



Indigenous Ecuadorian children: Parental education, parental wealth and children's cognitive ability level

Heiner Rindermann^{a,*}, Noah Carl^b

^a Department of Psychology, Chemnitz University of Technology, Wilhelm-Raabe-Str. 43, D-09107 Chemnitz, Germany

^b Nuffield College, Oxford University, New Road, Oxford OX11NF, United Kingdom



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ABSTRACT

In three rural Ecuadorian schools from different regions (central highlands in the Andes, hinterland of Quito, and Amazonian lowlands) $N = 161$ pupils aged 9–14 with about 86% Amerindian background were tested for cognitive ability. Fluid intelligence was measured using culture-reduced Raven's SPM, while crystallized intelligence was measured using school-near tasks from PIRLS-Reading and TIMSS-Mathematics. Parental education, parental wealth (family assets), number of books in the home, parenting style, discipline in school, and height (relative to age and sex) were also measured. Average IQ using British Flynn-corrected 1979 SPM norms was equal to 71, with the figure being lower in the central highlands ($IQ = 65$) than in the hinterland of Quito and the Amazonian lowlands ($IQ = 75$). Raw performance only weakly increased with age ($r = .11$ to $.18$) indicating limited cognitive development and resulting in lower normed IQs at higher ages ($r = -.17$ to $-.22$). Individual differences in cognitive ability were better explained by parental education ($\beta_{Ed} = .53$ to $.54$) than by parental wealth ($\beta_{We} = .14$ to $.15$). Height per-age-and-sex had an effect of $\beta_{Ht} = .13$ to $.14$. Number of books, discipline and authoritative parenting also had positive impacts. Explanations for the low average performance and for differences between regions are discussed.

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1. Introduction

Ecuador is a Latin American country located on the continent's West coast. It covers around 280,000 km², and has 15 million inhabitants. Most of the land area encompasses the highlands of the Andes ("Sierra"). Other regions comprise the coastal areas ("Costa"), the Amazonia lowlands in the east ("Oriente"), and the Galapagos islands in the Pacific Ocean. About 72% of the population self-identifies as Mestizo (mixed Amerindian and European ancestry), 7% as Amerindian (South American Indians, Indios, Native Americans, other indigenous people), 6% as European, 7% as African (sub-Saharan African ancestry) and 7% as mixed Amerindian and African ancestry (Montubios).

The Human Development Index (an amalgam of education, income and life expectancy) was equal to 0.695 in 2010 (one year after the survey), which is higher than the average for Latin America (0.682), but much lower than the average for developed countries (0.860). Income inequality is quite high: averaging across decades in the second half of the 20th century, the Gini coefficient is 0.51, which compares to an average of 0.46 in Latin America, and an average of 0.34 in developed countries. About 92% of adults can read and write (e.g. UNDP, 2010).

Ecuador has not participated in international student assessment studies (SAS), such as PISA (Programme for International Student Assessment; reading literacy, mathematics, science; 15 year old students), TIMSS (Trends in International Mathematics and Science Study; math and science literacy; 4th and 8th grade), or PIRLS (Progress in International Reading Literacy Study; reading literacy; 4th grade).¹ Average IQs are typically found to be low in countries that do not participate in international SAS. According to Lynn and Vanhanen (2012), the average IQ in Ecuador is 88—a figure which is based on 3 studies of 272 total students aged 5–17 that were published between 1969 and 2000. And in his book dealing with within-country intelligence differences, Lynn (2008, p. 180) reports an average IQ of 87 among Ecuadorian Amerindians. Ecuador has participated in a number of regional student assessment studies (1997; SERCE 2005–2006; TERCE 2013; LLECE, 2000, 2008, 2014). While results in the 1997 assessment were below the Latin American average (16th among 19 countries), results in the most recent TERCE survey were average.²

¹ PISA is organized by the OECD (Organisation for Economic Co-operation and Development), TIMSS and PIRLS by the IEA (International Association for the Evaluation of Educational Achievement). Ecuador has also not participated in the SLATINT study (Study of the Latin-American Intelligence; Flores-Mendoza et al., 2015).

² PERCE: First Regional Comparative and Explanatory Study, carried out in 1997, 9 year old students, reading and mathematics. SERCE: Second Regional Comparative and Explanatory Study, carried out in 2005–2006, 3rd and 6th grades, reading, mathematics, and science. TERCE: Third Regional Comparative and Explanatory Study, carried out in 2013, 3rd and 6th grades, reading, mathematics, and science.

* Corresponding author.

E-mail addresses: heiner.rindermann@psychologie.tu-chemnitz.de (H. Rindermann), noah.carl@nuffield.ox.ac.uk (N. Carl).

Latin American countries score, on average, much lower in international student assessment studies than do Western, European, and East Asian countries—those with the highest levels of economic development. The average for Latin America in PISA, TIMSS, and PIRLS using international student assessment norms ($M = 500$, $SD = 100$) is 397 SAS points, which when transformed to Greenwich IQ (UK natives as benchmark with $M = 100$, $SD = 15$) represents an IQ of 82. Adding the Latin American regional studies to the international student assessment studies, and using standardized international norms, results in an overall IQ of 80. The mean IQ across all cognitive ability studies, corrected for age differences and school participation in Latin America, is 79. With an average IQ of 82 on this scale, Ecuador's results place it about average in cognitive ability among Latin American countries.

Why is average cognitive ability lower in Ecuador and other Latin American countries? A variety of hypotheses have been put forward in the literature, ranging from culture and genes as global background factors to specific differences in education, wealth, health, geography, climate, politics, modernization, sampling error, test knowledge, discrimination, test bias and migration (e.g. Eppig, Fincher, & Thornhill, 2010; Lynn & Vanhanen, 2012; Rindermann & Ceci, 2009; Rindermann, Becker, & Coyle, 2016). Of these hypotheses, education is especially pertinent to explaining within-country differences in Latin America (e.g. Manrique-Millones, Flores-Mendoza, & Millones-Rivalles, 2015). Education is very highly correlated with ability at different data levels from individuals to nations, and is confirmed by experiments to be a causal factor for intelligence and knowledge. Another important factor is low income or wealth, which holds back the development of resources and technologies conducive to cognitive improvement (e.g. Glewwe & King, 2001; Hart & Risley, 1995; Mani, Mullainathan, Shafir, & Zhao, 2013). Such economic factors are relevant to poor countries.

Parental educational level and income are typically combined in an undifferentiated socio-economic status measure (SES). However, when they are distinguished, education usually exerts a stronger effect than income (e.g. Lemos, Almeida, & Colom, 2011). Further, if parental educational behavior itself, such as speaking to the child, is measured, it shows a stronger correlation with children's cognitive ability than a global SES measure (the Hart & Risley study reanalyzed: Rindermann & Baumeister, 2015). Generally, we assume that parental education is a better predictor and more important cause of children's cognitive ability than parental wealth because the first is more closely linked to parents' intelligence and parents' ability to create a beneficial environment for children's development, and it is a better proxy for relevant genetic factors contributing to both parents' and children's intelligence. However, in poorer countries, and within poorer strata, wealth could become more important since the minimal conditions for development may not be met (e.g. as in Brazil; Colom & Flores-Mendoza, 2007).

Our study has two aims. The first is simply to evaluate the average cognitive ability of indigenous Ecuadorians. There are only a few cognitive ability studies available for Ecuador, and even fewer for indigenous Ecuadorians living in rural areas. As noted above, there are also no international student assessment studies available for Ecuador. The present study therefore adds new information to the literature on Ecuadorian cognitive ability. The second aim is to analyze the relationships between family background factors and cognitive ability among indigenous Ecuadorians. At present, few studies examining the respective impact of parental education and parental wealth on children's cognitive ability have been conducted in developing countries. It is not yet firmly known which factor is more important. We analyze their impact alongside other family variables, such as: indicators of wealth and health (height per age), indicators of educational behavior and intellectual stimulation (authoritative parenting, number of books at home), and indicators of children's own behavior (discipline), as well as region of the country (school).

2. Method

2.1. Sample and location

Participants comprised $N = 161$ students (grades 3 to 7; ages 9–14; 93 boys; 68 girls) from three rural Ecuadorian villages with around 86% having native ancestry (“Indios”, “Amerindios”, “Amerindians”). All three schools were public. All the data were collected by two Master's students.

One school is located in the central Andes at an altitude of around 3800 m. It is relatively close to a small city with around 57,000 inhabitants. Observations of the students revealed that all had an Amerindian background (Caroline Seitlinger, 2010; Katharina Thünauer, 2009). 100% answered in the questionnaire that they spoke an Amerindian language at home. People in the Andean village live off tourism by producing and selling handicraft as souvenirs (“*artesanía*”), as well as by charging visitors a fee to enter the village. Some villagers offer transport by donkey to the nearby lake. School education is not necessary for any of these jobs, but being able to speak English is generally helpful. The village has had access to electricity since 2004. In the past, most people married within the village. Consanguineous marriages (unions between cousins) are not uncommon. Many families have the same surnames. School attendance has historically been low, owing to the expense of purchasing tuition, uniforms, books and transport. Many houses constitute simple mud huts. The village and school were recommended to the researchers who collected the data by the German NGO ViSozial, which works to improve living conditions for children in Ecuador. The school recently participated in a development project financed by Austro-German sponsors, which involved provision of food, uniforms, and deworming treatments. The physical quality of the school was above standard for Ecuador (new, desks, material).

In 2009, when the study was organized by students from the University of Graz in Austria, IRB approval was not required. Nonetheless, the study followed the standard guidelines. Participants in all three schools, as well as those associated with the NGO ViSozial, were informed in advance about the objective of the study (namely to research cognitive development and the factors which contribute to it). Participation of schools, teachers and students was voluntary. As standard, data were treated confidentially (no names were collected nor stored). Three pupils did not understand either the tests or the questionnaire, and therefore did not participate. The pupils in the three schools under study had similar average ages (11.38, 11.19 and 11.27 respectively).

The second school is located in a village near Quito (22 km away) that lies at an altitude of 2400 m. Teachers at this school showed interest in the tests, and the students were enthusiastic about participating. The survey was conducted straightforwardly. Compared to those in the first village, many children travel a long distance to school. In addition, several were orphans. People were generally more open than in the first village: People were more receptive to the study and less suspicious of outsiders. Observation of the researchers revealed that about 75% had an Amerindian background. 14% answered in the questionnaire that they spoke an Amerindian language at home. Pupils could read, and in most cases understand the items in the questionnaire.

The third school is located in a city with around 20,000 residents located in the Amazonian lowland jungle, in the “Oriente”. Teachers and children were curious about participating. Observation of the students revealed that around 80% had an Amerindian background. 33% answered in the questionnaire that they spoke an Amerindian language at home. In the third school, children of different ages attended different classes. This is in contrast to schools one and two, where children of different ages were all in the same class.

The samples collected were not representative of the general Ecuadorian population, but collectively they were informative of schooling in indigenous rural communities. Across the full sample, mean years of schooling for fathers was 4.17 years, and 18% were illiterate. Mean

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