promise” (World Bank 2018).

to prepare poor and disadvantaged youth for success in the public education system. The second program is a government-sponsored kindergarten program that was mandated across the country based on the Kindergarten Education Act, passed in 2011 by the Philippine government. This legislation expanded access to kindergarten education throughout the Philippines and mandated that each incoming first grade student must first enroll and participate in at least one year of kindergarten. By exploiting variation in the timing of the rollout of these programs, we compare the effects of enrollment in both types of kindergarten. These two kindergarten programs each use existing Philippines DepEd kindergarten curriculum. The Jumpstart program, however, also included several “enrichments,” such as medical checkups, provided lunch and snack at school, free school supplies, as well as potentially better and more motivated teachers. Comparisons between the government kindergarten program and the Jumpstart program identify the combined effect of these enrichments.<sup>2</sup>

We find evidence of substantial effects of enrollment in ICM’s Jumpstart kindergarten program on academic performance in elementary school. In particular, we estimate that relative to children who did not go to kindergarten, children who enrolled in ICM’s Jumpstart kindergarten are roughly one and a half to twice as likely to be the top academic performer within their household in both third grade specifically and in all of elementary school in general. By contrast children who enrolled in the government kindergarten program are no more likely be the top academic performer within their household compared to children who did not go to kindergarten.<sup>3</sup>

These results motivate an investigation into the factors that potentially mediate the outcomes of both Jumpstart and the government kindergarten program. We find strong evidence of positive effects on socio-emotional outcomes such as grit, self-control, and self-identity among children who attended Jumpstart. Re-categorizing our survey questions to create measures of each of the “Big 5” attributes, we find positive effects on openness and conscientiousness among children who attended Jumpstart. Among children who attended the government kindergarten, however, we find less robust evidence of effects on these socio-emotional outcomes. Applying a formal mediation analysis (Preacher and Selig 2012), we find that the effects on our primary outcomes may be mediated by socio-emotional factors, such as self-control, openness, and conscientiousness. The direct effect of enrollment in the Jumpstart program, however, remains strong across all specifications.

This paper contributes to the literature on the impacts of early education interventions in three

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<sup>2</sup>Section 2 includes additional detail about the specific components of these two kindergarten programs.

<sup>3</sup>These effects on the government kindergarten program are consistent with the effects of a similar program in Norway that mandated kindergarten enrollment (Drange et al. 2016).

ways. First, due to the nature of the role-out of ICM’s Jumpstart kindergarten program (beginning in 2005) and the Philippine government kindergarten program (beginning nation-wide in 2012) we are able to compare the effects of attending these two distinct kindergarten programs. This allows for an important discussion about the relevant counterfactual for children used when estimating program impact. Children from different socio-economic backgrounds may experience different benefits from enrollment in these programs, not only because they possess different characteristics, but also because they would have different early educational experiences in the absence of these programs (Berkes and Bouguen 2018). Our research design allows for not only an estimate of program impact against a “no kindergarten” counterfactual, but also a comparison of impacts between ICM’s Jumpstart kindergarten program and the government kindergarten program.

Second, we investigate the extent to which the development of socio-emotional or psychological characteristics mediate any estimated effects of enrollment in either kindergarten program. A growing literature suggests that the development of socio-emotional or psychological characteristics are instrumental in driving future academic, labor market, and adult life outcomes (Heckman 2008; Borghans et al. 2008; Chetty et al. 2011; Heckman et al. 2013; Wydick et al. 2013; Glewwe et al. 2018). Using measures of grit (Duckworth and Quinn 2009), self-control (Duckworth and Gross 2014), peer affiliation, positive identity, and the “Big 5 personality characteristics, we aim to understand if any of these factors explain not only the treatment effects of each kindergarten program, but also the difference in impact estimates between ICM’s Jumpstart kindergarten program and the Philippine government’s kindergarten program.

Finally, results from this research add to the literature comparing the effectiveness of public and private education systems, particularly in developing countries (Andrabi et al. 2008; Tabarrok 2013; Bold et al. 2013; Muralidharan and Sundararaman 2015; Wamalwa and Burns 2018; Romero et al. 2019). Our results indicate that children who enrolled in a private kindergarten program—ICM’s Jumpstart program—attained better academic performance in elementary school compared to children who enrolled in a public government-funded kindergarten program. Additionally, school aged children who enrolled in the Jumpstart program are more likely to be currently enrolled compared to school aged children who attended a government kindergarten. Although important considerations relating to external validity and scale-up of a relatively small-scale program implemented by an NGO are important (Bold et al. 2018), for the children in our data, ICM’s Jumpstart kindergarten program was more beneficial than the government kindergarten program in terms of academic performance in elementary school.

The remainder of the paper is structured as follows. The next section introduces and provides some contextual details about both the Jumpstart kindergarten program and the Philippine Kindergarten Education Act. Section three introduces the data, presents the identification strategy we use to estimate effects of enrollment in these two types of kindergarten, and discusses the approach we use to perform mediation analysis. The fourth section discusses the results on primary outcomes, the mediation analysis, and heterogeneous effects. Section five discusses robustness checks and the limitations of this analysis. Finally, section six concludes.

## 2 Kindergarten in the Philippines

Declining educational standards characterize the first decade of 21st century in the Philippines. Despite a global push for universal primary education, in the Philippines the net enrollment rate for primary schools dropped from 96 percent in 2000 to 84 percent in 2005 (DepEd Philippines 2007). Additionally, in 2005, only 70 percent of students successfully completed primary school (DepEd Philippines 2015). The cost of the reality described by these figures lingers into the future. In 2013, one in every ten—or about 4 million—Filipino youth between the ages of 6 and 24 was not enrolled in school (Philippine Statistics Authority 2013).

As a response to these trends, in 2005, ICM started the Jumpstart kindergarten program to improve the preparation of children for elementary school education. Jumpstart began with four kindergarten centers in 2005, steadily growing to 75 schools. Several years later, in 2011, the Philippine government passed the Kindergarten Education Act (No. 10157) that mandated kindergarten education as an integral part of the country’s basic education system, and the government began to quickly phase-in kindergarten access across the country. In 2012 the government legislated that all public schools provide kindergarten to local students.

### 2.1 ICM’s Jumpstart Program

The core objectives for Jumpstart are informed by the Millennium Development Goals “Education for All” objective. This guides the aim of the Jumpstart program to improve early childhood education in rural areas of the Philippines, particularly targeting the most disadvantaged and vulnerable children. ICM designed Jumpstart in line with their faith-based values.<sup>4</sup>

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<sup>4</sup>The Biblical basis for Jumpstart comes from Jeremiah 29:11 “For I know the plans I have for you,” declares the Lord, “plans to prosper you and not to harm you, plans to give you hope and a future.”

In practice, Jumpstart includes several components. The first is a ten month kindergarten education program that meets five days per week, similar to any other standard kindergarten program. ICM designed this first component specifically to prepare students for future success in public school. In this vein, ICM carefully instructs Jumpstart teachers to use the existing Philippines DepEd kindergarten curriculum. The second component aims to add “enrichments” over and above the typical Philippine public kindergarten program. These enrichments include medical checkups, provided lunch and snack at school, and free school supplies. The medical checkups include provision of de-worming treatment, standard medical screenings, and height and weight monitoring on a monthly basis. The daily provided lunch and snacks include nutritionally fortified rice and other food including soy protein. The provided school supplies include school uniforms and other necessary classroom infrastructure. Finally, the Jumpstart program also includes a component that targets parents. This component is essentially the VHL “Transform” program which exists as ICM’s core program and includes access to credit services, house visits, and livelihood training.<sup>5</sup>

The selection and implementation of Jumpstart follows a strict set of guidelines. An application must be submitted to ICM by a local pastor. This application must provide (a) evidence of support from the village which includes a signed statement of commitment from at least five members of the local church, (b) a village profile providing information about the need for a kindergarten in the area, and (c) a list of at least 40 potentially eligible kindergarten-aged children. Jumpstart teachers must apply with a referral letter from their local pastor indicating their commitment and passion for early childhood development and education. Additionally, they must be a university graduate with a degree in education and must attend a Philippine Department of Education teacher training program. Children must be at least five years old on or before October 31st of the year they begin kindergarten and come from a poor family. In practice, families are recommended by their local pastor and parents must sign a commitment letter with ICM. Class sizes are strictly capped at 40 children, however, a few “visitor” children can observe the class but are generally not entitled to the additional school supplies or other provisions.

Initially, through Jumpstart, ICM provided a service that the Philippine government was not providing. Before passage of the Kindergarten Education Act in 2011, ICM signed an agreement with the Philippine government that the Jumpstart program would only fill the gaps in the public government program. In 2018 ICM officially ended the Jumpstart program based on an under-

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<sup>5</sup>See Bryan et al. (2018) for a detailed discussion and evaluation of ICM’s “Transform” VHL Program.

standing that the public K-12 education system was operating at scale throughout the country. At the time, the Jumpstart program had implemented over 700 kindergarten class cohorts and served about 20,000 children.

## **2.2 The Kindergarten Education Act**

In 2011 the Philippine government passed the Kindergarten Education Act which implemented a “mandated and compulsory” pre-elementary year of kindergarten education. After the 2011-2012 school year, all Filipino children were required to spend a year in kindergarten before enrolling in first grade.

The passage of this act led to positive advances in enrollment in early childhood education. The net enrollment rate in kindergarten jumped from 55 percent in 2010 to 75 percent in 2015 and elementary school completion rates grew from 70 percent in 2005 to 83 percent in 2015 (UNESCO 2015). These changes benefited children from the poorest Philippine households. In 2008, the gross enrollment rate in kindergarten for the poorest 20 percent of the population was 33 percent. In 2013, however, this rate increased to 63 percent (World Bank 2016). Although these figures suggest positive changes in kindergarten and elementary enrollment, the Philippines continues to lag behind neighboring countries in a number of other dimensions. For example, only 53 percent of children from the poorest 20 percent of households attend high school (World Bank 2016). This implies that although disparities in access to early childhood education may have declined, disparities in the quality of early childhood education may still persist.

Although kindergarten enrollment has surged in the Philippines, questions remain over the quality of both Jumpstart and the government kindergarten program relative to both the counterfactual of no kindergarten and to each other. We utilize the age-eligibility rule for kindergarten in both programs in conjunction with the timing of the introduction of the programs to different villages to identify their respective effects on subsequent academic performance as well as potential mediators that may explain differences in their effects.

## 3 Empirical Framework

### 3.1 Data

The data come from a household survey administered in 2017.<sup>6</sup> The questionnaire includes information on kindergarten enrollment, mother characteristics, primary school academic performance, and socio-emotional or psychological characteristics of each child. In total, the data includes 2,692 children in 1,132 households across 93 villages. In practice, due to our identification strategy which uses household fixed effects to compare outcomes between siblings, we exclude households with only one child. This leaves us with 2,437 children in 943 households across 88 villages.

In third grade every student in the Philippines takes the National Achievement Test. This test assess student reading ability, in both English and Filipino, mathematics, and science. Based on the results of this test, students are placed into different class sections. About 30 of the best performing students are placed in the top section, then the next 30 students are placed in the following section, and so on. Within each section the students are ranked from best to least based on their performance on the National Achievement Test. Unfortunately we do not have access to the results from the National Achievement test for the children in our data.

Instead, we consider four main outcome variables. The first two are within-household comparisons of academic performance of each child as reported by mothers.<sup>7</sup> We asked mothers which of their children performed best in third grade and elementary school, respectively. The core limitation of these variables is they are not objective or administrative measures of student academic performance. They do, however, identify mother's perception of who is the best performing child in third grade and elementary school. Although these perceptions in academic performance are subjective, they may be what ultimately determine demand for schooling in the future (Jensen 2010). The third outcome variable indicates whether each child was placed in the top section in third grade.<sup>8</sup> Finally, the fourth outcome variable indicates if a child is currently enrolled in school. These final two main outcome variables provide a more objective measure of educational

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<sup>6</sup>The survey was designed by a research team at the University of San Francisco and implemented in partnership with ICM.

<sup>7</sup>In 81 percent of cases, the child's mother was the respondent to the survey. If the mother was not available another household member served as the respondent. In 11 percent of cases the respondent was the child's father. In 4 percent of cases the respondent was the child's grandmother. In the remaining 4 percent of cases the respondent was the child's grandfather, aunt, or uncle.

<sup>8</sup>A limitation of this variable is that only 78 percent of children have valid responses. We therefore, predict the missing values using a linear regression based on kindergarten enrollment, the within-household indicator of best academic performance in third grade, the child's age, the sex of the child, birth order dummy variables, and household/mother fixed effects.



and academic performance.

The questionnaire also included questions asking mothers about academic and socio-emotional skills that potentially mediate academic performance in primary school.<sup>9</sup> These questions broadly take the form: “Relative to children his/her age [child  $i$ ] practices math frequently,” or “Relative to others his/her age [child  $i$ ] is easily discouraged.” To which mothers answered using a one through five Likert scale; with one indicating “strongly disagree” and five indicating “strongly agree.” These questions aggregate together to create indices measuring academic or scholastic skills and a host of socio-emotional characteristics such as: grit, peer-affiliation, self-control, self-identity, spirituality, and behavior. We can also use the same survey questions to generate an alternative set of indices, which approximate the “Big 5” personality characteristics. These characteristics include: openness, conscientiousness, extraversion, agreeableness, and neuroticism. This alternative set of index variables allows for a robustness check to the specific categorization of these questions measuring socio-emotional skills. We use the methods of Kling et al. (2007) to generate standardized indices. In the appendix we show a table which summarizes these variables. They each have a mean of zero and a standard deviation of one.

Table 1 shows summary statistics of our data. Respondents in our data, who are mostly mothers, are about 43 years old. Less than half have attended high school and only about 10 percent have attended college. Most are married, stay at home, and participated in ICM’s “Transform” VHL program. Children in our data are typically teenagers when we administered our survey. Those who are still attending school are in the latter grades of primary school or junior high school.

By simply comparing means, we can already begin to see the effect of kindergarten enrollment on our main outcome variables. Children who attended Jumpstart are much more likely, than both children who attended government kindergarten and no kindergarten, to be the best performing child in both third grade and elementary school. Children who attended Jumpstart are much more likely, relative to both children who attended government kindergarten and children who did not attend any kindergarten, to be placed in the top section in third grade. Finally, most children who attended either the Jumpstart or government kindergarten are still enrolled in school. This is not the case for children who did not attend kindergarten.

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<sup>9</sup>Each of these questions are listed in the appendix.

### 3.2 Identification Strategy

Simply comparing means may lead to biased estimates of the true effect of enrolling in either Jumpstart or the government kindergarten. Children who attend a specific type of kindergarten (e.g., Jumpstart or government) or not may differ based on household characteristics (e.g., access to kindergarten, income level, socio-economic status, etc.) or based on individual characteristics (e.g., age, sex, birth order, etc.). To address these potential sources of bias we use the following empirical strategies to estimate the effect of enrollment in each of these two distinct kindergarten programs. Our first approach is to estimate the following linear regression using OLS:

$$Y_{hi} = \beta_0 + \beta_1 \text{Jumpstart}_{hi} + \beta_2 \text{Government}_{hi} + X'_{hi} \Gamma + \omega_h + \epsilon_{hi} \quad (1)$$

In equation (1)  $Y_{hi}$  represents binary variables that represent one of each of our four primary outcome variables. These primary outcome variables include: (a) a variable indicating if a child is the best performing sibling within their household in third grade, (b) a similar variable indicating if the child is the best performing sibling in elementary school, (c) a variable indicating if a child placed in the top third grade section, and finally (d) a variable indicating if a school-aged child is currently enrolled. The *Jumpstart* variable is a binary variable that indicates if the child attended a Jumpstart kindergarten. Similarly, the *Government* variable is a binary variable that indicates if the child attended a government kindergarten program.  $X$  is a vector of child-level control variables, including child age, the sex of the child, and birth order dummy variables. These control variables in particular help to control for any potential reporting or recall bias embedded in our data. Additionally, since our data include children who are not old enough to have completed third grade, we include a binary variable indicating if the child is “too young” (less than 9 years old) for third grade when estimating effects on the first three of the four primary outcome variables. When estimating effects on current enrollment, we include two binary variables. One indicating if the child is “too young” (less than 4 years old) to be enrolled in school and the other indicating if the child is “too old” (greater than 24 years old). Finally,  $\omega_h$  is a household fixed effect and  $\epsilon_{hi}$  is the error term. As a robustness test on this specification, we estimate a variant of equation (1) which, instead of household fixed effects, includes village fixed effects with household/mother control variables.<sup>10</sup>

Although we are controlling for household fixed effects, enrollment in Jumpstart or government

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<sup>10</sup>These results are shown in the appendix.

kindergarten may still be endogenous and thus  $\beta_1$  and  $\beta_2$  may be biased estimates of the true effect. In particular, parents may make strategic choices about which of their children to send to a particular type of kindergarten. If, for example, parents tend to send more capable children to the Jumpstart kindergarten program, then the estimate of  $\beta_1$  from equation (1) will be biased upwards. On the other hand, if parents tend to send less capable children to the Jumpstart kindergarten program, the the estimate will be biased downwards. Since it is difficult to reason the magnitude and direction of the potential bias of results estimated from equation (1), a more sophisticated method is necessary.

We make use of the fact that both of these kindergarten programs started at different times in different villages and that older children are less likely to attend kindergarten upon the program's first implementation. Specifically we use the age of children when jumpstart entered their village to instrument for Jumpstart participation. Jumpstart started in a small number of villages in 2005 and added additional villages in each subsequent year. We use a similar strategy to instrument for enrollment in government kindergarten. Specifically we use the age of children when government kindergarten entered their village to instrument for government kindergarten participation. The Philippine government passed the Kindergarten Education Act in 2011 which mandated universal public kindergarten education by 2012. In practice, a number of villages introduced a government-sponsored kindergarten as early as 2008. We use a vector of 11 binary variables that represent if a child is a particular age—zero through 10—when the jumpstart and government kindergartens entered their village. Specifically we implement this instrumental variable method by estimating the following equations:

$$Jumpstart_{hi} = \sum_{j=1}^{11} I_{ji} + \sum_{g=1}^{11} I_{gi} + X'_{hi}\Pi + \tau_h + \mu_{hi} \quad (2)$$

$$Government_{hi} = \sum_{j=1}^{11} I_{ji} + \sum_{g=1}^{11} I_{gi} + X'_{hi}\Psi + \kappa_h + \eta_{hi} \quad (3)$$

$$Y_{hi} = \delta_0 + \delta_1 \hat{Jumpstart}_{hi} + \delta_3 \hat{Government}_{hi} + X'_{hi}\Xi + \rho_h + \nu_{hi} \quad (4)$$

In equations (2) and (3)  $I_j$  and  $I_g$  each equal one when a child is a particular age between zero and 10 at the time when the Jumpstart program and the government kindergarten program started in their village, respectively. In equation (4)  $\hat{Jumpstart}$  and  $\hat{Government}$  are the predicted values from equation (2) and (3).

These instruments are both relevant and valid. These instruments are strong since age is a key determinant for kindergarten eligibility, and therefore attendance. Of course, instrument strength can be tested directly by calculating an F-statistic testing for the joint significance of all instruments in predicting attendance in Jumpstart ( $F - statistic = 78.98$ ) and government kindergarten ( $F - statistic = 25.19$ ) in the main specifications (Sanderson and Windmeijer 2016). Additionally, these instruments are excludable since the timing of the rollout of both the jumpstart and government kindergarten programs are exogenous to parental choices—such as kindergarten enrollment, child-bearing decisions, etc. Figure 1 shows that there is sufficient variation in enrollment rates across each age at both Jumpstart and government and kindergarten introduction in a village.

### 3.3 Mediation Analysis

Although a central motivation for this analysis is to estimate the effects for Filipino children of attending two distinct types of kindergarten, we are also interested in trying to understand what factors mediate the estimated effects on our primary outcomes. In our data we have information on both academic and socio-emotional skills. These are skills that children who attend kindergarten may possess that children who do not attend kindergarten may not possess. Additionally, the Jumpstart program took special care in aiming to instill positive values through the various “enhancements” to the core Philippine kindergarten curriculum.

To assess the extent to which specific academic or socio-emotional skills mediate the primary results we follow the approach of Preacher and Selig (2012). In general, this approach calls for a two step procedure for estimating the effect of kindergarten enrollment on primary outcomes via potential mediating variables (i.e., the indirect effect) and the effect of kindergarten enrollment on primary outcomes conditional on potential mediating variables (i.e., the direct effect). The first step estimates the following specification:

$$M_{hi} = \alpha_0 + \alpha_1 \text{Jumpstart}_{hi} + \alpha_2 \text{Government}_{hi} + X'_{hi} \Theta + \psi_h + \xi_{hi} \quad (5)$$

In equation (5)  $M_{hi}$  is an index variable measuring either academic or socio-emotional skills of child  $i$  in household  $h$ . Similar to equation (1), the *Jumpstart* and *Government* variables are binary variables indicating if the child attended either a Jumpstart or government kindergarten.  $X$  is a vector of child-level control variables, such as child age, the sex of the child, and birth order dummy variables. Finally,  $\psi_h$  is a household fixed effect and  $\xi_{hi}$  is the error term. Similar to

the analysis of effects on primary outcomes, we can instrument for participation in Jumpstart and government kindergarten using the age of children when each program first entered their village. The instrumental variable framework essentially mirrors equations (2) through (4), but instead uses the outcome variables,  $M_{hi}$ , which represent potential mediating index variables. Again, as a robustness test on this baseline specification, we estimate a variant of equation (5) using village fixed effects with household/mother control variables instead of household fixed effects.<sup>11</sup> The second step estimates an augmented version of equation (1) that includes the potential mediating variables in the specification.

$$Y_{hi} = \gamma_0 + \gamma_1 \text{Jumpstart}_{hi} + \gamma_2 \text{Government}_{hi} + M'_{hi} \Lambda + X'_{hi} \Delta + \varphi_h + \zeta_{hi} \quad (6)$$

Equation (6) is identical to equation (1) except for that it includes the vector  $M_{hi}$  which indicate various potential mediating variables. In the Preacher and Selig (2012) framework the direct effect of Jumpstart attendance on primary outcomes is equal to  $\gamma_1$ , the coefficient on *Jumpstart* in equation (6). The indirect effect is equal to the product of  $\alpha_1$  in equation (5) and the corresponding coefficient in the vector  $\Lambda$  in equation (6). A corresponding process follows for the direct and indirect effects on government kindergarten enrollment.

Although the approach of Preacher and Selig (2012) is relatively straightforward to implement, causal inference is challenging. In particular, controlling for the mediating variable  $M_{hi}$  can introduce bias into otherwise unbiased causal effect estimates if the potential mediating variable is endogenous (Acharya et al. 2016). We follow the reasoning of Heckman and Pinto (2015) which states that in order for mediation analysis to have a credible causal interpretation we need to assume independence between kindergarten enrollment (i.e., treatment status) and any of the potential mediators (i.e., measured inputs) with respect to our primary outcomes conditional on other observed covariates. This assumption is often called the sequential ignorability assumption (Imai et al. 2010; 2011). We implement mediation analysis by making this assumption and support it in two ways: First, we implement unobservable selection and coefficient stability tests of Oster (2017) to test if coefficients on mediators change based on the inclusion of observable controls; if they do not, then Oster (2017) argues that coefficient estimates would be unlikely to change with the inclusion of unobservable variables. Second, similar to Heckman et al. (2013), we identify mediators over a theoretically comprehensive measure of personality, in our context the “Big 5” personality traits.

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<sup>11</sup>These results are shown in the appendix.

Heckman et al (2013) argue that using a comprehensive set of personality mediators greatly reduces the possibility of a confounding personality variable that would introduce bias in OLS estimation.

## 4 Results

In this section we discuss two sets of results. First, the primary results show how attending either the Jumpstart or government kindergarten program affects education outcomes. As explained in Section 3.1, these primary outcomes include: the mother’s report of which child performed best in third grade and overall in elementary school, whether the child was placed in the highest ranking section in third grade, and whether “school aged” children are currently enrolled in school. We also discuss heterogeneity in these primary effects in two dimensions: (i) by the sex of children, and (ii) by the age of children. The later provides some preliminary insight about whether the government kindergarten program has improved since first implemented. Second, the mediation results show how impacts of the programs may occur through influences of different personality traits, perhaps affected through participation in the program. Here, in the first-stage we show how attending either the Jumpstart or government kindergarten program affects socio-emotional outcomes. We use two sets of socio-emotional variables. The first is a core set of indices that includes grit, self-control, peer affiliation, self-identity, behavior, and spirituality. The second is an alternative set of indices that represent the “big 5” personality characteristics: openness, conscientiousness, extraversion, agreeableness, and neuroticism. We also use indices that broadly measure current and future academic skills. In the second-stage we show how much these potential mediating characteristics influence our primary outcome variables. Finally, we discuss both the direct and the indirect effect, through measured inputs, of attending each of these kindergarten programs.

### 4.1 Primary Results

What is the effect of enrollment in the Jumpstart or the government kindergarten program on academic outcomes in primary school? To answer this question, we estimate the household fixed effect regression—shown in equation (1)—and the instrumental variables regressions—shown in equations (2) through (4). We report the results from these regressions in Table 2.

The first two columns show the effect of enrollment in Jumpstart and government kindergarten on performing best in third grade, relative to siblings within the household who did not attend kindergarten. The results are both statistically and economically significant. As reported in Table

1, the probability that a child who did not attend any kindergarten is the best performing sibling in third grade is about 27 percent. The coefficient on our OLS estimate is 0.282 ( $p < 0.01$ ), and the coefficient from our IV estimate is 0.259 ( $p < 0.01$ ). These estimates thus suggest that enrolling in Jumpstart increases the probability of a child being the best performing sibling by roughly 100 percent. Additionally, there no evidence of any meaningful effect of enrollment in government kindergarten on the probability that a child is the best performing sibling in third grade. A test of equality of effects between enrollment in Jumpstart and the government kindergarten shows that the difference is very statistically significant.

Results for the effect on performing best in elementary school, shown in columns (3) and (4) are similar. Again as reported in Table 1, the probability that a child who did not attend any kindergarten is the best performing sibling in elementary school is about 29 percent. This means that OLS and IV estimates suggest that enrolling in Jumpstart increases the probability of a child being the best performing sibling by roughly 69 percent. Again, there is no evidence of any meaningful effect of enrollment in government kindergarten on the probability that a child is the best performing sibling in elementary. Formal tests of equality of these effects show that the difference is highly statistically significant.

Columns (5) and (6) show the effects of enrollment in Jumpstart and government kindergarten on the probability of placing in the top third grade section. In contrast with the previous two outcomes, this outcome is more objective and identifies academic performance based on the government-administered National Achievement Test. Based on the results of this test, students are placed into different class sections. About 30 of the best performing students are placed in the top section, then the next 30 students are placed in the following section, and so on. We find economically and statistically significant effects for both kids who attended Jumpstart and the government kindergarten program, relative to siblings who did not attend any kindergarten. As reported in Table 1, children who did not attend any kindergarten realize a probability of being placed in the top third grade section is about 35 percent. OLS and IV estimates suggest that children who enrolled in Jumpstart are about 65 percent more likely to place in the top section in third grade than their siblings who did not attend kindergarten. Similarly, OLS and IV estimates suggest that children who enrolled in government kindergarten are about 50 percent more likely to place in the top section in third grade than their siblings who did not attend kindergarten. A formal test of equality of these effects suggest that these effects are not statistically different from one another.

Finally, columns (7) and (8) report the effects of enrollment in Jumpstart and government kindergarten on current enrollment status for “school aged” kids. In this setting, “school aged” kids are aged from 4 through 24 years old. Similar to the results in the first four columns, we find strong evidence of meaningful effects for children who attended Jumpstart and no evidence of meaningful effects for children who attended government kindergarten. As shown in Table 1, only about 60 percent of children who did not attend any kindergarten are currently enrolled in school. Therefore, OLS and IV estimates suggest that school aged children who enrolled in Jumpstart are about 15 percent more likely to be enrolled in school. Additionally, there no evidence of any meaningful effect of enrollment in government kindergarten on current enrollment status of school aged children. Formal tests of equality of the effects between Jumpstart and government kindergarten indicate the difference is statistically significant.

These results lead to two conclusions about the effects of kindergarten education in the Philippines. First, across three of our four outcomes, we find that the government kindergarten does not perform significantly better than no kindergarten. For both the mother’s report of academic performance among siblings and current enrollment status of school aged kids, only children who enrolled in Jumpstart fair better than kids who did not attend any kindergarten. The government kindergarten program is effective, however, in increasing the likelihood that a child is placed within the top third grade section. Although we are unsure why the government kindergarten appears to have a significant impact on this measure of academic performance relative to its insignificant impact in the other measures, it may be because placement into the upper class is a relatively blunt indicator of academic performance. It also does not seem to translate into increased levels of future school enrollment. Thus, taken together, our results indicate greater impacts from the Jumpstart program, and that the approach and quality of kindergarten seem to matter substantially.

One obvious concern regarding our first two outcomes is the mother’s subjective report of academic performance among siblings. For this outcome, we asked mothers to list their children in order of academic performance in both third grade specifically and in elementary school in general. Although the presence of the National Achievement Test provides parents with some objective information to base their reporting, they may forget their children’s scores or grades. It is reassuring, therefore, that the effect of enrollment in Jumpstart on more objective outcomes—such as placing in the top third grade section and current enrollment status—is also positive, of meaningful magnitude, and statistically significant.



### 4.1.1 Heterogeneity in Primary Effects

These primary effects vary in a number of ways. In this sub-section, we discuss heterogeneity in two dimensions. First, we restrict our sample to only within-sex sibling comparisons. This allows us to estimate differential effects for girls vs. boys. Second, we restrict our sample by age-groups. Specifically, we examine children who are older or younger than 11 at the time of data collection. This allows us to estimate differential effects of these programs over time.

Table A2, in the appendix, reports OLS and IV estimates of primary outcomes separated by sex. Panel A shows effects when we restrict our sample to include both only girls and only households who have at least two girl siblings. This allows us to compare the effects of attending either Jumpstart or the government kindergarten program among only girls. Panel B shows the opposite when we restrict our sample to include both only boys and only households who have at least two boy siblings. The results show that there effects do not vary much at all among only girl siblings vs. only boy siblings. This finding is supported by a recent review of the education literature in lower income countries (Evans and Yuan 2019). Namely, that general educational interventions may be just as beneficial to girls than compared to educational interventions that specifically target girls.

Table A3, in the appendix, reports OLS and IV estimates of primary outcomes separated by age groups. Panel A reports results among children who are 11 years old or older and Panel B reports results among children who are 10 years old or younger at the time of data collection. Children who are less than 10 years old are about prime kindergarten age at the time the Kindergarten Education Act was mandated and scaled nationally. This investigation of heterogeneity is driven by questions about whether the effects of these kindergarten programs perhaps improve over time. The government kindergarten program specifically may have suffered from implementation constraints in the early years of the program and may have improved in more recent years. A key challenge we face when implementing these regressions is that in more recent years there are far fewer children who did not attend kindergarten. Therefore, in Table A3, we only examine the effect of being enrolled in Jumpstart vs. not being enrolled in Jumpstart. This comparison effectively pools together children who either attended a government kindergarten or did not attend kindergarten.<sup>12</sup> We find that there is very little difference in the effect of attending Jumpstart vs. no attending Jumpstart over time. If anything the estimated effects seem to increase among children who

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<sup>12</sup>As shown in Table 2, with the exception of the effects on being placed in the top third grade section, whether or not a child is enrolled in a government kindergarten or did not attend kindergarten makes little difference among our core primary outcomes.

attended kindergarten more recently. Although these results are limited, and future research is needed to examine the longer-run effects of the government kindergarten program in the Philippines, we find no evidence suggesting that the government kindergarten program has improved over time relative to the Jumpstart program.

## 4.2 Mediation Results

We present the results of the mediation analysis in three parts. First, we show and discuss the results from the first-stage regression that estimates the effect of attending Jumpstart or the government kindergarten on each of our potential mediating variables. Second, we show and discuss the results from the second-stage regression that estimates the direct effect of attending Jumpstart or the government kindergarten conditional on a vector of potential mediating variables. Finally, we discuss the estimated direct and indirect effects of this mediation analysis.

### 4.2.1 Mediation First-Stage

As previously noted, the questions in our survey allow us to create several different sets of indices. The core set of indices include variables measuring the following psychological variables: grit, peer affiliation, self-control, and self-identity. This set of indices also include variables measuring interpersonal behavior, spirituality, academic expectations, and academic skills. We can also use the same survey questions and group the questions together differently to generate an alternative set of indices. These indices include variables that measure each of the “Big 5” personality characteristics: openness, conscientiousness, extraversion, agreeableness, and neuroticism. More detailed information about the specific survey questions associated with each index is presented in the appendix.

Table 3 reports results on the psychological attributes from the core set of indices. The first two columns show estimates of attending Jumpstart or government kindergarten on a grit index. Both the OLS and IV estimates suggest relatively large and statistically significant effects on grit. Since the outcome variable is standardized to have a mean of zero and a standard deviation of one, the coefficient estimates suggest that attending Jumpstart increases grit by roughly 0.14 standard deviations, large enough to have significant effects on task completion (Duckworth and Gross, 2014). Although the effect of attending government kindergarten is smaller and not statistically significant, formal tests fail to reject equality of these two effects. We find similar effects for self-control and self-identity. In particular, OLS and IV estimates suggest that self-control increases by about 0.15

standard deviations and self-identity increases by about 0.20 standard deviations. Again, although in each of these psychological attributes there seems to be no effect of government kindergarten, formal tests fail to reject equality of the Jumpstart effect estimate and the government kindergarten effect estimate. One exception is the effect of the government kindergarten on peer affiliation. We find IV estimates suggesting that attending the government kindergarten leads to a 0.15 standard deviation increase in peer-affiliation.

Table 4 shows the estimated effects of attending Jumpstart and the government kindergarten on behavior, spirituality, and two academic skills indexes. The behavior index includes questions about whether the child is obedient to instruction or breaks rules at home and school, whether the child acts like others their age, and whether the child is kind to younger children. The first two columns of Table 4 show that attending either Jumpstart or the government kindergarten does not have any measurable effect on this behavior index. The spirituality index includes questions on whether the child participates in church youth group activities, whether the child asks questions about God, whether the child enjoys attending church, and whether the child gives the family's offering at church. Similar to the results on the behavior index, columns (3) and (4) of Table 4 show that there is no effect on spirituality due to attending either the Jumpstart or the government kindergarten.

The last four columns of Table 4 report results on two different academic indices. The academic expectations index includes questions about the likelihood a child will finish high school, graduate from university, get a good job, and be generally successful in life. The academic skills index includes questions about how much the child—relative to others their age—reads, practices math, takes interest learning new languages, achieves highly in school, and is considered smart. IV estimates for the effect of both attending Jumpstart and government kindergarten are relatively large and statistically significant. The estimates in column (6) of Table 4 suggest that attending either the Jumpstart or government kindergarten increases the academic expectations index by roughly 0.23 standard deviations, relative to not attending any kindergarten. The estimates in column (8) suggest that attending either the Jumpstart or government kindergarten increase the academic skills index by about 0.30 standard deviations, again relative to not attending any kindergarten.

These results from our core set of potential mediating variables suggest two intermediate conclusions. First, the results in Table 3 suggest that the Jumpstart program seems to have increased the grit, self-control, and self-identity of the children who attended, relative to children who did not attend any kindergarten. Although we fail to reject equality of the effect among children who

attended Jumpstart and children who attended government kindergarten, we only find effects of attending the government kindergarten on peer affiliation. These findings provide new evidence about the production function for personality traits (Pagani et al. 2019). Second, in Table 4 we see that both the Jumpstart and government kindergarten programs increased indices measuring future academic expectations and current academic skills. This suggests that some kindergarten, regardless if it was the Jumpstart or government kindergarten, has some academic benefits relative to not attending any kindergarten.

We carry out our estimations on an alternative set of indices, where we index responses to our survey questions within the “Big 5” personality traits: openness, conscientiousness, extraversion, agreeableness, and neuroticism. These indices should be viewed as alternatives to the psychological, behavior, and spirituality variables from the core set of indices. We do this for two reasons. First, comparing the results between the core and alternative sets of indices allows for a robustness test of results to different aggregations of the survey questions. If we find similar results across similar types of socio-emotional variables, then this should lend credence to any broad conclusion about the effects of these kindergarten programs. Second, the “Big 5” personality traits have been developed by psychologists to represent broad dimensions of personality, within which more specific traits are nested (Goldberg, 1993). Following Heckman et al. (2013), we use our “Big 5” personality trait index in order to mitigate the possibility of outside personality traits exhibiting an endogenous influence on our potential mediators.

We report results of the effects of attending Jumpstart or the government kindergarten on the “Big 5” attributes in Table 5. The first two columns report the OLS and IV estimates on the openness index. The OLS and IV estimates suggest that attending Jumpstart increased openness by between 0.18 and 0.23 standard deviations. Although both OLS and IV estimates do not indicate any effect among children who attended the government kindergarten, formal tests fail to reject equality of attending Jumpstart and government kindergarten. Columns (3) and (4) report a similar finding on the conscientiousness index. The OLS and IV estimates suggest that attending Jumpstart increased conscientiousness by about 0.19 standard deviations. Again, there is no evidence of any meaningful effect for children who attended the government kindergarten, but we fail to reject equality of Jumpstart and government kindergarten effects. The effects reported in columns (5) through (10) in Table 5 all generally show that attending Jumpstart or government kindergarten has at most weak and at least no effects on extraversion, agreeableness, and neuroticism. IV estimates for the effect of attending the government kindergarten on agreeableness is statistically significant

and mirrors the effect on peer-affiliation reported in Table 4.

Comparing the results between the core and alternative set of socio-emotional indices suggests at least one conclusion for these first-stage mediation results. According to psychologists who study the components of important psychological attributes, attributes such as self-control and grit are often considered as subsets of conscientiousness (John and Srivastava 1999). Given the results reported in Table 3, it may not be too surprising to see that of the all of the “Big 5” attributes, the strongest effects of attending Jumpstart is in the conscientiousness index.

#### 4.2.2 Mediation Second-Stage

The second-stage of the Preacher and Selig (2012) mediation approach essentially mirrors the main empirical specifications, but includes a vector of indices representing potential mediating factors. In this sub-section we report results separately for the core and alternative sets of indices. Tables reporting results for each of the second-stage mediation regressions are in appendix Tables A7 through A14. In this sub-section these results are summarized in Figures 2 and 3. In each of these figures, the effects on Jumpstart and government kindergarten attendance are the direct effects of participating in either kindergarten program, relative to not attending kindergarten, conditional on all of the measured potential mediating variables. The effect on each of the index variables are the second-stage mediation effect, which needs to be multiplied with the associated first-stage mediation effects in order to calculate the indirect effect. These indirect effects will be discussed specifically in the next sub-section.

Figure 2 shows the second-stage mediation results using the core set in indices for each of our four primary outcome variables. Each panel represents the IV estimates from the second-stage mediation regression. Panel A shows results for the outcome variable indicating if the child performed best in third grade relative to their siblings. These results indicate a large direct effect due to attending Jumpstart, which persists even conditional on potential mediating index variables. The direct effect on attending government kindergarten remains small and statistically insignificant. The coefficient on each of the index variables is statistically insignificant. The results are about similar for the outcome variable indicating if the child performed best in elementary school relative to their siblings, shown in Panel B. The direct effect of attending Jumpstart remains relatively large, there is no direct effect of attending the government kindergarten, and the effects on each of the index variables are either relatively small or statistically insignificant. The only difference is that in Panel B the effect on the self-control index is now statistically significant at the conventional

level of confidence.

Panel C, in Figure 2, shows the second-stage mediation results for the outcome variable indicating if the child placed in the top section in third grade. The direct effects on both Jumpstart and government kindergarten attendance are relatively large and consistent with the primary results shown in Table 2. This indicates that these direct effects persist despite controlling for all of the potential mediating index variables. Additionally, none of the coefficients on the index variables are statistically significant at conventional levels and are all quite small. Finally, Panel D, shows the second-stage mediation results for the outcome variable indicating current enrollment status for school-aged children. Similar to the results in Panels A and B, the direct effect on Jumpstart attendance is large and roughly equivalent to the primary results shown in Table 2. One exception is that the effect on the academic skills index appears to be negative in Panel D. This effect, however, is not robust to coefficient stability tests of Oster (2017) and should be interpreted with care. Again, along with the finding that the effect estimates on each of the index variables are small or statistically insignificant, this indicates that the direct effect is strong even conditional on each of the potential mediating variables.

The overall pattern, displayed in Figure 2 shows up again in Figure 3 which reports results using the alternative set of indices. Again, each panel represents the IV estimates from the second-stage mediation regression. Panel A shows results for the outcome variable indicating if the child performed best in third grade relative to their siblings. Apart from the effect of conscientiousness, similar to Figure 2, these results suggest a large direct effect of attending Jumpstart, no evidence of a direct effect of attending government kindergarten, and small and statistically insignificant effect on each of the index variables. Panel B, which shows results for the outcome indicating if the child performed best in elementary relative to their siblings, also lead to similar findings. Again, the direct effect of attending Jumpstart is large. The only index variables with statistically significant effects are agreeableness and neuroticism, however similar with the effects on the other index variables, these effects are relatively small.

The second-stage mediation effects, using the alternative set of index variables shown in Panel C, also show similar results to those reported in Figure 2. Again the direct effect of both Jumpstart and government kindergarten are large, statistically significant, and are consistent with the primary results reported in Table 2. Aside from the effect estimate on the openness index, which is small but statistically significant at the conventional level of confidence, we find no effects on the other index variables. Finally, in Panel D, we show the second-stage mediation results on the outcome

variable indicating current enrollment status for school-aged children. These results are consistent with those shown in Figure 2, using the core set of index variables. Similarly, the negative effect of the academic skills index is not robust to the coefficient stability tests of Oster (2017). The direct effect of attending Jumpstart remains strong even when conditioning on all index variables. Additionally, all of the effects on the “Big 5” index variables are small and statistically insignificant at the conventional level of confidence.

### 4.2.3 Direct and Indirect Effects

As we discussed in the previous sub-section, the direct effects of attending each kindergarten program largely persist even when conditioning on potential mediating variables. More specifically, the effects on Jumpstart and government kindergarten attendance shown in Figures 2 and 3 are qualitatively consistent with the primary effects shown in Table 2. This implies that any potential indirect effect—calculated by multiplying the corresponding first-stage and second-stage effects together—are relatively small. Indeed this is largely what we see.

Panel A in Table 6 shows the indirect effect of the core set of indices. This set of potential mediating variables includes: grit, peer affiliation, self-control, self-identity, behavior, and spirituality. In most cases, we find that the 95% confidence interval includes zero which indicates a statistically insignificant indirect effect. The one exception is that we find a statistically significant indirect effect on self-control in column (2) of Table 6. This suggests that self-control may have a small mediating effect on academic performance elementary school.

We find similar results in Panel B in Table 6 with the alternative set of indices. This set of potential mediating variables include the “Big 5” attributes: openness, conscientiousness, extraversion agreeableness, and neuroticism. Again, similar to the results shown in Panel A, we find that in most cases the 95% confidence interval includes zero. There are three exceptions. First, we find evidence of a statistically significant indirect effect of conscientiousness in column (1). This makes sense given the significance of our self-control effect in the former index as self-control is an important sub-trait of the “Big 5” trait of conscientiousness. This suggests that conscientiousness may have a small mediating effect on academic performance in third grade. Second, we also find evidence of a statistically significant indirect effect of openness in column (3). This suggests that openness may have a small mediating effect on the probability of being placed in the top section in third grade. Finally, we find a statistically significant effect of conscientiousness on current enrollment in column (4).

What explains these results? Results from the first-stage of the mediation analysis, shown in Tables 3 and 5, show evidence of relatively large effects of attending Jumpstart on socio-emotional attributes such as grit, peer affiliation, self-control, openness, and conscientiousness. Each of these effects suggest that attending jumpstart increases these attributes by between 0.2 and 0.3 standard deviations. When we consider the second-stage of the mediation analysis, however, the effects of these potential mediating index variables have relatively small effects on our primary outcome variables, suggesting large and persistent direct effects of attending the Jumpstart program. This begs the question: What is in the direct effect that makes attending Jumpstart so beneficial even conditional on important socio-emotional attributes that seem to have also improved due to attending Jumpstart?

One plausible explanation is the health components included in the Jumpstart program as enrichments to the standard kindergarten curriculum. These health components included the provision of de-worming treatment, daily provided nutritionally fortified lunch and snacks, and regular medical screening on a monthly basis that monitored each child’s physical growth and development. Each of these individual components—de-worming (Miguel and Kremer 2004), school feeding (Alderman and Bundy 2012; Aurino et al. 2019; Chakraborty and Jayaraman 2019), and medical screening (Glewwe et al. 2001; Alderman et al. 2006; Maluccio et al. 2009)—are known to spur positive effects on educational and academic outcomes. Therefore, it is plausible that these components of the Jumpstart program play an important role in driving the persistent and large direct effects.

Although, this is a plausible explanation we are ultimately unable to identify these effect quantitatively because the provision of these health components is completely co-linear with attending Jumpstart. Therefore, in our present study we are unable to disentangle any of these likely important indirect effects of the health components from the rest of the Jumpstart program. Future work could follow up on this study by investigating the indirect effects of the health components in explaining the overall benefits of the Jumpstart program.

## 5 Limitations and Robustness Checks

Similar to any empirical study, our results come with limitations. In this section we aim to address these limitations and perform robustness checks whenever it is possible. Our aim is to be forthcoming about any limitations so as to properly establish the credibility of our empirical findings



and motivate future research on the topic of the effectiveness of various types of early childhood education programs in the Philippines specifically and developing countries more broadly.

## 5.1 Outcome Variables

One possible shortcoming of our paper are the measures we use as outcome variables. Like most survey data, our data is elicited from the head of household. With education data, however, it is often ideal to rely at least to some degree on institutional data, to which we did not have access for this study. One weakness with our parental data is that some of our outcomes rely on parental ranking, which does not take into account the size of the differences between siblings. Conceivably there could also be biases that confound behavioral outcomes with academic outcomes, so that if a child behaves better in school as a result of a kindergarten intervention, this could be confused in a parent's mind with better academic outcomes. While institutional data clearly may be advantageous in that it would provide exact measures of scores on grades and national exams, parental data may contain its own advantages. These would include a better ability to see the larger and more holistic picture of academic development among children, the ability to account in academic performance for illnesses and other events outside a particular child's control, and a knowledge of other factors that may allow the parent to adjust for other factors (e.g., the challenge of switching schools from a family move, better or poor teaching quality as reported by children, etc.). As such, asking parents to rank their children in overall academic performance embodies some advantages that may compensate for disadvantages. Additionally, it is worth mentioning again that the core results are robust to more objective measures, such as whether or not the child placed in the top third grade section and current enrollment status for school aged children.

## 5.2 Village Fixed Effects

We prefer the use of household fixed-effect estimations on our data, especially when used in conjunction with sibling rankings over elementary school academic performance. They control for parenting, many environmental factors common to the household, and to some extent genetic factors, while simultaneously inducing variation in outcomes through the sibling ranking exercise. However, in Appendix Table A1, we present standard OLS (without fixed effects) and village fixed-effect estimations on the four basic outcomes in our data. These estimations are very similar to our OLS estimations with household fixed-effects, actually showing slightly higher point estimates for most of the primary outcomes. Estimates using standard OLS give somewhat higher point estimates

than the household fixed-effect estimates, but point estimates for village fixed-effect estimates are lower and, while still mostly positive, often statistically insignificant. This is not surprising given the selection method used by ICM for the Jumpstart program, where the most disadvantaged children were chosen for the program. Failing to correct for the level of poverty of the household should bias estimates downwards.

### 5.3 Unobservable Selection

Also in the Appendix, we present robustness checks using Oster (2017) bounds, which calculates a statistic known as Oster's  $\delta$ . This statistic represents the ratio of the influence of unobservables to observable control variables that would render a null effect from the variable of concern. A high delta is thus generally considered to represent a result more robust to possible unobserved heterogeneity. A negative result implies that when observable controls (or fixed effects) are added that the magnitude of the coefficient increases, and if this occurs, the result is unlikely to decrease if one were able to include unobservables in the estimation.

In Table A8, in the appendix, we examine the robustness of four of the statistically significant indirect effects reported in Table 6.<sup>13</sup> In columns (1) and (2) of Table A8, we examine robustness of the indirect effect of conscientiousness on the core outcome indicating if the child performed best in third grade among their siblings. We find a negative value for Oster's  $\delta$ . We also find a negative value for Oster's  $\delta$  in columns (3) and (4) when examining the robustness of the indirect effect of self-control on the core outcome indicating if the child performed best in elementary school. These results indicate that the indirect effects of conscientiousness and self-control are highly robust in this context. In columns (5) and (6) we find that Oster's  $\delta$  is equal to about 0.45. This implies that the indirect effect of openness on being placed in the top section in third grade is less robust to potential unobserved heterogeneity. Finally, in columns (7) and (8) Oster's  $\delta$  implies that unobservables would need to be about 1.73 times more influential than the relevant observables. According to Oster (2017), this suggests that the indirect effect of conscientiousness on current enrollment is relatively robust to unobserved heterogeneity.

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<sup>13</sup>We do not examine the robustness of the academic skills effect, shown in Panel D of Figures 2 and 3, because the coefficient estimate in the short regression is positive and statistically significant and is negative and statistically significant in the long regression. According to Oster (2017) this result is not robust to unobservable heterogeneity.

## 6 Discussion and Conclusion

Our research examines the relative impacts of two types of kindergarten programs that were introduced in the Philippines during the last 15 years, a government kindergarten which began to be introduced across the country beginning in 2012 and a faith-based kindergarten, Jumpstart, which was phased in in 2005 and operated in the country until 2017. We find that while the government kindergarten had modest effects overall, the impacts of Jumpstart were much larger. Ordinary least squares estimations with household fixed effects indicate children enrolled in Jumpstart were more than twice as likely to be listed by their mothers as having the highest academic performance in elementary school among all of their siblings, in third grade (when a National Achievement Test measures child academic performance), more likely to be placed in the highest third-grade section, and more likely to continue be enrolled in school at time of survey. These results are robust to instrumental variable estimation that exploits the timing of the village-level rollout of these kindergarten programs.

We test for mediation, trying to understand through which channels the Jumpstart program affected academic outcomes, finding that the program increased grit, peer affiliation, self-control, and a stronger sense of self-identity along with academic skills, where the government kindergarten only exhibited a significant effect on the latter. Measured in terms of the “Big 5” personality traits, Jumpstart positively affected conscientiousness and openness to new experience. We find modest evidence that the increase in academic achievement caused by Jumpstart was mediated by an increase in Conscientiousness.

We believe that these results re-enforce the conclusions of previous work carried out in the United States (Heckman et al. 2013) for developing countries. This research strongly indicates the development of socio-emotional skills during the pre-school and kindergarten years to be of vital importance to subsequent academic achievement and later-life outcomes. Future work should be carried out in the context of lower- and middle-income countries to provide external validity to these results.

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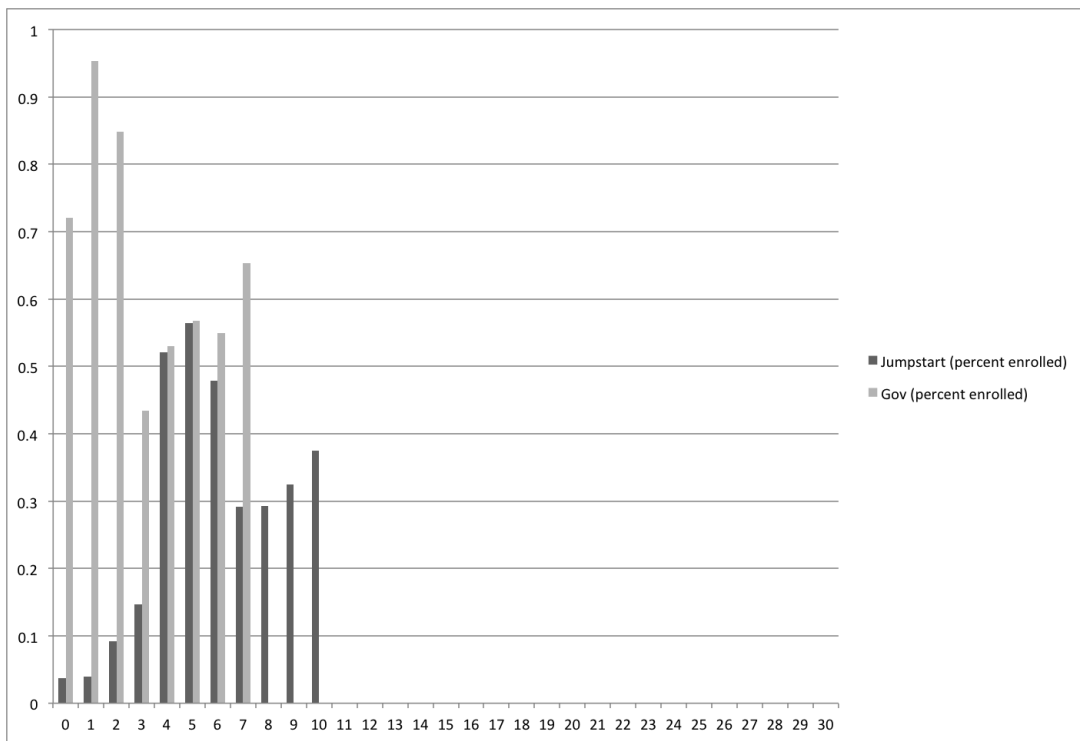


Table 1: Summary Statistics

<b>Panel A: Household Variables</b>	Mean	Std. Dev.	Obs.
HH income	4,982	4,246	921
IHS HH income <sup>a</sup>	9.00	0.73	921
HH size	6.08	2.36	942
Mother's age	42.73	9.35	943
Mother attended high school	0.48	0.50	943
Mother attended college	0.10	0.30	943
Mother married	0.86	0.34	943
Mother "stay-at-home"	0.58	0.49	943
Mother graduated VHL	0.83	0.38	943
<b>Panel B: Child Variables</b>	Mean	Std. Dev.	Obs.
Child age			
Jumpstart	11.67	2.30	565
Gov't Kindergarten	9.54	2.68	791
No Kindergarten	17.71	4.67	1,081
Child current grade			
Jumpstart	5.86	2.02	544
Gov't Kindergarten	4.18	2.38	774
No Kindergarten	9.57	2.40	647
Sex of Child (1 = Male)			
Jumpstart	0.51	0.50	565
Gov't Kindergarten	0.54	0.50	791
No Kindergarten	0.57	0.49	1,081
Performed best in third grade			
Jumpstart	0.51	0.50	565
Gov't Kindergarten	0.27	0.44	791
No Kindergarten	0.27	0.45	1,081
Performed best in elementary school			
Jumpstart	0.49	0.50	565
Gov't Kindergarten	0.30	0.46	791
No Kindergarten	0.29	0.46	1,081
Placed in top third grade section <sup>b</sup>			
Jumpstart	0.44	0.50	565
Gov't Kindergarten	0.38	0.49	791
No Kindergarten	0.35	0.48	1,081
Child currently enrolled in school			
Jumpstart	0.96	0.19	565
Gov't Kindergarten	0.98	0.15	791
No Kindergarten	0.60	0.49	1,081

*Notes:* <sup>a</sup>IHS is the inverse hyperbolic sine transformation. This is a "log-like" function that is capable of computing zero values.  
<sup>b</sup>The variable identifying children placed in the top third grade section includes predicted values for missing information due to item non-response.

Figure 1: Enrollment Rates at Age when Kindergarten Entered Village



*Notes:* In this figure the darker bars represent the enrollment rate in Jumpstart kindergarten at each age when the Jumpstart program entered each village. The lighter bars represent the enrollment rate in government kindergarten at each age when the Kindergarten Education Act was passed in 2011.

Table 2: Effects on Primary Outcomes — OLS and IV Estimates

	Performed Best in Third Grade		Performed Best in Elementary		Placed in Top Third Grade Section		Currently Enrolled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Jumpstart	0.282*** (0.0652)	0.259*** (0.0615)	0.178*** (0.0576)	0.165** (0.0773)	0.229*** (0.0505)	0.213*** (0.0548)	0.112** (0.0483)	0.0865** (0.0421)
Gov't kindergarten	0.00997 (0.0506)	-0.0122 (0.0823)	-0.00782 (0.0544)	-0.0735 (0.0881)	0.177*** (0.0492)	0.188*** (0.0622)	0.0479 (0.0519)	-0.0858* (0.0483)
Jumpstart = Gov't test (p-value)	0.000	0.000	0.000	0.007	0.218	0.685	0.018	0.000
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.254	0.253	0.185	0.184	0.638	0.638	0.672	0.665
Weak IV test								
Jumpstart (F-stat)		78.08		78.08		78.08		54.72
Gov't kindergarten (F-stat)		25.19		25.19		25.19		24.50
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. In columns (1) through (6) an additional control variable indicates if a child is less than 9 years old. In columns (7) and (8) two additional control variables indicate if the child is less than 4 or over 24 years old. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. In columns (1) through (4) and (7) through (8) standard errors are clustered at the village level. In columns (5) and (6) standard errors are bootstrapped with 1000 replications. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 3: Effects on Psychological Attributes — OLS and IV Estimates

	Grit index		Peer affiliation index		Self control index		Self identity index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Jumpstart	0.131* (0.0699)	0.141** (0.0687)	0.113 (0.0716)	0.0498 (0.0798)	0.136** (0.0679)	0.158* (0.0839)	0.184** (0.0803)	0.207** (0.0857)
Gov't kindergarten	0.0763 (0.0676)	0.131 (0.0805)	0.0180 (0.0645)	0.157** (0.0738)	0.0732 (0.0557)	0.190** (0.0885)	0.0925 (0.0918)	0.0769 (0.0978)
Jumpstart = Gov't test (p-value)	0.473	0.902	0.136	0.215	0.334	0.706	0.220	0.178
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.795	0.795	0.832	0.829	0.775	0.774	0.749	0.749
Weak IV test								
Jumpstart (F-stat)		78.08		78.08		78.08		78.08
Gov't kindergarten (F-stat)		25.19		25.19		25.19		25.19
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. Standard errors are clustered at the village level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 4: Effects on Behavior, Spirituality, and Academic Indices — OLS and IV Estimates

	Behavior index		Spirituality index		Academic expectations index		Academic skills index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Jumpstart	-0.0162 (0.0450)	0.0231 (0.0520)	0.0358 (0.0688)	0.104* (0.0620)	0.114 (0.0927)	0.230*** (0.0825)	0.230** (0.0962)	0.305*** (0.0812)
Gov't kindergarten	-0.0371 (0.0481)	0.0301 (0.0562)	0.0721 (0.0488)	0.133* (0.0711)	0.106 (0.0640)	0.235** (0.111)	0.152* (0.0853)	0.320*** (0.112)
Jumpstart = Gov't test (p-value)	0.667	0.910	0.514	0.680	0.921	0.969	0.414	0.905
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.898	0.898	0.834	0.834	0.728	0.727	0.639	0.637
Weak IV test								
Jumpstart (F-stat)		78.08		78.08		78.08		78.08
Gov't kindergarten (F-stat)		25.19		25.19		25.19		25.19
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

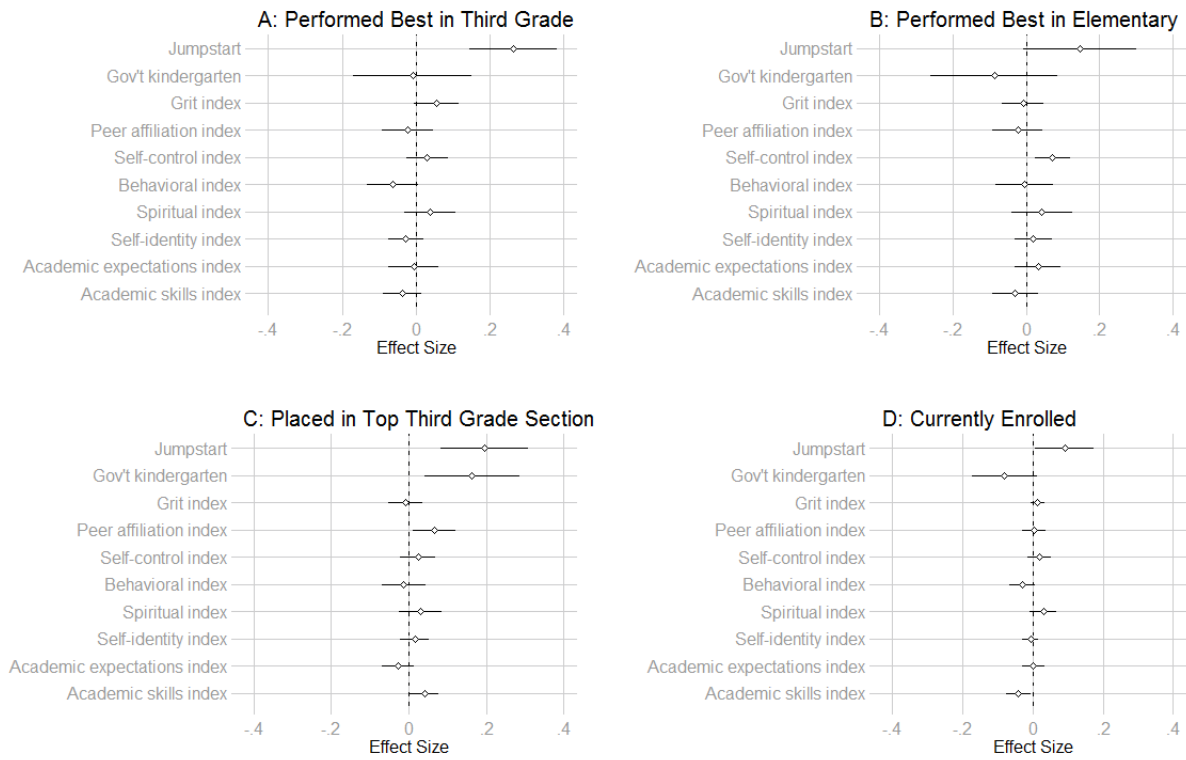
*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. Standard errors are clustered at the village level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 5: Effects on “Big 5” Attributes — OLS and IV Estimates

	Openness index		Conscientiousness index		Extraversion index		Agreeableness index		Reverse(Neuroticism) index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
Jumpstart	0.181** (0.0902)	0.226** (0.0935)	0.183** (0.0794)	0.192** (0.0833)	0.0590 (0.0836)	0.0384 (0.0812)	0.0850 (0.0643)	0.104 (0.0702)	-0.00358 (0.0497)	0.00335 (0.0627)
Gov't kindergarten	0.104 (0.0837)	0.127 (0.123)	0.0863 (0.0738)	0.170* (0.102)	0.0309 (0.0648)	0.127 (0.0875)	0.0231 (0.0695)	0.172** (0.0803)	0.0231 (0.0510)	0.0917 (0.0700)
Jumpstart = Gov't test (p-value)	0.299	0.356	0.249	0.855	0.728	0.371	0.345	0.424	0.581	0.137
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.677	0.677	0.720	0.720	0.768	0.768	0.784	0.782	0.885	0.885
Weak IV test										
Jumpstart (F-stat)		78.08		78.08		78.08		78.08		78.08
Gov't kindergarten (F-stat)		25.19		25.19		25.19		25.19		25.19
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

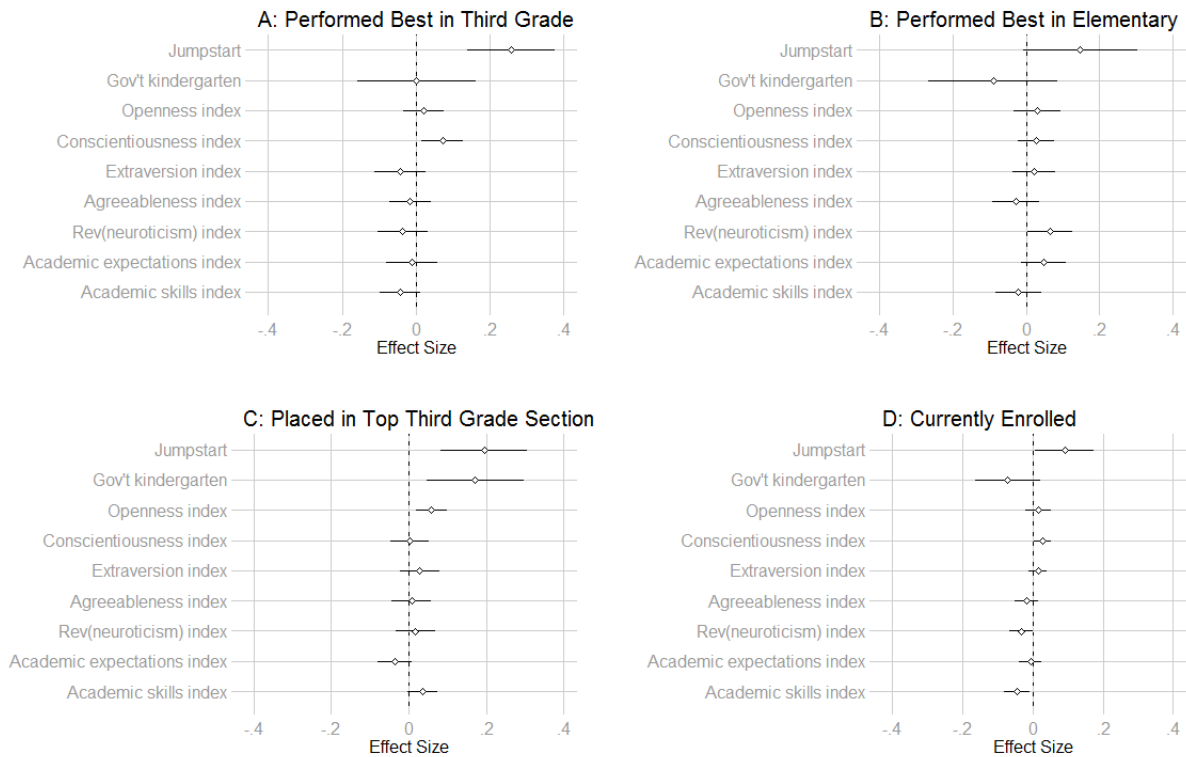
*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Figure 2: Second-Stage Mediation Results, Core Indices



*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, and birth order dummy variables. Standard errors are clustered at the village level. Tables showing the individual regressions behind these figures are in the appendix.

Figure 3: Second-Stage Mediation Results, “Big 5” Indices



*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, and birth order dummy variables. Standard errors are clustered at the village level. Tables showing the individual regressions behind these figures are in the appendix.

Table 6: 95% Confidence Intervals of Indirect Effects

	Performed best in third grade (1)	Performed best in elementary (2)	Placed in top section (3)	Currently enrolled (4)
<b>Panel A: Core indices</b>				
Grit index	[-0.001; 0.022]	[-0.011; 0.008]	[-0.007; 0.007]	[-0.001; 0.007]
Peer affiliation index	[-0.015; 0.005]	[-0.017; 0.006]	[-0.003; 0.015]	[-0.005; 0.006]
Self-control index	[-0.005; 0.017]	[0.000; 0.029]	[-0.002; 0.016]	[-0.002; 0.011]
Self-identity index	[-0.019; 0.005]	[-0.007; 0.017]	[-0.004; 0.013]	[-0.007; 0.004]
Behavior index	[-0.009; 0.005]	[-0.005; 0.004]	[-0.003; 0.003]	[-0.005; 0.003]
Spirituality index	[-0.003; 0.019]	[-0.004; 0.019]	[-0.003; 0.012]	[-0.001; 0.010]
<b>Panel B: Alternative “Big 5” indices</b>				
Openness index	[-0.008; 0.021]	[-0.008; 0.026]	[0.002; 0.029]	[-0.005; 0.015]
Conscientiousness index	[0.001; 0.033]	[-0.004; 0.019]	[-0.010; 0.011]	[0.000; 0.014]
Extraversion index	[-0.013; 0.007]	[-0.005; 0.008]	[-0.005; 0.009]	[-0.003; 0.005]
Agreeableness index	[-0.011; 0.005]	[-0.013; 0.005]	[-0.006; 0.008]	[-0.008; 0.002]
Reverse(neuroticism) index	[-0.007; 0.006]	[-0.009; 0.010]	[-0.004; 0.004]	[-0.005; 0.005]
All “Big 5”	[-0.009; 0.043]	[-0.013; 0.036]	[-0.003; 0.037]	[-0.005; 0.023]

*Notes:* We calculate these confidence intervals using the Monte Carlo approach detailed by Preacher and Selig (2012). Figures showing the distributions of these indirect effects are presented in the appendix.



## Supplemental Appendix

The supplemental appendix includes additional tables and figures that support the results presented and discussed in the main manuscript.

Tables A1 shows OLS and village fixed effects estimates and show robustness of the results reported in Tables 2 in the main manuscript.

Table A2 shows OLS and IV estimates of heterogeneous effects between girls and boys.

Table A3 shows OLS and IV estimates of heterogeneous effects between children who are 11 years old or older and children who are 10 years old or younger at the time of data collection.

Tables A4 through A6 show OLS and village fixed effects estimates and show robustness of the results reported in Tables 3 through 5 in the main manuscript.

Table A7 shows summary statistics of each of the potential mediating index variables. Each of these indices are constructed using the methods of Kling et al. (2017), so each variable has a mean of zero and a standard deviation of one.

Table A8 show results of unobservable selection and coefficient stability tests on select indirect effects, using the methods of Oster (2017).

Tables A9 through A16 show the second-stage mediation effects summarized in Figures 2 and 3 in the main manuscript.

Figures A1 through A8 show the Monte Carlo distribution of the indirect effects, summarized in Table 6 in the main manuscript.

Tables A17 and A18 report the individual survey questions used to construct the various index variables used in this analysis.

Table A1: Effects on Primary Outcomes — OLS and Village FE Estimates

	Performed Best in Third Grade		Performed Best in Elementary		Placed in Top Third Grade Section		Currently Enrolled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Jumpstart	0.215*** (0.0319)	0.260*** (0.0359)	0.160*** (0.0268)	0.187*** (0.0314)	0.203*** (0.0457)	0.246*** (0.0368)	0.109*** (0.0322)	0.113*** (0.0350)
Gov't kindergarten	0.0273 (0.0244)	0.0112 (0.0268)	0.0143 (0.0248)	0.000655 (0.0270)	0.182*** (0.0352)	0.174*** (0.0348)	0.0582 (0.0375)	0.0572 (0.0375)
Jumpstart = Gov't test (p-value)	0.000	0.000	0.000	0.000	0.650	0.020	0.001	0.011
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.141	0.162	0.105	0.117	0.077	0.265	0.387	0.441
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. In columns (1) through (6) an additional control variable indicates if a child is less than 9 years old. In columns (7) and (8) two additional control variables indicate if the child is less than 4 or over 24 years old. Household/mother controls include household income, household size, mother's age, dummy variables indicating if the mother has attended either high school or college, mother's marital status, a dummy variable indicating if the mother is a "stay at home" mom, and a dummy variable indicating if the mother graduated from ICM's "Transform" program. In columns (1) through (4) and (7) through (8) standard errors are clustered at the village level. In columns (5) and (6) standard errors are bootstrapped with 1000 replications. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A2: Effects on Primary Outcomes by Sex — OLS and IV Estimates

	Performed Best in Third Grade		Performed Best in Elementary		Placed in Top Third Grade Section		Currently Enrolled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
<b>Panel A: Girl siblings</b>								
Jumpstart	0.332*** (0.125)	0.242** (0.116)	0.106 (0.155)	0.0804 (0.150)	0.225** (0.101)	0.226** (0.0939)	0.155** (0.0690)	0.114* (0.0595)
Gov't kindergarten	-0.0138 (0.125)	0.158 (0.159)	-0.124 (0.122)	-0.186 (0.141)	0.205** (0.0927)	0.311*** (0.113)	0.0923 (0.0609)	-0.0138 (0.0818)
Jumpstart = Gov't test (p-value)	0.002	0.588	0.079	0.084	0.817	0.426	0.181	0.069
Observations	705	705	705	705	705	705	705	705
R-squared	0.281	0.264	0.232	0.231	0.680	0.677	0.762	0.758
Weak IV test								
Jumpstart (F-stat)		26.30		16.30		26.30		35.20
Gov't kindergarten (F-stat)		17.53		17.53		17.53		14.26
<b>Panel B: Boy siblings</b>								
Jumpstart	0.342*** (0.0948)	0.385*** (0.111)	0.149 (0.103)	0.176 (0.111)	0.245*** (0.0842)	0.221** (0.0971)	0.128 (0.0834)	0.117* (0.0683)
Gov't kindergarten	0.0633 (0.0931)	-0.0823 (0.106)	0.0306 (0.108)	-0.110 (0.118)	0.156** (0.0773)	0.225** (0.0905)	0.0428 (0.0807)	-0.106 (0.0741)
Jumpstart = Gov't test (p-value)	0.003	0.000	0.208	0.007	0.242	0.967	0.076	0.001
Observations	952	952	952	952	952	952	952	952
R-squared	0.360	0.350	0.290	0.281	0.673	0.671	0.706	0.699
Weak IV test								
Jumpstart (F-stat)		48.19		48.19		48.19		35.83
Gov't kindergarten (F-stat)		21.94		21.94		21.94		27.35
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. In columns (1) through (6) an additional control variable indicates if a child is less than 9 years old. In columns (7) and (8) two additional control variables indicate if the child is less than 4 or over 24 years old. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. In columns (1) through (4) and (7) through (8) standard errors are clustered at the village level. In columns (5) and (6) standard errors are bootstrapped with 1000 replications. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table A3: Effects on Primary Outcomes by Age — OLS and IV Estimates

	Performed Best in Third Grade		Performed Best in Elementary		Placed in Top Third Grade Section		Currently Enrolled	
	(1) OLS	(2) IV	(3) OLS	(4) IV	(5) OLS	(6) IV	(7) OLS	(8) IV
<b>Panel A: Age 11 or Older</b>								
Jumpstart	0.208** (0.0947)	0.139 (0.0931)	0.0778 (0.0644)	-0.0212 (0.105)	0.133** (0.0523)	0.185*** (0.0619)	0.0119 (0.0427)	-0.0590 (0.0605)
Observations	1,508	1,508	1,508	1,508	1,508	1,508	1,508	1,508
R-squared	0.195	0.193	0.164	0.161	0.660	0.660	0.694	0.692
Weak IV test								
Jumpstart (F-stat)		34.01		34.01		34.01		29.90
<b>Panel B: Age 10 or Younger</b>								
Jumpstart	0.332*** (0.116)	0.383** (0.182)	0.103 (0.146)	0.229 (0.278)	0.135 (0.114)	0.348** (0.168)	0.0340 (0.0673)	0.0338 (0.127)
Observations	445	445	445	445	445	445	445	445
R-squared	0.583	0.583	0.462	0.458	0.676	0.666	0.722	0.722
Weak IV test								
Jumpstart (F-stat)		26.28		26.28		26.28		25.60
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. In columns (1) through (6) an additional control variable indicates if a child is less than 9 years old. In columns (7) and (8) two additional control variables indicate if the child is less than 4 or over 24 years old. Weak instrument tests report the Sanderson and Windmeijer (2016) F-statistic. In columns (1) through (4) and (7) through (8) standard errors are clustered at the village level. In columns (5) and (6) standard errors are bootstrapped with 1000 replications. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A4: Effects on Psychological Attributes — OLS and Village FE Estimates

	Grit index		Peer affiliation index		Self control index		Self identity index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Jumpstart	0.201** (0.0856)	0.0139 (0.0525)	0.232*** (0.0673)	0.0502 (0.0578)	0.256*** (0.0776)	0.0604 (0.0644)	0.102 (0.0938)	0.0244 (0.0637)
Gov't kindergarten	0.0353 (0.0749)	0.102* (0.0548)	0.0159 (0.0636)	0.0990* (0.0558)	0.0715 (0.0638)	0.122** (0.0568)	-0.0171 (0.0761)	0.0138 (0.0676)
Jumpstart = Gov't test (p-value)	0.072	0.166	0.006	0.408	0.025	0.276	0.197	0.853
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.073	0.428	0.083	0.371	0.064	0.319	0.033	0.289
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Household/mother controls include household income, household size, mother's age, dummy variables indicating if the mother has attended either high school or college, mother's marital status, a dummy variable indicating if the mother is a "stay at home" mom, and a dummy variable indicating if the mother graduated from ICM's "Transform" program. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A5: Effects on Behavior, Spirituality, and Academic Skills — OLS and Village FE Estimates

	Behavior index		Spiritual index		Academic index		Scholastic index	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Jumpstart	0.111 (0.0784)	-0.0418 (0.0585)	0.0864 (0.0961)	0.0697 (0.0741)	0.0775 (0.0916)	0.0453 (0.0789)	0.185** (0.0911)	0.131 (0.0841)
Gov't kindergarten	0.00570 (0.0673)	0.0325 (0.0561)	0.145* (0.0777)	0.127** (0.0628)	0.0617 (0.0726)	0.129* (0.0713)	0.114 (0.0743)	0.168** (0.0762)
Jumpstart = Gov't test (p-value)	0.250	0.243	0.532	0.281	0.857	0.230	0.370	0.604
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.061	0.444	0.049	0.346	0.058	0.225	0.041	0.161
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Household/mother controls include household income, household size, mother's age, dummy variables indicating if the mother has attended either high school or college, mother's marital status, a dummy variable indicating if the mother is a "stay at home" mom, and a dummy variable indicating if the mother graduated from ICM's "Transform" program. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A6: Effects on Big Five Attributes — OLS and Village Fixed Effect Estimates

	Openness		Conscientiousness		Extraversion		Agreeableness		Reverse(Neuroticism)	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Jumpstart	0.170*	0.0912	0.239***	0.0465	0.143*	0.0302	0.251***	0.0770	0.0439	-0.0505
	(0.0907)	(0.0654)	(0.0825)	(0.0639)	(0.0813)	(0.0664)	(0.0785)	(0.0697)	(0.0924)	(0.0759)
Gov't kindergarten	0.0565	0.0938	0.0417	0.101	0.0540	0.126**	0.0930	0.135**	0.00439	0.0297
	(0.0762)	(0.0723)	(0.0722)	(0.0616)	(0.0570)	(0.0506)	(0.0597)	(0.0542)	(0.0767)	(0.0684)
Jumpstart = Gov't test (p-value)	0.194	0.963	0.019	0.394	0.285	0.169	0.078	0.411	0.636	0.187
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.054	0.266	0.073	0.332	0.032	0.240	0.047	0.264	0.061	0.416
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household/mother controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village fixed effects	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Child controls include the child's age, the sex of the child, and birth order dummy variables. Household/mother controls include household income, household size, mother's age, dummy variables indicating if the mother has attended either high school or college, mother's marital status, a dummy variable indicating of the mother is a "stay at home" mom, and a dummy variable indicating if the mother graduated from ICM's "Transform" program. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A7: Summary Statistics, Potential Mediating Variables — Kling et al. (2007) Index

<b>Panel A: Core Variables</b>	Mean	Std. Dev.	Obs.
Grit index	0.00	1	2,437
Peer-affiliation index	0.00	1	2,437
Self-control index	0.00	1	2,437
Self-identity index	0.00	1	2,437
Behavior index	0.00	1	2,437
Spiritual index	0.00	1	2,437
Academic index	0.00	1	2,437
Scholastic index	0.00	1	2,437

<b>Panel B: Alternative “Big 5” Variables</b>	Mean	Std. Dev.	Obs.
Openness index	0.00	1	2,437
Conscientiousness	0.00	1	2,437
Extraversion index	0.00	1	2,437
Agreeableness	0.00	1	2,437
Rev(Neuroticism)	0.00	1	2,437

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). This method first standardizes each of the components for each index and then, after summing the components of an index together, standardizes the aggregated index.



Table A8: Unobservable Selection and Coefficient Stability Tests on Indirect Effects

	Performed Best in Third Grade		Performed Best in Elementary		Placed in Top Third Grade Section		Currently Enrolled	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Self-control index			0.007 (0.006)	0.074** (0.031)				
Conscientiousness index	-0.001 (0.007)	0.071* (0.0367)					0.010 (0.009)	0.030* (0.015)
Openness index					0.064*** (0.015)	0.058** (0.026)		
Oster's $\delta$		-2.26		-28.16		0.457		1.73
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.046	0.259	0.037	0.194	0.022	0.648	0.221	0.676
Jumpstart enrollment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Gov't kindergarten enrollment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Child controls	No	Yes	No	Yes	No	Yes	No	Yes
Household/mother fixed effects	No	Yes	No	Yes	No	Yes	No	Yes

*Notes:* In this table we only assess the robustness of the statistically significant indirect effects (presented in column (9) in Tables 6 and 7 and column (8) in Tables 9 and 10), since it is unreasonable to assess whether the observed non-relationship is driven by omitted variables. The  $\delta$  parameter is estimated following the procedures described by Altonji, Elder, and Taber (2005) and Oster (2017) and represents the proportional selection coefficient. Each of the indices are standardized using the technique used by Kling et al. (2007). Child controls include the child age, the sex of the child, and birth order dummy variables. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A9: Second-Stage Mediation Effects on Performance in Third Grade, Core Mediators — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Grit index	0.0217 (0.0307)								0.0541 (0.0397)	0.0570* (0.0299)
Peer affiliation index		-0.00879 (0.0282)							-0.0221 (0.0368)	-0.0252 (0.0300)
Self-control index			0.0189 (0.0262)						0.0304 (0.0351)	0.0257 (0.0279)
Behavioral index				-0.0502 (0.0403)					-0.0655 (0.0435)	-0.0559* (0.0322)
Spiritual index					0.0136 (0.0319)				0.0425 (0.0464)	0.0550 (0.0364)
Self-identity index						-0.0251 (0.0276)			-0.0287 (0.0305)	-0.0238 (0.0247)
Academic index							-0.00879 (0.0307)		-0.00530 (0.0434)	0.00768 (0.0314)
Scholastic index								-0.0145 (0.0237)	-0.0366 (0.0337)	-0.0437 (0.0263)
Jumpstart (Direct effect)	0.280*** (0.0662)	0.284*** (0.0651)	0.280*** (0.0652)	0.282*** (0.0649)	0.282*** (0.0651)	0.287*** (0.0643)	0.283*** (0.0650)	0.286*** (0.0650)	0.286*** (0.0643)	0.135*** (0.0465)
Gov't kindergarten (Direct effect)	0.00831 (0.0505)	0.0103 (0.0508)	0.00859 (0.0502)	0.00810 (0.0513)	0.00898 (0.0507)	0.0123 (0.0503)	0.0109 (0.0507)	0.0122 (0.0511)	0.00784 (0.0508)	-0.178*** (0.0629)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.254	0.254	0.254	0.255	0.254	0.254	0.254	0.254	0.259	0.211
Weak IV test										
Jumpstart (F-stat)										44.88
Gov't kindergarten (F-stat)										29.90
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table A10: Second-Stage Mediation Effects on Performance in Elementary, Core Mediators — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Grit index	0.0219 (0.0256)								-0.00922 (0.0360)	-0.00845 (0.0282)
Peer affiliation index		0.0219 (0.0341)							-0.0283 (0.0410)	-0.0294 (0.0327)
Self-control index			0.0764*** (0.0243)						0.0740** (0.0309)	0.0742*** (0.0243)
Behavioral index				0.00282 (0.0447)					-0.00600 (0.0478)	-0.00767 (0.0377)
Spiritual index					0.0712* (0.0385)				0.0467 (0.0536)	0.0480 (0.0428)
Self-identity index						0.0394 (0.0293)			0.0180 (0.0328)	0.0181 (0.0254)
Academic index							0.0473* (0.0282)		0.0327 (0.0397)	0.0331 (0.0309)
Scholastic index								0.0279 (0.0222)	-0.0278 (0.0400)	-0.0273 (0.0313)
Jumpstart (Direct effect)	0.175*** (0.0579)	0.175*** (0.0585)	0.168*** (0.0586)	0.178*** (0.0577)	0.176*** (0.0576)	0.171*** (0.0578)	0.173*** (0.0581)	0.172*** (0.0588)	0.171*** (0.0585)	0.148* (0.0777)
Gov't kindergarten (Direct effect)	-0.00949 (0.0541)	-0.00876 (0.0545)	-0.0134 (0.0539)	-0.00771 (0.0548)	-0.0129 (0.0545)	-0.0115 (0.0547)	-0.0128 (0.0544)	-0.0120 (0.0548)	-0.0158 (0.0549)	-0.0843 (0.0870)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.186	0.186	0.191	0.185	0.189	0.187	0.188	0.187	0.194	0.193
Jumpstart (F-stat)										63.74
Gov't kindergarten (F-stat)										25.34
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A11: Second-Stage Mediation Effects on Placed in Top Section, Core Mediators — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Grit index	0.0495* (0.0279)								-0.00129 (0.0281)	-0.00115 (0.0220)
Peer affiliation index		0.0674** (0.0284)							0.0281 (0.0302)	0.0287 (0.0235)
Self-control index			0.0676** (0.0289)						0.0303 (0.0291)	0.0306 (0.0227)
Behavioral index				0.0218 (0.0359)					-0.000368 (0.0358)	-0.000725 (0.0278)
Spiritual index					0.0775*** (0.0278)				0.0281 (0.0357)	0.0271 (0.0275)
Self-identity index						0.0458** (0.0228)			0.0160 (0.0237)	0.0166 (0.0187)
Academic index							0.0454*** (0.0167)		-0.0275 (0.0267)	-0.0279 (0.0209)
Scholastic index								0.0599*** (0.0160)	0.0404* (0.0241)	0.0410** (0.0188)
Jumpstart (Direct effect)	0.223*** (0.0511)	0.219*** (0.0513)	0.220*** (0.0507)	0.230*** (0.0506)	0.226*** (0.0501)	0.221*** (0.0499)	0.224*** (0.0510)	0.215*** (0.0509)	0.211*** (0.0515)	0.192*** (0.0577)
Gov't kindergarten (Direct effect)	0.173*** (0.0500)	0.174*** (0.0500)	0.172*** (0.0492)	0.178*** (0.0488)	0.171*** (0.0485)	0.172*** (0.0480)	0.172*** (0.0495)	0.168*** (0.0493)	0.167*** (0.0485)	0.163** (0.0624)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.640	0.642	0.642	0.638	0.642	0.640	0.640	0.644	0.646	0.646
Jumpstart (F-stat)										63.74
Gov't kindergarten (F-stat)										25.34
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A12: Second-Stage Mediation Effects on Current Enrollment, Core Mediators — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Grit index	-0.000739 (0.0132)								0.0138 (0.0138)	0.0148 (0.0107)
Peer affiliation index		0.00254 (0.0151)							0.00674 (0.0199)	0.00291 (0.0158)
Self-control index			0.0108 (0.0152)						0.0191 (0.0206)	0.0187 (0.0164)
Behavioral index				-0.0212 (0.0224)					-0.0273 (0.0228)	-0.0290 (0.0179)
Spiritual index					0.00641 (0.0207)				0.0268 (0.0244)	0.0303 (0.0198)
Self-identity index						-0.00872 (0.0148)			-0.00407 (0.0143)	-0.00563 (0.0116)
Academic index							-0.0103 (0.0187)		0.000166 (0.0213)	0.00181 (0.0168)
Scholastic index								-0.0187 (0.0161)	-0.0407* (0.0211)	-0.0412** (0.0172)
Jumpstart (Direct effect)	0.112** (0.0486)	0.111** (0.0488)	0.110** (0.0482)	0.113** (0.0484)	0.112** (0.0483)	0.113** (0.0489)	0.112** (0.0485)	0.115** (0.0487)	0.115** (0.0483)	0.0910** (0.0424)
Gov't kindergarten (Direct effect)	0.0480 (0.0519)	0.0479 (0.0519)	0.0474 (0.0514)	0.0479 (0.0518)	0.0478 (0.0519)	0.0483 (0.0519)	0.0486 (0.0520)	0.0495 (0.0520)	0.0490 (0.0508)	-0.0788* (0.0467)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.672	0.672	0.673	0.673	0.672	0.672	0.673	0.673	0.675	0.669
Jumpstart (F-stat)										
Gov't kindergarten (F-stat)										
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and two binary variables indicating if the child is less than 4 or older than 24 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A13: Second-Stage Mediation Effects on Performance in Third Grade, Big 5 Characteristics — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Openness index	0.00462 (0.0241)							0.0209 (0.0353)	0.0214 (0.0278)
Conscientiousness index		0.0224 (0.0234)						0.0711* (0.0367)	0.0716** (0.0287)
Extraversion index			-0.0245 (0.0275)					-0.0427 (0.0438)	-0.0431 (0.0344)
Agreeableness index				-0.0139 (0.0285)				-0.0159 (0.0366)	-0.0160 (0.0286)
Reverse(Neuroticism) index					-0.0283 (0.0400)			-0.0366 (0.0426)	-0.0361 (0.0336)
Academic index						-0.00879 (0.0307)		-0.0113 (0.0444)	-0.0118 (0.0348)
Scholastic index							-0.0145 (0.0237)	-0.0427 (0.0355)	-0.0420 (0.0278)
Jumpstart (Direct effect)	0.282*** (0.0646)	0.278*** (0.0664)	0.284*** (0.0648)	0.284*** (0.0649)	0.282*** (0.0650)	0.283*** (0.0650)	0.286*** (0.0650)	0.281*** (0.0632)	0.258*** (0.0598)
Gov't kindergarten (Direct effect)	0.00948 (0.0507)	0.00803 (0.0503)	0.0107 (0.0508)	0.0103 (0.0507)	0.0106 (0.0507)	0.0109 (0.0507)	0.0122 (0.0511)	0.0119 (0.0504)	0.00107 (0.0804)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.254	0.254	0.254	0.254	0.254	0.254	0.254	0.259	0.259
Weak IV test									
Jumpstart (F-stat)									71.39
Gov't kindergarten (F-stat)									25.58
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A14: Second-Stage Mediation Effects on Performance in Elementary, Big 5 Characteristics — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Openness index	0.0372 (0.0286)							0.0285 (0.0420)	0.0291 (0.0323)
Conscientiousness index		0.0462** (0.0215)						0.0286 (0.0310)	0.0282 (0.0249)
Extraversion index			0.0446 (0.0289)					0.0221 (0.0370)	0.0218 (0.0288)
Agreeableness index				0.0258 (0.0317)				-0.0254 (0.0411)	-0.0266 (0.0322)
Reverse(Neuroticism) index					0.0220 (0.0411)			0.0634 (0.0395)	0.0658** (0.0311)
Academic index						0.0473* (0.0282)		0.0462 (0.0396)	0.0475 (0.0311)
Scholastic index							0.0279 (0.0222)	-0.0223 (0.0401)	-0.0213 (0.0313)
Jumpstart (Direct effect)	0.171*** (0.0571)	0.170*** (0.0580)	0.175*** (0.0582)	0.176*** (0.0580)	0.178*** (0.0578)	0.173*** (0.0581)	0.172*** (0.0588)	0.169*** (0.0581)	0.147* (0.0780)
Gov't kindergarten (Direct effect)	-0.0117 (0.0542)	-0.0118 (0.0534)	-0.00919 (0.0545)	-0.00841 (0.0545)	-0.00832 (0.0546)	-0.0128 (0.0544)	-0.0120 (0.0548)	-0.0163 (0.0540)	-0.0901 (0.0889)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.187	0.188	0.187	0.186	0.186	0.188	0.187	0.191	0.190
Weak IV test									
Jumpstart (F-stat)									71.39
Gov't kindergarten (F-stat)									25.58
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table A15: Second-Stage Mediation Effects on Placed in Top Section, Big 5 Characteristics — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Openness index	0.0735*** (0.0182)							0.0580** (0.0259)	0.0584*** (0.0201)
Conscientiousness index		0.0567** (0.0259)						0.00211 (0.0314)	0.00269 (0.0246)
Extraversion index			0.0708** (0.0286)					0.0281 (0.0328)	0.0277 (0.0256)
Agreeableness index				0.0661** (0.0261)				0.00722 (0.0329)	0.00733 (0.0256)
Reverse(Neuroticism) index					-0.0313 (0.0290)			0.0170 (0.0320)	0.0170 (0.0252)
Academic index						0.0454*** (0.0167)		-0.0358 (0.0277)	-0.0364* (0.0218)
Scholastic index							0.0599*** (0.0160)	0.0349 (0.0256)	0.0354* (0.0199)
Jumpstart (Direct effect)	0.216*** (0.0488)	0.219*** (0.0507)	0.225*** (0.0506)	0.224*** (0.0505)	0.229*** (0.0505)	0.224*** (0.0510)	0.215*** (0.0509)	0.212*** (0.0500)	0.194*** (0.0559)
Gov't kindergarten (Direct effect)	0.169*** (0.0478)	0.172*** (0.0500)	0.175*** (0.0487)	0.175*** (0.0493)	0.177*** (0.0498)	0.172*** (0.0495)	0.168*** (0.0493)	0.168*** (0.0482)	0.171*** (0.0626)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.645	0.642	0.643	0.642	0.639	0.640	0.644	0.648	0.647
Jumpstart (F-stat)									71.39
Gov't kindergarten (F-stat)									25.58
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and a binary variable indicating if the child is less than 9 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1



Table A16: Second-Stage Mediation Effects on Current Enrollment, Big 5 Characteristics — OLS and IV Estimates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	OLS	OLS	OLS	OLS	OLS	OLS	OLS	OLS	IV
Openness index	0.00478 (0.0168)							0.0175 (0.0231)	0.0171 (0.0184)
Conscientiousness index		0.00618 (0.0136)						0.0299* (0.0153)	0.0283** (0.0129)
Extraversion index			0.00621 (0.0164)					0.0153 (0.0177)	0.0150 (0.0134)
Agreeableness index				-0.00794 (0.0161)				-0.0160 (0.0201)	-0.0177 (0.0162)
Reverse(Neuroticism) index					-0.0262 (0.0231)			-0.0356 (0.0218)	-0.0327** (0.0165)
Academic index						-0.0103 (0.0187)		-0.00883 (0.0204)	-0.00581 (0.0162)
Scholastic index							-0.0187 (0.0161)	-0.0461** (0.0224)	-0.0457** (0.0181)
Jumpstart (Direct effect)	0.111** (0.0487)	0.110** (0.0485)	0.111** (0.0486)	0.112** (0.0488)	0.112** (0.0482)	0.112** (0.0485)	0.115** (0.0487)	0.113** (0.0476)	0.0913** (0.0424)
Gov't kindergarten (Direct effect)	0.0477 (0.0519)	0.0476 (0.0516)	0.0478 (0.0519)	0.0480 (0.0519)	0.0488 (0.0517)	0.0486 (0.0520)	0.0495 (0.0520)	0.0513 (0.0507)	-0.0717 (0.0469)
Observations	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437	2,437
R-squared	0.672	0.672	0.672	0.672	0.673	0.673	0.673	0.676	0.670
Jumpstart (F-stat)									53.93
Gov't kindergarten (F-stat)									25.25
Child controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

*Notes:* Each of the indices are standardized using the technique used by Kling et al. (2007). Results are relative to a child who did not attend kindergarten. Controls include the child age, the sex of the child, birth order dummy variables, and two binary variables indicating if the child is less than 4 or older than 24 years old. Standard errors are clustered at the village level. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Figure A1: Distribution of Indirect Effects — Core Mediators on Performance in Third Grade

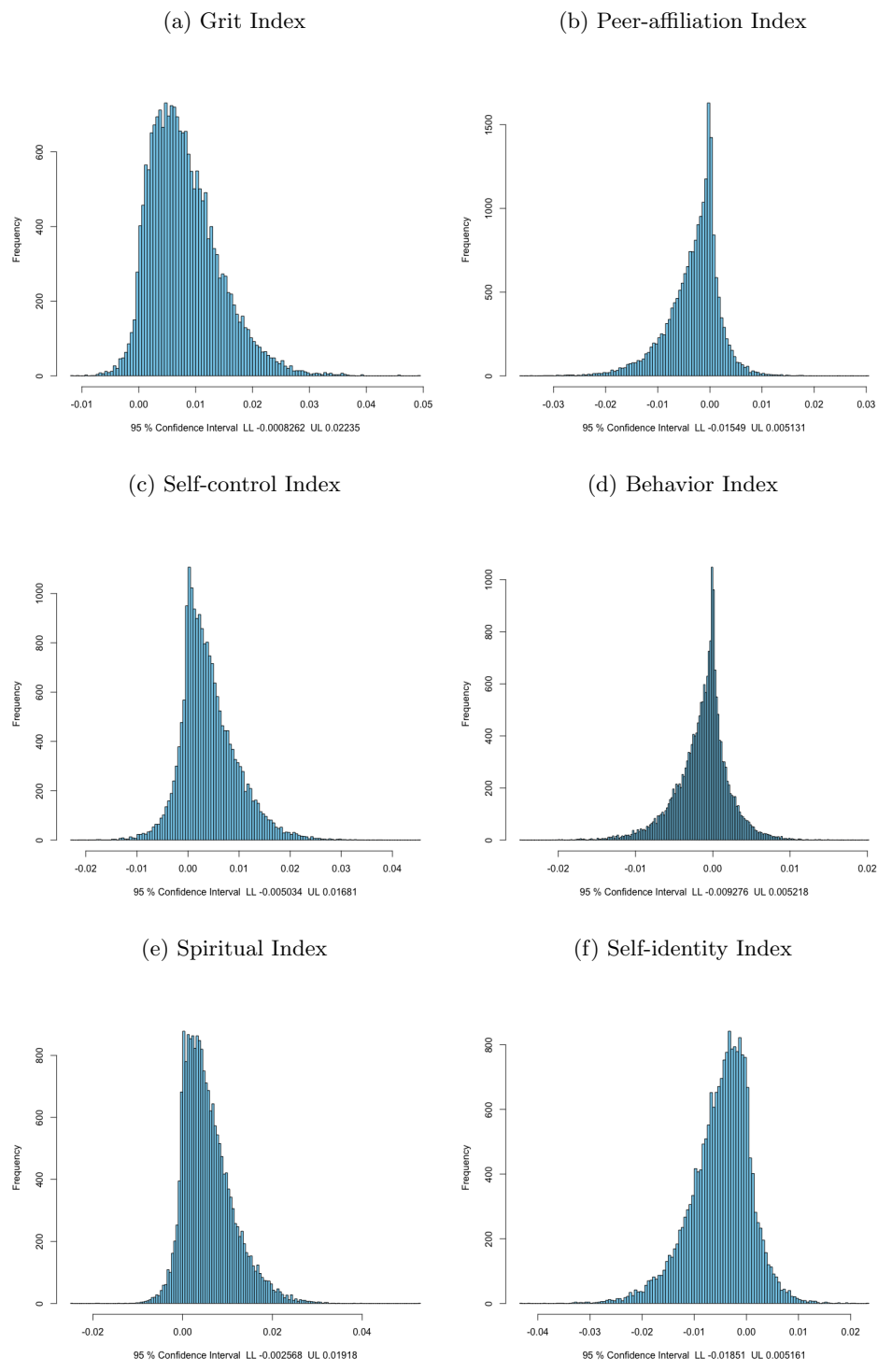


Figure A2: Distribution of Indirect Effects — Core Mediators on Performance in Elementary

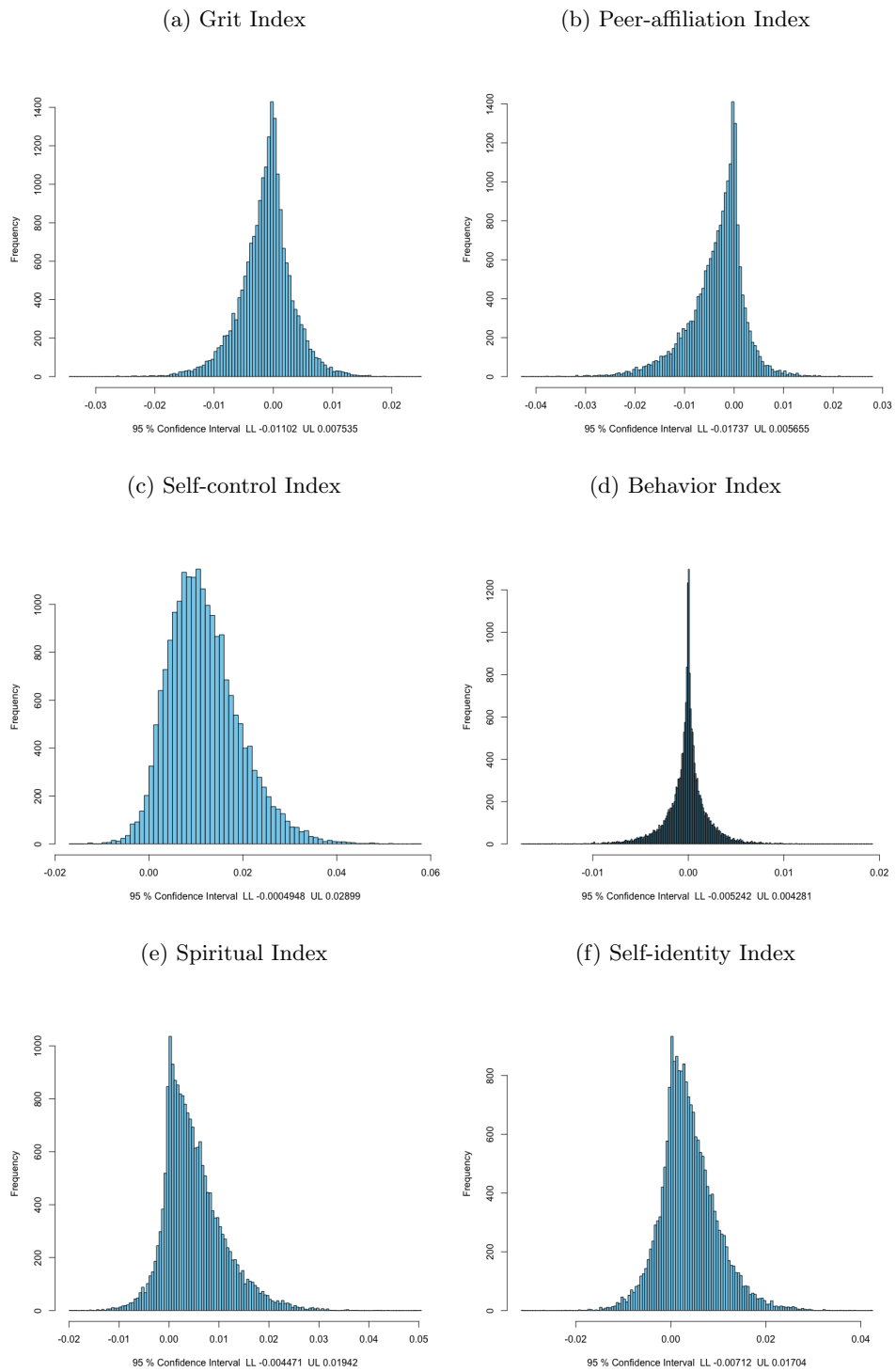
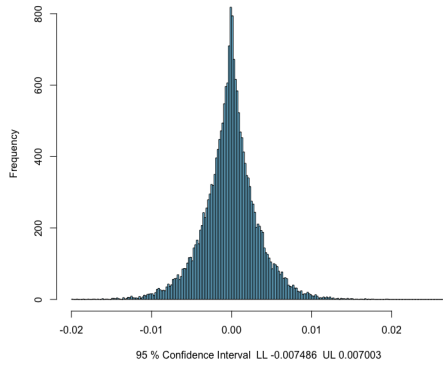
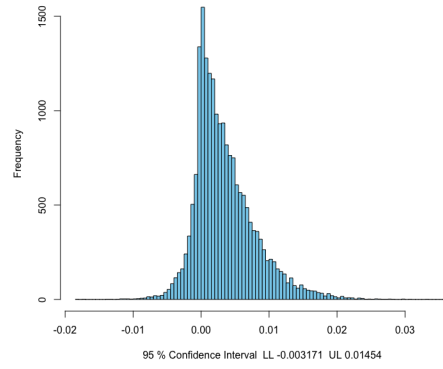


Figure A3: Distribution of Indirect Effects — Core Mediators on Probability Place in Top Section

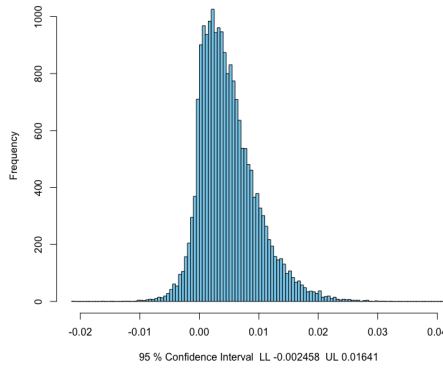
(a) Grit Index



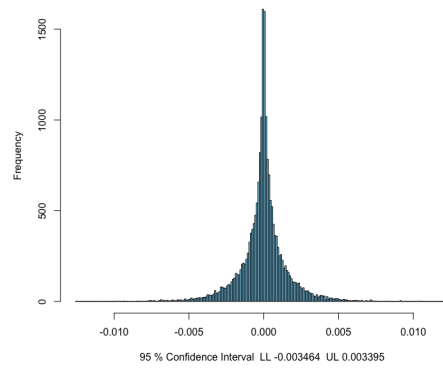
(b) Peer-affiliation Index



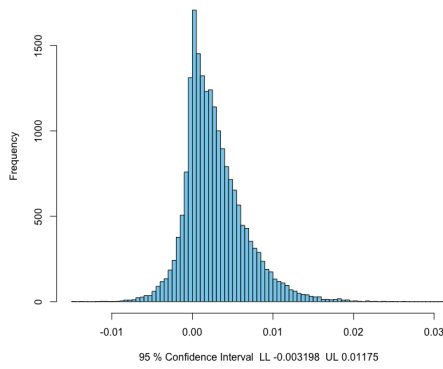
(c) Self-control Index



(d) Behavior Index



(e) Spiritual Index



(f) Self-identity Index

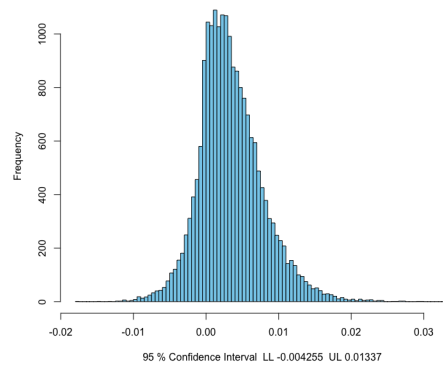
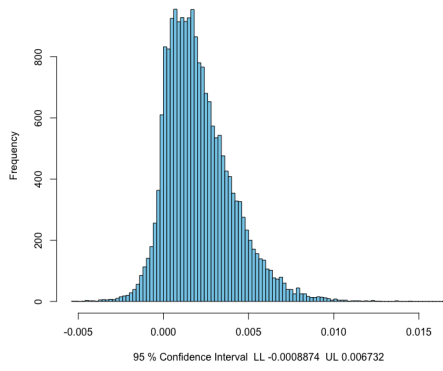
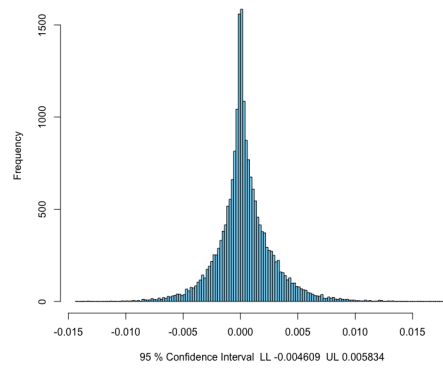


Figure A4: Distribution of Indirect Effects — Core Mediators on Current Enrollment

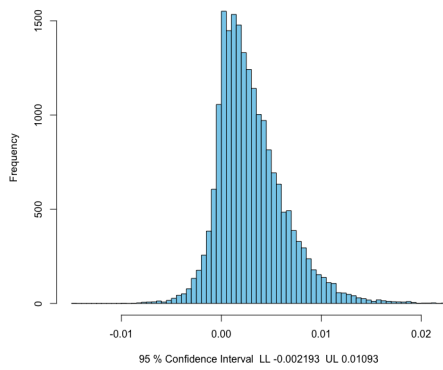
(a) Grit Index



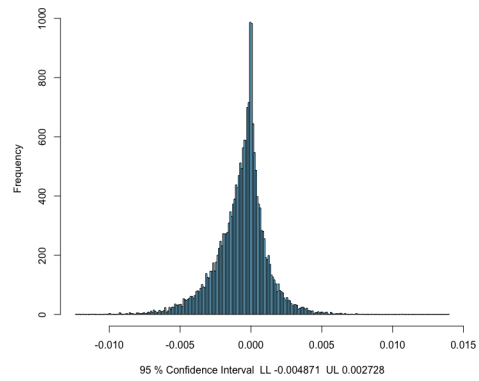
(b) Peer-affiliation Index



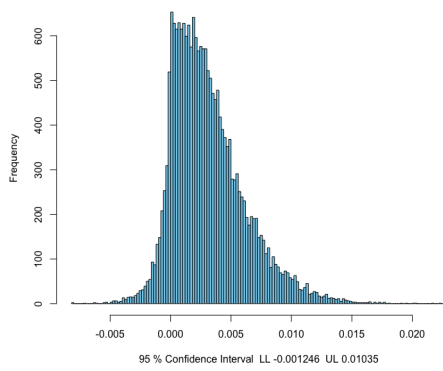
(c) Self-control Index



(d) Behavior Index



(e) Spiritual Index



(f) Self-identity Index

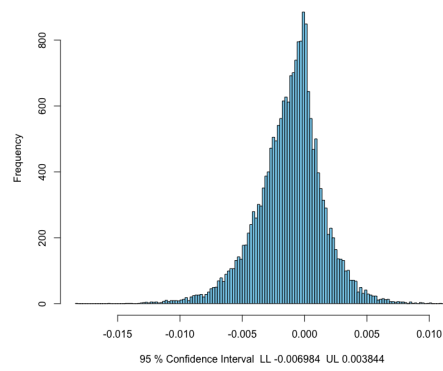
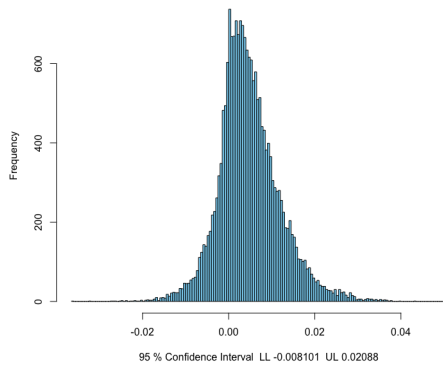
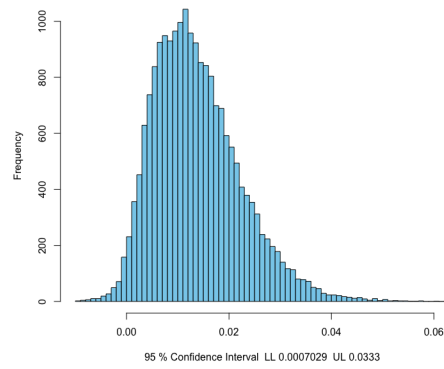


Figure A5: Distribution of Indirect Effects — Big 5 on Performance in Third Grade

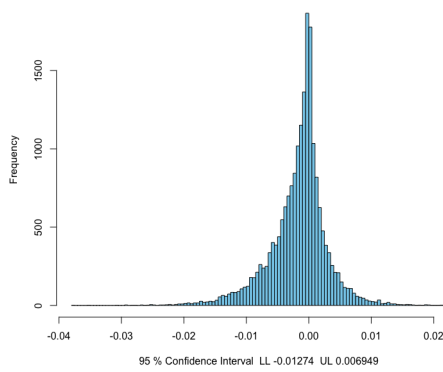
(a) Openness



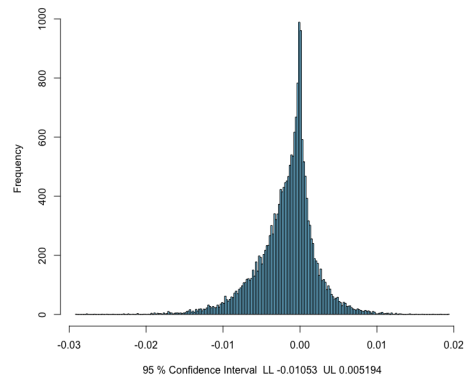
(b) Conscientiousness



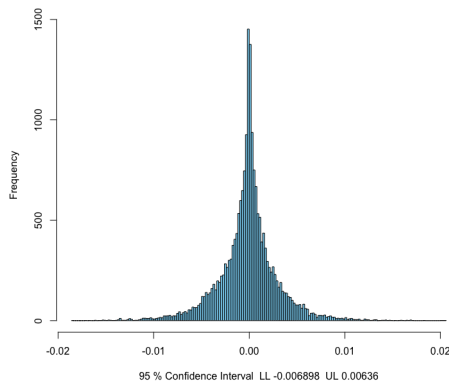
(c) Extraversion



(d) Agreeableness



(e) Neuroticism



(f) All Big 5

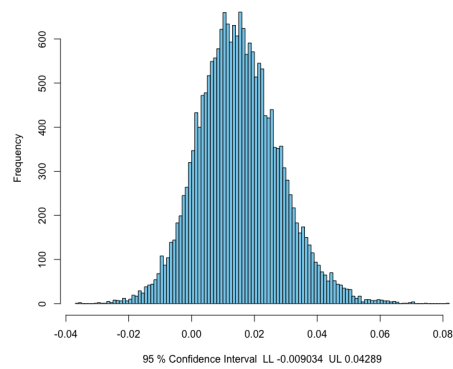
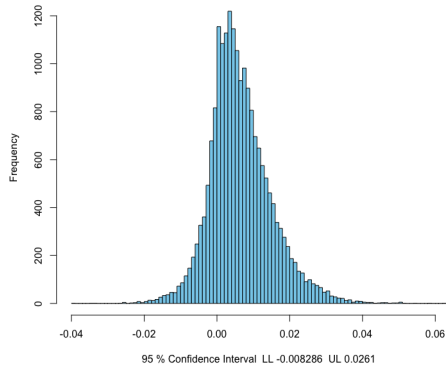
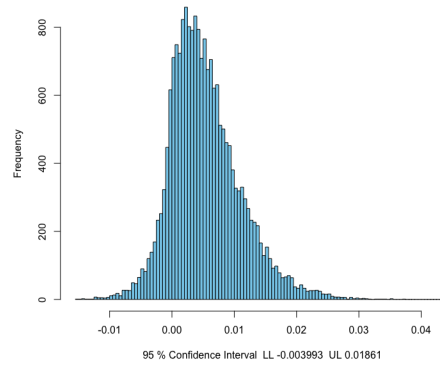


Figure A6: Distribution of Indirect Effects — Big 5 on Performance in Elementary

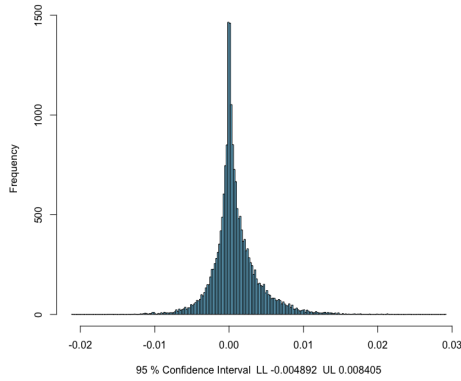
(a) Openness



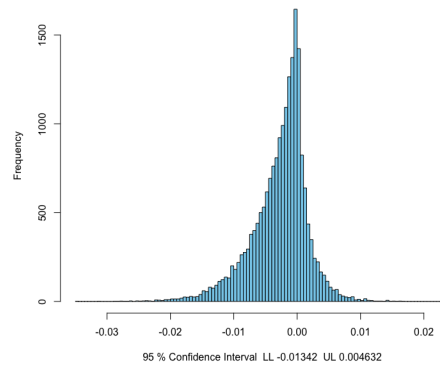
(b) Conscientiousness



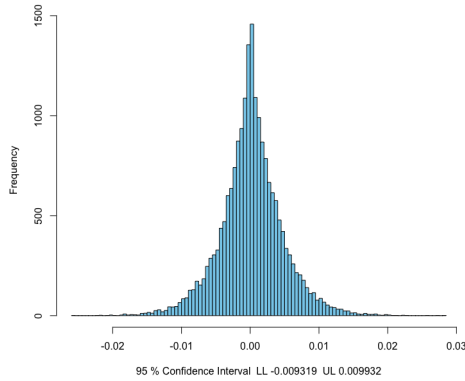
(c) Extraversion



(d) Agreeableness



(e) Neuroticism



(f) All Big 5

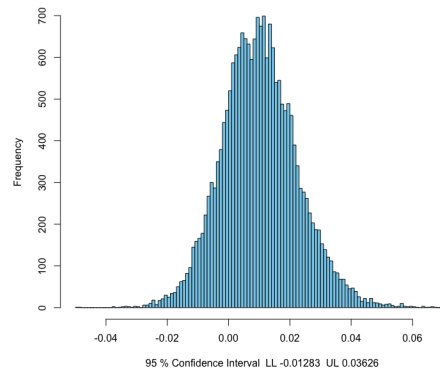
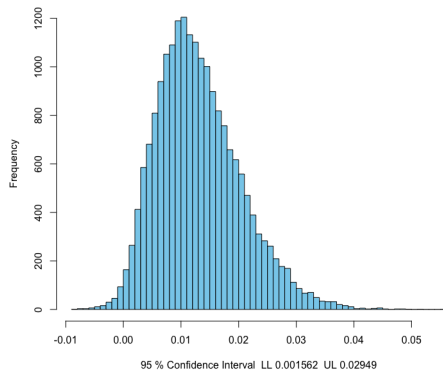
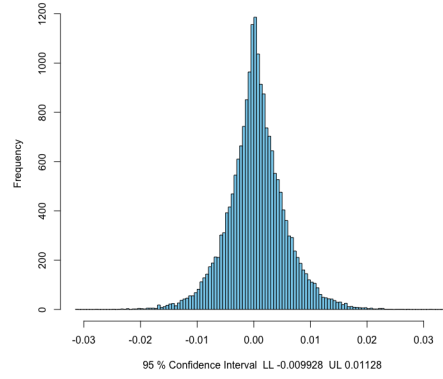


Figure A7: Distribution of Indirect Effects — Big 5 on Probability in Top Third Grade Section

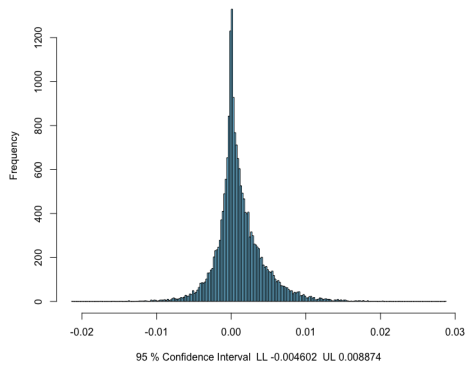
(a) Openness



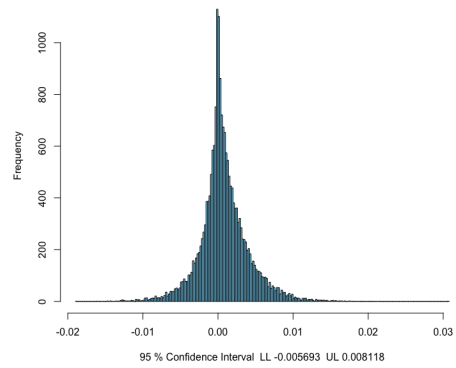
(b) Conscientiousness



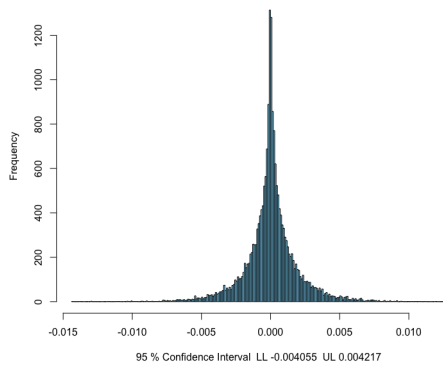
(c) Extraversion



(d) Agreeableness



(e) Neuroticism



(f) All Big 5

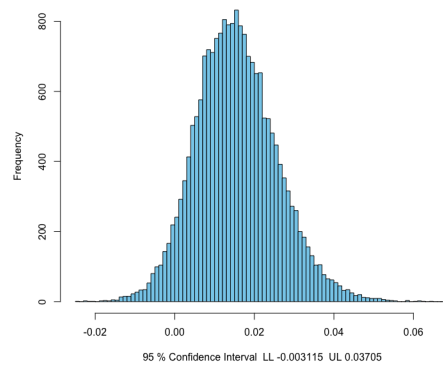
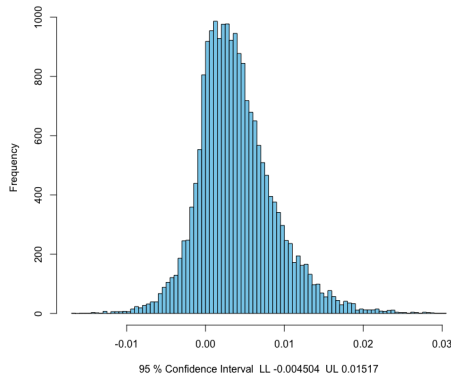


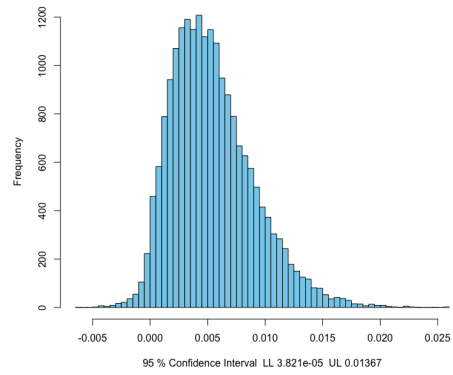


Figure A8: Distribution of Indirect Effects — Big 5 on Current Enrollment

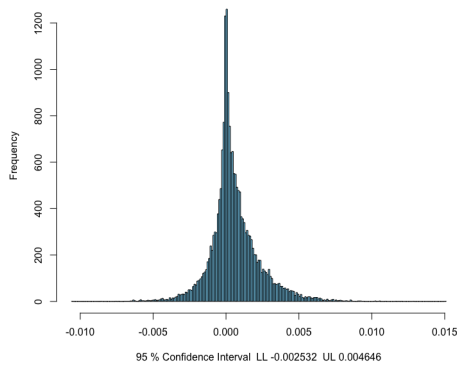
(a) Openness



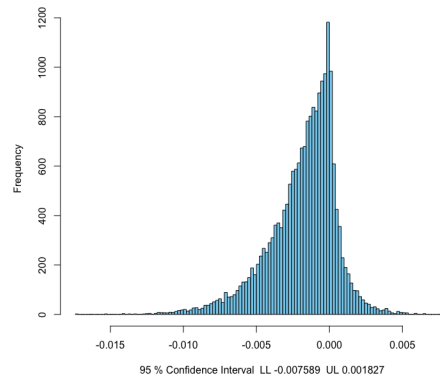
(b) Conscientiousness



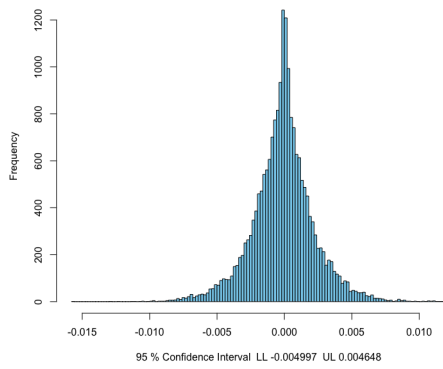
(c) Extraversion



(d) Agreeableness



(e) Neuroticism



(f) All Big 5

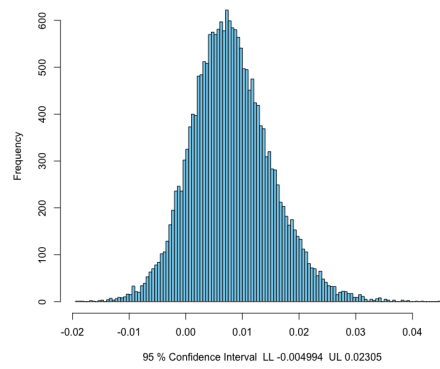


Table A17: Survey Questions for the Index Variables

<b>Panel A: Academic Indices</b>	
Academic index <sup>b</sup>	How likely do you think it is that [child <i>i</i> ] will finish high school?
	How likely do you think it is that [child <i>i</i> ] will graduate from university?
	How likely do you think it is that [child <i>i</i> ] will have a good job hen they are grown up?
	How likely do you think it is that [child <i>i</i> ] will be generally successful in life?
Scholastic index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] reads a lot.
	Relative to others his/her age [child <i>i</i> ] practices math frequently.
	Relative to others his/her age [child <i>i</i> ] has achieved/will achieve highly in school.
	Relative to others his/her age [child <i>i</i> ] shows interest in learning languages.
	Relative to others his/her age [child <i>i</i> ] is quite smart.
<b>Panel B: Core Indices</b>	
Grit index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] is easily discouraged.
	Relative to others his/her age [child <i>i</i> ] is a hard worker.
	Relative to others his/her age [child <i>i</i> ], when setting goals, often changes their mind to a new goal.
	Relative to others his/her age [child <i>i</i> ] has difficulty focusing on tasks that take longer than thirty minutes.
	Relative to others his/her age, once [child <i>i</i> ] starts something, they will finish it.
	Relative to others his/her age [child <i>i</i> ] is distracted easily.
	Relative to others his/her age [child <i>i</i> ] is patient.
Peer affiliation index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] can easily make a new friend.
	Relative to others his/her age [child <i>i</i> ] often tries to avoid social situations.
	Relative to others his/her age [child <i>i</i> ] gets into fights frequently.
	Relative to others his/her age [child <i>i</i> ] comforts others when they are upset.
	Relative to others his/her age [child <i>i</i> ] is often teased or bullied.
Behavior index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] has often been disobedient at home and at school.
	Relative to others his/her age [child <i>i</i> ] acts younger than his/her age.
	Relative to others his/her age [child <i>i</i> ] is kind to other kids his/her age and younger.
	Relative to others his/her age [child <i>i</i> ] often breaks rules at home, school, or elsewhere.
Spirituality index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] participates in youth church group activities.
	Relative to others his/her age [child <i>i</i> ] asks questions about God.
	Relative to others his/her age [child <i>i</i> ] enjoys attending church.
	Relative to others his/her age [child <i>i</i> ] often asks to give the family’s offering at church.
Self control index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] gets mad easily.
	Relative to others his/her age [child <i>i</i> ] waits his/her turn to speak.
	Relative to others his/her age [child <i>i</i> ] often yells or hits people when they are mad.
	Relative to others his/her age [child <i>i</i> ] can easily sit still for an hour at a time.
	Relative to others his/her age [child <i>i</i> ] makes decisions quickly.
Positive identity index <sup>b</sup>	Relative to others his/her age [child <i>i</i> ] easily becomes upset if they can’t do something correctly.
	Relative to others his/her age [child <i>i</i> ] feels that they have value to others that is less than other children.
	Relative to others his/her age [child <i>i</i> ] often talks about what they want to be when they are grown up.
	Relative to others his/her age [child <i>i</i> ] talks about the future positively.

*Notes:* We construct each of these indices using the methodology of Kling et al. (2007). <sup>a</sup> These questions are answered on a 1 through 5 Likkert scale with one indicating “very unlikely” and five indicating “very likely.” <sup>b</sup> These questions are answered on a 1 through 5 Likkert scale with one indicating “strongly disagree” and five indicating “strongly agree.”

Table A18: Alternative Question Groupings for the “Big 5” Index Variables

Openness index	Relative to others his/her age [child <i>i</i> ] often talks about what they want to be when they are grown up.
	Relative to others his/her age [child <i>i</i> ] talks about the future positively.
	Relative to others his/her age [child <i>i</i> ] asks questions about God.
	Relative to others his/her age [child <i>i</i> ], when setting goals, often changes their mind to a new goal.
Conscientiousness index	Relative to others his/her age [child <i>i</i> ] can easily sit still for an hour at a time.
	Relative to others his/her age [child <i>i</i> ] waits his/her turn to speak.
	Relative to others his/her age [child <i>i</i> ] is patient.
	Relative to others his/her age, once [child <i>i</i> ] starts something, they will finish it.
	Relative to others his/her age [child <i>i</i> ] is distracted easily.
	Relative to others his/her age [child <i>i</i> ] has difficulty focusing on tasks that take longer than thirty minutes.
	Relative to others his/her age [child <i>i</i> ] is a hard worker.
Extraversion index	Relative to others his/her age [child <i>i</i> ] is easily discouraged.
	Relative to others his/her age [child <i>i</i> ] often asks to give the family’s offering at church.
	Relative to others his/her age [child <i>i</i> ] participates in youth church group activities.
	Relative to others his/her age [child <i>i</i> ] often tries to avoid social situations.
	Relative to others his/her age [child <i>i</i> ] can easily make a new friend.
Agreeableness index	Relative to others his/her age [child <i>i</i> ] is often teased or bullied.
	Relative to others his/her age [child <i>i</i> ] enjoys attending church.
	Relative to others his/her age [child <i>i</i> ] often breaks rules at home, school, or elsewhere.
	Relative to others his/her age [child <i>i</i> ] is kind to other kids his/her age and younger.
	Relative to others his/her age [child <i>i</i> ] has often been disobedient at home and at school.
Neuroticism index	Relative to others his/her age [child <i>i</i> ] comforts others when they are upset.
	Relative to others his/her age [child <i>i</i> ] makes decisions quickly.
	Relative to others his/her age [child <i>i</i> ] feels that they have value to others that is less than other children.
	Relative to others his/her age [child <i>i</i> ] easily becomes upset if they can’t do something correctly.
	Relative to others his/her age [child <i>i</i> ] often yells or hits people when they are mad.
	Relative to others his/her age [child <i>i</i> ] gets mad easily.
	Relative to others his/her age [child <i>i</i> ] is kind to other kids his/her age and younger.
	Relative to others his/her age [child <i>i</i> ] gets into fights frequently.

*Notes:* We construct each of these indices using the methodology of Kling et al. (2007). These questions are answered on a 1 through 5 Likkert scale with one indicating “strongly disagree” and five indicating “strongly agree.”