

## 2016 Klaus J. Jacobs Research Prize “Sustaining the Gains – An Integrated Approach to Early Childhood Development”

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**Orazio Attanasio combines structural modeling with randomized controlled trials to assess and shape health and education policies in early childhood development. What is meant by structural modeling and randomized controlled trials?**

**Structural models** are models for empirical work that have parameters stable to changes in the economic environment. In structural econometric models, economic theory is used to develop mathematical statements about how a set of observable “endogenous” variables are related to another set of observable “exogenous” variables. Examples for structural modeling include demand analysis, schooling choices, saving, marriage and fertility decisions, choosing which crops to plant.

**Randomized controlled trial (RCT)** is a type of scientific experiment which aims to estimate the impacts of certain treatments/interventions establishing a causal link. Individuals or groups participating in the trial are **randomly** allocated to either the group receiving the treatment under investigation or to a group receiving no treatment (or placebo treatment) as the control. Randomization aims at eliminating selection bias. The comparison groups allow researchers to determine any effects of the treatment. RCTs are often considered the gold standard for a clinical trial and used to test the efficacy or effectiveness of various types of intervention.

**Why is this combination of the two research methods unique and important for policy analysis?**

In the past few decades, many economists have been evaluating interventions using RCTs where impacts are obtained by a simple comparison of means in the treatment and control groups. However, RCTs do not provide all the information needed for meaningful policy analysis and advice. The design of effective policies, the simulation of counterfactual policies, and the extrapolation of findings to different contexts require the identification of mechanisms that determine the observed outcome. This means that modeling individual or household behavior and the interaction among individuals is essential. Therefore, even when RCTs on a specific intervention are available, the use of structural models of behaviors should become a key part of purposeful policy analysis. Indeed, Attanasio argues, it is the availability of RCTs that makes the estimation of more realistic and credible structural models possible. In other words: the difference caused by the intervention and measured by the RCT can be used to validate structural models. Having estimated a structural model, one can use it to simulate different versions of the intervention and extrapolate the results of an RCT to different contexts. Thus, RCTs and structural models are complements rather than substitutes.

Attanasio’s approach to blend economic structural modeling with RCT’s has allowed him to generalize intervention results above and beyond an explicit experiment to other outcomes, predicting, among other things, what would happen if the program is scaled up. This is a unique way to think about the generalizability and scalability of any program or policy in child development.

**Attanasio has designed, implemented, and evaluated a scalable early years intervention in Colombia. What was the Colombia trial about?**

Inspired by the famous Jamaican Home Visiting study led by Sally Grantham McGregor, Attanasio and collaborators designed a stimulation and nutrition intervention in Colombia based on home visits delivered by local female leaders in the community. The weekly home visits were aimed at promoting children’s stimulation by encouraging mothers to teach skills and concepts in daily routine activities.

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The evaluation sample consisted of 1429 children in relatively poor households in 96 towns. This experiment is probably the largest of its kind performed in either developed or developing countries. After 18 months of home visitation, children in the treatment group had significantly higher cognition and receptive language than the control group. In addition to using an RCT to assess the impact of the intervention, Attanasio and his collaborators used a structural model to test whether the intervention impacts derived from an increase in parents' skills or from an increase in the material and time investments parents made in their children. They could show that the intervention's impact was obtained by inducing parents to invest more time and materials in their children. Investments in time showed to be important for children's socio-economic skills, and investments in materials (e.g., toys and books) showed to be important for children's cognitive development.

### **What implications did the Colombian experiment have?**

The results of the Colombian experiment had visibility and policy impact at various levels: The government of Peru used it as a model for a parenting intervention deployed at scale, reaching hundreds of thousands of children. Attanasio's group is currently working with the Colombian government on the evaluation of a new intervention that, while inspired by the original home visiting intervention, uses an existing program and complements the home visits with group visits.

The results relating to the nature of the impacts obtained in the Colombian intervention have led Attanasio to investigate the role of beliefs in explaining parental behavior. The intervention did not give parents additional resources, but induced them to invest more in their children. A natural question to ask is why this happened. One possible answer is that the intervention, during which the home visitor actively engaged with the children and their mothers in stimulating activities, might have led to a change in the parents' perception of the usefulness of the investment in their children.

Parents' choices, which are obviously crucial in shaping child development, depend on parents' objectives, on their resources, their tastes, and their perceptions about the usefulness of parental investment. If the latter increases, investment should increase. Elicitation of parental preferences is not easy, but a number of preliminary studies have shown it to be a promising area of research.

### **According to Attanasio, the characterization of parental behavior and of the process of child development reflect the main challenges for current research on early childhood development and the accumulation of human capital. What is human capital and how does it relate to child development?**

Human capital refers to the stock of knowledge, habits, social and personality attributes embodied in the ability to perform labor so as to produce economic value. It also refers to a collection of resources (knowledge, talents, skills, abilities, experience, intelligence, training, judgment, and wisdom) possessed individually and collectively by individuals in a population. These resources are the total capacity of the people that represents a form of wealth which can be directed to accomplish the goals of the nation or state or a portion thereof.

Attanasio explains the development of children's human capital by means of a production function and a structural model of the determinants of parents' investments in their children's human capital. In economics, the production function explains physical output as the result of a production process which uses physical inputs. The resulting output depends on how effectively the various inputs are used, and possibly, on some unobserved input including random environmental influences, which explains why different units produce different quantities of outputs with the same inputs.

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The production function is therefore the relation that links inputs to outputs. The understanding of the production function of human capital in the early years is still incomplete. Human capital is now understood as a multidimensional object, where different domains (physical growth, cognition, language, socio-emotional skills) develop in an intertwined fashion over time. The nature of these dynamic interactions is still not fully understood. Attanasio emphasizes the need to quantify the complementarities between different components of human capital and the various inputs that enter the production function and, crucially, how these complementarities change over the life course, as children develop.

Parental investments and the inputs from child care or schools have different dimensions and these can affect different components of human capital differently. Attanasio emphasizes that the pathways through which these investments manifest into developmental outcomes need to be fully characterized. This evidence is key for the design of effective policies, as they are key for the identification of windows of opportunities and for the identification of specific domains that should be targeted in specific periods by specific forms of investment.

### **For what will the Research Prize money be used?**

Attanasio will develop his research to address both the characterization of the process of child development and of parental behavior. With the Klaus J. Jacobs Research Prize money, he will implement and evaluate an intervention in rural India to provide children with better quality childcare at home as well as in childcare centers. The RCT includes about 2,000 children. In addition to a pure control group, there will be children receiving both early and late interventions, children receiving the early but not the late intervention, and children receiving the late but not the early intervention. The data will allow exploring the role of different dimensions of child development (health, cognition, socio-emotional skills) and how they are affected by the interventions. At the end of the study, there will be four surveys on a cohort of children aged 9 to 18 months and 57 to 66 months.

This type of study is unique and the first to provide evidence on the interactions of interventions at two key stages of the child development process. As such, Attanasio expects the study to have important implications for the design of effective complementary policies over the different stages of early childhood. This research plan reflects Attanasio's desire to understand the process of child development. A significant part of Attanasio's research will continue to address human capital as a multidimensional object, and consequently, optimal childhood interventions, as a multi-stage process.

### **What are the implications of Attanasio's work for early childhood development policies and programs in both developed and developing countries?**

The first lesson from the research evidence is that early childhood development (ECD) programs shown to be effective at pilot stage, in carefully controlled environments and using highly skilled professionals, can be effectively adapted for implementation and scale using locally available resources and infrastructure in low-income settings. Attanasio and colleagues have generated some of the first evidence on the feasibility of implementing such ECD programs in low-income and middle-income countries at scale. In Colombia, they have adapted the Jamaican home-visitation model to the local context by training local female leaders involved in the administration of a national welfare program to deliver the home visits.

The second lesson is that the quality of the service delivered in ECD programs is crucial for their effectiveness. A persistent finding across contexts is that the quality of children's pedagogical experience really matters, while there is little evidence of significant impacts of structural quality

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(physical infrastructure, quality of furnishings and space) on learning. Attanasio’s work in Colombia supports these findings: an evaluation of a government program to transform parental family day-care units into large childcare centers of higher structural quality has shown no impacts on child developmental outcomes.

The third lesson is that scalable ECD programs need a well-defined fully specified curriculum and implementation methodology adapted to the local context. Detailed, structured, and easy-to-follow curriculum and implementation guidelines are crucial. In the Colombian home-visitation intervention, the curriculum prescribed specific activities for each week and included specific instructions in simple language to match activities to the child’s age and level of development. The challenge is to develop this curriculum in a way that allows for sufficient flexibility to suit children of different developmental levels, ensuring that every child benefits from its key elements and a well-structured learning program while at the same time being delivered by personnel based in the communities and with a limited level of technical knowledge on child development. If adapting interventions from other contexts, an essential ingredient is that the personnel tasked with adapting the program not only have knowledge of local culture and parenting practices, but also understand and respect the underlying philosophy of the intervention.

The final lesson is that sustaining gains from early interventions is likely to require continuing investment at later childhood stages. Attanasio’s research suggests that developmental delays among disadvantaged children can be detected as early as 12 months and that what happens at each stage of childhood matters. This may in part explain fade-out of ECD intervention effects and suggests that optimal childhood intervention may be a multi-stage process. To understand fade-out effects, Attanasio emphasizes the importance of building a better understanding of how different skills develop over the course of childhood, how development in one domain affects that in the others and how interventions can be designed to reinforce this process. This knowledge will help understand how interventions can be designed to change these behaviors sustainably and how interventions over different phases of the life cycle of children (home visits, center-based care) interact and should be integrated.