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International Child Sponsorship and School Performance: Evidence from Goma (DRC)

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Abstract

This paper provides new evidence on the effect of an International Child Support (ICS) program, implemented in ten primary schools located in the outskirts of Goma (Congo, DR), on school performances. Using original micro data in a sample of 309 children (121 treated and 188 control), we explore whether the ICS program impacts on a broad set of alternative educational outcomes - namely, performance scores in 4 different subjects (plus total score), failure rates and school drop-out rates - through a Difference-in-Differences approach. The results show that sponsored children report lower drop-out rates and failure rates with respect to their control peers and, while lagging behind before the program started, in two school years they catch-up in all subjects. Results are robust to the implementation of Coarsened Exact Matching that exploits the structure of the data to produce unbiased estimates along with bounded ex-post balancing.

Keywords: International Child Support, Education, Program evaluation, School performance, Matching estimator

JEL: C93, D04, I25

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International Child Sponsorship and School Performance: Evidence from Congo

1. Introduction

Education has been recognized as a basic human right, safeguard for human dignity and foundation of freedom, justice, and peace (United Nations, 1948). From Schultz (1961), Cass (1965) and Koopmans (1965) to Romer (1990) and Lucas (1988), human capital has been considered as a fundamental determinant of economic development. More recently, a number of authors stress the importance of analyzing the role played by the quantity and quality of educational inputs (Bils and Klenow, 2000; Gennaioli et al., 2012; Hanushek, 2016) in school performance. All the above build on the firm belief that education plays positive effects on individuals, communities and societies as a whole. Education expands freedom through many channels, by raising aspirations and by increasing the potential to reach them. Benefits are both monetary and non monetary for individuals and households - in terms of higher future earnings, better employability, stronger health; and for communities and societies - in terms of higher productivity, poverty reduction, increased social mobility, higher level of civic engagement, greater social cohesion, gender gap reduction and women's empowerment - and they operate both on the short and on the long term (World Bank, 2018, p. 39). In particular, primary education continues to exhibit the highest social profitability when compared to higher educational level across different world regions (Psacharopoulos, 1985; Psacharopoulos and Patrinos, 2018).

Since the seminal study of Barro (2001), increasing attention has been devoted to the development of cognitive and soft skills - rather than schooling attainment only - as driver for increasing earnings, and real GDP per capita (Laurini and de Carvalho Andrade, 2012; Hanushek and Woessmann, 2012, 2015). Generally speaking, learning shortages and inadequate development of cognitive and soft skills are reflected in weak capacities once young people enter the workforce, reducing employment quality, earnings and labor mobility (World Bank, 2018).

Thus, the promotion of programs aiming to increase human capital in developing countries is crucial to ignite self-reinforcing patterns of development. However, significant cross-country differences in the quality of schooling exists (Kaarsen, 2014). With this respect, recent empirical evidence highlights that improved educational outcomes cannot be measured in mere terms of school enrollment. Although necessary, higher enrollment and completion rates are not always sufficient signals of improved educational achievements (World Bank, 2018). A widespread learning crisis in global education is particularly affecting low and middle income countries: even after the completion of primary school, for example, millions of children cannot read, write or do basic math. School enrollment without learning denotes the failure of the educational sector to create shared opportunity and prosperity for all, and outlines a critical gap in human capital accumulation. The long-lasting effect of such learning crisis is to fuel social inequality and to waste development opportunities. Therefore, emphasizing performances and learning outcomes in research and policy should be promoted.

In this perspective, International Child Support (ICS) programs can provide a valuable and effective tool to promote human capital accumulation in developing countries, provided

they target educational quality and school enrollment. As shown by Wydick et al. (2013), ICS programs usually act in a holistic way, by promoting children well-being in a broad perspective, for example by stressing the role of soft-skills and human relations to achieve sustainable results, such as self-esteem and self-expectations. It should be noted that internal constraints that reflect low aspirations have been consistently found conducive to poverty traps (Lybbert and Wydick, 2018). Despite ICS usefulness is seldom contested, these programs gained very limited attention by scholars, and their effectiveness remains an under-researched topic in the debate about educational outcomes.

This research work aims to reduce this literature gap by providing evidence on the micro-level effects of an International Child Support program with special attention on the learning attainments of pupils. In particular, our analysis delves into this debate by evaluating the effects of an ICS on a sample of 309 children enrolled in ten primary schools located in Goma (Democratic Republic of Congo) and by focusing on a broad set of educational outcomes, namely: performance scores in 4 different subjects (plus total score), failure rates and school abandonment rates. This work enriches the current debate about the “learning crisis” in poor countries, by analyzing original data on score performances achieved by primary school children in Goma (Democratic Republic of Congo). The analysis of educational micro-data allows exploring the learning capacity of vulnerable children and the effectiveness of a targeted development initiative - namely, an ICS program - in reducing obstacles to learning in poor countries.

In particular, it measures the impact of an International Child Support program in terms of educational outcomes: through a longitudinal analysis based on a Difference-in-Differences approach, we provide evidence of ICS positive impacts in terms of school attainments and dropout rates reduction.

The paper proceeds as follows: Section 2 introduces the debate, Section 3 outlines the context of action and presents the ICS program, Section 4 describes the sample and the research design, Section 5 presents the main results and robustness checks, Section 6 concludes.

2. School attendance and educational outcomes in low income countries

Given the role of human capital in fostering growth and human development, investments in the education sector have been identified as high social priority initiatives in low and middle income countries. Since the 1990s, official development assistance flows from donor countries extensively financed programs to enhance educational outcomes.¹

Despite some geographical heterogeneity, significant results were achieved under the Millenium Development Goals (MDGs) framework. The primary school net enrolment rate in developing countries reached 91 percent in 2015, up from 83 per cent in 2000. The number of out-of-school children of primary school age worldwide fell by almost half within the same period. Sub-Saharan Africa, the region receiving the highest level of official development aid in the education sector, reported the highest improvement in primary education enrolment rates since the MDGs were established. The region achieved

¹In line with the renewed international commitment brought by the World Declaration on “Education for All”, adopted by the United Nations Educational Scientific and Cultural Organization (UNESCO) in 1990, the MDGs foresaw the achievement of universal primary education as a target to be met by 2015.

a 20 percentage point increase in the net enrolment rate from 2000 to 2015, almost tripling the results achieved during the previous decade (United Nations, 2015). Although initially the efforts were particularly devoted to reinforcing the supply side (for instance, building new schools), more recently a substantial shift in the paradigm of action occurred with greater attention given to the demand side, through the adoption of initiatives such as tuition subsidies, free primary education, and conditional and unconditional cash transfers (Lincove, 2015).

However, despite significant results achieved, full primary enrollment is a target that remains to be met in many countries, especially in Sub-Saharan Africa, historically lagging behind. Looking at primary education, although net enrollment rate reached 78% in 2016,² this region still struggles to enroll children, especially in rural, remote and conflict-prone areas. In particular, among the widely recognized effects of civil conflicts on education outcomes, organized violence negatively impacts on primary school completion and attendance (Verwimp and Van Bavel, 2013; Bertoni et al., 2018), with long-lasting detrimental effects on human capital accumulation (Justino et al., 2013). Furthermore, even when children complete primary school, they often achieve very low learning outcomes, for example, not mastering basic competencies in reading and mathematics (Hungu et al., 2010; PASEC, 2016).

In framing the post-2015 agenda under the Sustainable Development Goals (SDGs), the debate moved from school enrollment and attendance to education access and quality of learning, bringing a new focus to education policies worldwide (Masino and Niño-Zarazúa, 2016). At the basis of this renovated approach there essentially is the evidence concerning the structurally poor quality of educational systems in many developing countries, with particular concerns for the Sub-Saharan Africa region. Lack of teaching materials, overcrowded classrooms, unskilled and unmotivated teachers, very high pupil/teacher ratios, as well as inadequate infrastructures are unfortunately quite common features of the educational systems in poor countries (UNESCO, 2014).

Recent evidence spotlights the existence of a double-faced problem: many countries are still struggling to provide education for all despite impressive results in terms of improved school access;³ and even where a significant share of children is enrolled in the education system, their learning outcomes may be very poor. Using Pritchett's words, schooling is not the same of learning (Pritchett, 2013), and even after several years in school, millions of children lack basic literacy and numeracy skills.

It should be noted that more vulnerable children - such as those living in chronic poverty - not only experience tougher obstacles in accessing schooling (for instance due to school fees and other indirect costs), but also tend to perform worse than their peers. Malnutrition, illness and harsh environments associated to poverty undermine early childhood learning, widening gaps in learning outcomes (McCoy et al., 2016; World Bank, 2018). Thus, the combined effect of social dimensions of exclusion (such as poverty, ethnicity, disability and gender) and inadequate school environment (if any) might even exacerbate original inequalities and marginalization. In other words, under some conditions, educa-

²Gross enrollment rate for primary education is 98% during the same year. All data are gathered from UNESCO dataset, accessible at www.data.uis.unesco.org.

³According to UNESCO, still 61 million children of primary school age were not in school in 2016, whose higher share live in fragile and conflict-affected countries (UNESCO, 2016).

tion systems can widen social gaps instead of narrowing them. In addition to inequality, growing evidence emphasizes that quality of education is what matters for economic development (Masino and Niño-Zarazúa, 2016).

2.1. Improving educational outcomes: the experience of International Child Support programs

Most scholars' attention has been devoted to explore the impact of three main categories of policy tools aimed at strengthening educational systems: cash transfers (Fiszbein and Schady, 2009; Abdoulayi et al., 2016); provision of school inputs - such as free or subsidized school meals (Diagne et al., 2014), uniforms and textbook (Evans et al., 2009); and school-based health interventions - such as deworming (Miguel and Kremer, 2004) or other free treatments (Glewwe et al., 2016). Although the existing empirical literature is based on programs implemented in diverse geographic and cultural settings, it shows overwhelming evidence suggesting that all programs have a positive impact in terms of higher school enrollment and attendance, lower grade repetition and lower dropouts rates. As to learning outcomes, Conn (2017) provides evidence for Sub-Saharan Africa by evaluating different types of education interventions such as the provision of school supplies, the use of teacher incentives, and school-based management programs. Through meta-analytic techniques, it suggests that initiatives aimed at reducing the financial burden for students and families - such as cash transfers, elimination of school fees, or uniforms provision as well as the supply of school meals - have varying, positive but low effects on performance. Health treatments (especially against malaria) have a positive effect on cognitive outcomes. Further it appears that using incentives to increase student motivation has a greater effect on learning outcomes than giving incentives to teachers (Conn, 2017).⁴ Smaller classes, or learning groups, the provision of instructional materials and teacher training stand out as meaningful area of intervention (McEwan, 2015).

Other forms of development initiatives finalized to widening access to educational system - such as International Child Support (ICS) programs - have been very little studied. "Given the number of individuals involved in child sponsorship relationships and the billions of dollars committed to them, it is surprising that almost no research exists that evaluates the impacts of these programs" (Wydick et al., 2013, p. 397). Although a reliable figure on the volume of internationally sponsored children worldwide is not accessible, it is possible to reasonably affirm that the number of assisted children is especially noteworthy.⁵ ICS programs are not uniform and show different implementation characteristics. However, the core intervention logic is common (Watson and Clarke, 2014): improving school attainments and grade completion stand out as standard objectives in ICS programs (Van Eekelen, 2013). Further, from an operational point of view, ICS initiatives work in a similar way to poverty-targeted cash transfers in resource poor settings. To the best of our knowledge, only few studies explored the impact of these initiatives (Kremer et al., 2003; Wydick et al., 2013, 2017).

Thus, ICS programs represent a broadly neglected instrument and an under-researched

⁴Such evidence results from a meta-analysis based on 56 experimental and quasi-experimental studies referring to interventions aimed at improving learning outcomes for students in Sub-Saharan Africa

⁵Wydick et al.(2013) provides one of the rare efforts to rigorously quantify the impact of sponsorship programs. Through information gathered from official websites of organizations promoting international child sponsorships, they estimate some 9.14 million internationally sponsored children in the world in 2012.

topic in educational outcomes literature. The analysis of ICS impact appears even more promising once we consider that poor educational outcomes - more generally, human development outcomes - might be largely driven by the experience of material deprivation (poverty) as well as the lack of spiritual and emotional resources needed to survive and develop (Minujin et al., 2006). Social constraints and non-material dimensions, in fact, can deeply affect educational outcomes, by preventing children from achieving full potential. As Wydick et al. (2013) remark, ICS programs aim “to simultaneously relieve both internal and external constraints that can impede progress in education” (p.426). These programs not only alleviate the effects of material dimensions (namely external constraints), such as guaranteeing school access to poor children by covering school fees not affordable otherwise, but they can also contribute to fostering aspirational hopes and agency, by reducing uncertainty and sustaining child emotional development. This is particularly worth of notice since internal constraints - such as the lack of aspiration - play a role in perpetuating poverty traps (Dalton et al., 2016): in particular, aspirations and hope appear firmly correlated with development outcomes (Ray, 2006; Duflo, 2012).

3. Background

3.1. Primary education in the Democratic Republic of Congo (DRC)

The Democratic Republic of Congo has a prolonged history of social instability, conflict and poverty which claimed millions lives, either as a direct result of fighting or because of disease and malnutrition. As such, the country faces significant obstacles to invest in human capital, although education is explicitly identified in the new Constitution as a natural right and an obligation of the State.⁶ In particular, the recent Education Sector Plan (2016 – 2025) brings new emphasis on expanding access and equity, improving learning quality and the management of the education sector. In particular, it sets three main strategic objectives: *i*) promoting an equitable education system by providing all children with free primary education, preparing the gradual extension of basic education to 8 years and adapting learning to promote social integration of young people; *ii*) creating an environment that boosts quality education systems, by developing monitoring mechanisms and fostering quality learning through the provision of learning materials and equipment for students and training for teachers; *iii*) improving transparency and efficiency of the governance and management of the education sector (République Démocratique du Congo).

Nevertheless, despite the considerable efforts spent in fostering cohesive partnerships and increasing public financial commitment on education,⁷ the Congolese education system is still plagued by low coverage and poor quality. National data show that 3.5 million children of primary school age are still not in school, and among those attending school, 44 percent start school after the age of six.⁸ In other words, DRC is still one of the countries

⁶See articles 40-46 of the 2011 amended Constitution.

⁷According to UNESCO, in 2015 2.29% of GDP is allocated to the education sector, with a positive trend since 2010 when only 1.60% of GDP were allocated for the same purpose. Data are accessible at www.data.uis.unesco.org.

⁸The education system is structured over three levels: pre-school (not compulsory), for children aged 3-5 years; primary school organized in a 6-years cycle where children aged 6 are admitted; and secondary school

with the largest number of out-of-school children. As regards completion rate in primary education, only 68.9 percent of children who enter first grade will complete sixth grade; this percentage falls to 66.5 percent when considering only female students.⁹ As regards the expected years of schooling, children in the DRC can expect to complete totally 9.2 years by age 18. However, when years of schooling are adjusted for quality of learning, this is only equivalent to 4.7 years: that is a dramatic learning gap afflicts the education outcome.¹⁰ Limited access and poor learning quality are therefore widespread features of the education system in the Democratic Republic of Congo. Further, areas particularly targeted by social unrest and instability - such as the Kivu region - face even higher obstacles since violence at and around schools is a known barrier to school access and learning.

3.2. International Child Support Program in Goma (DRC): AVSI Foundation experience

With 12.8 million people in dire need of assistance,¹¹ the Democratic Republic of Congo continues to witness one of the most complex and long-standing humanitarian crises.¹² In particular, the Kivu area is marked by chronic violence, widespread insecurity, high instability and displacement, as well as extreme poverty and the breakdown of family, community and social ties. Within this context, many school-age children are unable to access school on regular basis and are thus denied the opportunity to acquire the knowledge, skills and competencies to cope with difficult circumstances and to contribute to the recovery of their families and communities. Beside organized violence, in 2002 the city of Goma - capital of North Kivu province - was deeply affected by the eruption of Nyiragongo volcano whose effects exacerbated social instability and marginalization of such area. At that time, AVSI Foundation - an Italian non-governmental organization devoted to the promotion of cooperation activities for development.¹³ - started its intervention of emergency relief for affected people. Complementary to such intervention, an International Child Support program (called "Soutien à Distance", SAD henceforth) started with the specific aim of increasing school enrollment and reducing dropouts. Gradually, AVSI Foundation broaden its field of intervention from the original focus on education to the inclusion of child-protection measures, with clear emphasis on psycho-social aspects of child development.

The AVSI Foundation SAD program, as generally expected from this kind of programs, is based on regular giving on the side of a donor in favour of the especially vulnerable individuals (children), associated to the provision of regular personalized updates (through

structured on three different curricula.

⁹Unless otherwise specified, all data reported in this section are gathered from the UNESCO dataset on education. Data retrieved on December 2018 from www.data.uis.unesco.org.

¹⁰Data from the Human Capital Project (DRC) promoted by the World Bank. Data retrieved on December 2018 from <http://www.worldbank.org/en/publication/human-capital>

¹¹This figure roughly represents 16% of the total population, reported being 81.34 million in 2017.

¹²Data gathered from the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) website on January 2019.

¹³AVSI Foundation, established in 1972, manages several development initiatives implemented through stable relations with local partners, with particular attention to the education sector, and sustains 24,338 international child sponsorships in the Global South (data retrieved in 2018). More details at <https://www.avsi.org/en/>

yearly pictures, updates about child's school progress and brief written messages from the sponsored child) to the donors. The relationship between one private donor, who contribute a small percentage of monthly income to alleviating child poverty in a low income country, and the child, who lives in a state of need and poverty, creates some degree of personalized involvement. Thus, a degree of personalized involvement is the core engine of the program (Watson and Clarke, 2014).

The specific objective of the SAD program implemented in Goma is improving the access to quality education and vocational training through schooling and apprenticeship courses. This main target is included in a far-reaching strategy embracing the improvement of health and nutritional status of children, the strengthening of their relational ties (with parents or caregivers, teachers and peers), children protection mechanisms and social vigilance. According to AVSI Foundation approach, international children sponsorships are meant to support personal development of children in a comprehensive approach, involving families and communities. It implies that funding raised for sponsorships are partially devoted to financially support corresponding households. This support is not only meant to feed poor households development, but also to ensure social inclusion and empower parents and guardians by increasing their awareness of being protagonists of family development and responsible for their children, thus fuelling communities development.

A local office of AVSI Foundation, placed in Goma, manages stable interactions with local communities, through which basic information about households composition, health conditions, poverty status and specific needs are collected. This local office (through a number of social workers) is responsible for the selection of children for sponsorship, ranked according to a list of objective criteria regarding the household income level, orphanage condition, health conditions. Sponsored children are accompanied through a process of schooling facilitation (including for example, payment of fees and provision of uniforms), and health assistance. They are also involved in a wide range of after-school psycho-social activities such as recreational moments which emphasize their socio-emotional development, self-esteem and aspirations. In parallel with these activities, families are often involved to take part to sensitization activities which may regard, for example, nutritional or health care issues.

4. Research design

The reference population of this study on educational attainments is composed by vulnerable children living in a violence affected environment, and facing huge health and security challenges. Among them, many children benefit from an International Child Support program, particularly oriented towards the improvement of educational outcomes (both in terms of attainment and learning quality). We explore whether such initiative generates significant results in terms of enrollment, attainment and learning outcomes.

Organizing a longitudinal study in conflict-torn environments, with geographically dispersed interventions could make it very difficult to gather a sample of people under "treatment", plus a control group with enough statistical power to perform sound statistical analyses. However, we exploited the facilitating circumstance of a new SAD program that AVSI Foundation decided to start during school year 2015-16 in 10 primary schools, previously unsupported by any international aid program, in the city of Goma (DRC),

targeting about 200 children. In close collaboration with local staff, we implemented our research protocol at the beginning of this new SAD program.

According to AVSI Foundation’s experience based on other similar initiatives, two years in a SAD program is perceived to be the time span required to produce significant transformative impacts on children. Therefore we collected our outcome measures twice: at the end of the first term of school year 2015/16 (December 2015, baseline), before treatment started; and at the completion of the following school year, at the end the third term of 2016/17 (July 2017, follow-up).¹⁴

4.1. The sample

The schoolchildren participating in our longitudinal study were identified first of all on the base of their age. The significant elapse of time between the first and the second data collection required to limit the sample to only those children that in two years would still be attending school. Therefore, the sample only includes children attending from 1st to 4th grade in 2015/16.

Since the SAD initiative specifically targets most vulnerable children, the treatment assignment cannot be considered completely random, while classes’ composition can be reasonably assumed to be random, being performed by school headmasters irrespective of the existence of sponsorship programs sustaining individual children. Thus, for each treated child, we randomly selected two children matching age and gender and attending the same class (within the same school), to provide a control group for the evaluation of the program.

In the first term of 2015/16 school year, the resulting sample consisted of 134 children assigned to treatment (in other words, accessing the SAD program) and 264 children forming the control group. In the course of the treatment, 5 children previously in the control group were included in the SAD program by AVSI Foundation, and therefore excluded from the subsequent analysis. Moreover, before the second data collection, 84 children left school, either because they abandoned it, or because their families moved. Therefore, the resulting sample of children included in the final analysis consists of 121 children enrolled in the SAD program and 188 in the control group.¹⁵

To account for possible differences in the household environment where the children live, we also collected a set of information about background socio-economic characteristics. Table 1 provides a full description of all variables, and Table 2 provides summary statistics by treatment group, as well as the outcome of a t-test to assess pre-treatment balancing of our sample.

Table 1: Description of outcome and control variables

Variable	Description
<i>School reports’ scores</i>	
CIVEDREL	Harmonized score for “Civic education and religion”
NATLANG	Harmonized score for “National (local) languages”

¹⁴The school year in DRC consists of three consecutive terms starting in October each year.

¹⁵Please note that due to some missing values in school reports, the number of observations reported at the bottom of each model can be less than 309.

FRENCH	Harmonized score for “French”
MATH	Harmonized score for “Math”
TOTAL	Harmonized score for Total score, calculated as the sum of all subjects’ scores by each term
<i>Individual background characteristics</i>	
Age (years)	Child’s age (in years)
Female	Child’s sex, binary (female = 1)
<i>Parents:</i>	
- Orphan	Child is orphan, binary (orphan = 1)
- One parent	One of the child’s parents does not live within the household, binary (if absent =1)
- Both parents	Both child’s parents live within the household, binary (if both parents are present = 1)
<i>House type:</i>	
- Hut/Precarious	The child lives in a hut or a precarious housing
- Adobe	The child lives in an adobe building
- Concrete	The child lives in a concrete house
Class change	Dummy equal if in s.y. 2016/17 the child is in a different class than previous year

Table 2: Summary statistics of background characteristics, by treatment group

	SAD		Control		Difference		
	Mean	SD	Mean	SD	Diff.	T-stat	Chi-sq.
Female	0.53	0.50	0.51	0.50	-0.02	(-0.40)	(0.16)
Age (years)	8.01	1.62	7.80	1.50	-0.21	(-1.15)	
<i>Parents:</i>							
- Orphan	0.09	0.29	0.02	0.14	-0.07*	(-2.46)	(7.73)***
- One parent	0.27	0.45	0.14	0.35	-0.13**	(-2.81)	(8.61)***
- Both parents	0.64	0.48	0.84	0.37	0.20***	(3.97)	(16.83)***
<i>House type:</i>							
- Hut/Precarious	0.08	0.28	0.02	0.13	-0.07*	(-2.49)	(8.12)***
- Adobe	0.87	0.34	0.92	0.27	0.05	(1.43)	(2.24)
- Concrete	0.05	0.22	0.06	0.25	0.01	(0.53)	(2.24)
Observations	121		188		309		

Notes:

T statistics refer to difference between means by group.

Pearson Chi-Sq. is reported for binary and categorical variables.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 2 clearly shows that while the sample results well-balanced for most of our observable variables, SAD children are more likely to be orphans and to live in precarious or poor dwellings.¹⁶ Although these characteristics refer to a limited number of children in the sample, we address this source of unbalance by controlling for these variables in all our

¹⁶Looking at those being orphan and living in precarious conditions, 9% of SAD children share these characteristics whilst only 2% of children belonging to the control group do the same.

model specifications. Finally, through the regular annotations that all social workers are required to take about the activities and services delivered to children and families, as foreseen by the sponsorship, we verified a very high homogeneity of treatment.

4.2. School performance scores

For all children in the sample, we collected the school reports for two school years, namely 2015/2016 and 2016/2017. Each report includes information about the scores obtained in each subject for each term of attendance. Further, each school report includes a total score, obtained as the subject-wise sum of all the 3 terms. This total score is relevant for decisions about promotion and failure. It should be taken in account that the yearly total score is correlated with the baseline observation by construction, being the first term's scores included in the final sum. Therefore, to handle this issue and to provide robust results, our analysis exploits the information included in the school reports by using single term's scores. More specifically, since the children were assigned to the SAD program in the first months of 2016, the timing considered in the analysis is the following:

- the baseline outcome (pre-treatment) corresponds to the first term of 2015/2016, before the children were assigned to the program;
- the follow-up outcome is measured at the end of the third term of 2016/2017, i.e. after two school years have been completed.

Scores are awarded to students according to different ranges, that are specific to subject, term and grade (see Table A1). To make comparisons across grades feasible, all raw scores have been firstly harmonized, by re-scaling them relatively to their subject-, term- and grade-specific maximum. The resulting harmonized scores appear in all subsequent tables and figure.

In order to investigate whether the effect of the SAD program on school performance is heterogeneous with respect to alternative dimensions of school abilities, we collected data on 4 different subjects: Civic Education and Religion (CIVEDREL), National (local) Language (NATLANG), French (FRENCH) and Mathematics (MATH). We selected these subjects since they are common to all grades and obviously relevant in terms of learning attainment.

As shown in detail in Section 5, it is worth noting that before treatment SAD children are generally under-performing in all subjects respect to their peers belonging to the control group, and thus they were more likely to fail their grade.

4.3. Estimation technique

The estimation approach we adopted is devised to address the specific features of data and research design. Firstly, we are dealing with observational data, since the treatment has not been fully randomized on pre-treatment level of our outcome of interest: we are dealing with a field experiment in which the assignment to treatment is made by AVSI Foundation actually operating in the field. Secondly, in order to increase statistical power, we choose control group children within the schools placed in Goma that host SAD children, by ensuring that for each treated child two children were randomly chosen within the same class, sharing the same age and gender. This ex-ante matching procedure bounded the pre-treatment unbalance of our sample with respect to available observed covariates. Third,

we are aware of the fact that despite the SAD initiative is mainly targeted on children well-being, the program devotes attention to families also. This implies that SAD impacts may be diffused and therefore difficult to assess.

Taking in consideration these features in order to reduce this potential bias, the most appropriate estimation approach is a Difference-in-Differences (DID) analysis, in which the change recorded by the Treatment group (SAD children) is compared to the change observed in children belonging to the Control group. DID analysis allows to test the effect of the treatment on the treated sample (i.e. Average Treatment Effect on the Treated, ATT henceforth) by controlling for possible confounding factors, including fixed time-invariant individual characteristics.

In our analysis, we aim at estimating the ATT for SAD children on a set of school performance outcomes. Formally, being $Perf_{jit}$ the score of child i at time t related to subject j (i.e. either CIVEDREL, NATLANG, FRENCH, MATH or TOTAL) the effect of the SAD program on each specific j outcome is estimated as follows:

$$Perf_{jit} = \alpha + \beta SAD_{it} + \gamma Post_{it} + \rho(SAD * Post)_{it} + \delta X_i + \epsilon_{it} \quad (1)$$

where α represents the constant term; $Post$ is the time dummy, taking value 1 for observations belonging to the end of 3rd term in 2016/17 and 0 for the 1st term of 2015/16; SAD is the treatment dummy, identifying children enrolled to SAD; X_i are individual children characteristics; ϵ_{it} is the usual error term, while β , γ , ρ and δ are the parameters to be estimated. The ATT effect is estimated by the coefficient ρ .

DID is designed to control for time-invariant fixed effects, that are sorted out in the estimation process. However, in order to account for possible time-varying confounding factors, we include also some additional controls, namely children age, a set of dummy variables referring to the presence of both, one or none of their parents, and a set of dummy variables referring to the type of house where the children live.¹⁷

Although in the past decade, the enrolment rate of girls of all ages has been catching up to that of boys in many Sub-Saharan Africa countries, gender gap in educational attainment is still an issue implying - among other effects - gender-related labour market inequality. As far as regards DRC, school exposure rates highlight a persistent problem for girls to accessing and attending primary school: thus, we included a binary variable for gender to verify possible discrepancies in the learning attainments achieved by girls.

Finally, our research design envisages the possibility that unobserved peer effects might influence school performances, and for this reason we included a full set of class fixed effect to explicitly account for such effects.¹⁸ To control also for possible change of child assignment to class across the time span observed, due for example to optimization of classrooms which are likely to be over-crowded, we introduced a further binary control taking the value of 1 if the child changes class, and 0 otherwise.

To allow a clear interpretation of how SAD treatment influences pupils' scores and changes over time, all coefficients are standardized by "anchoring" individual scores to the Control

¹⁷Please refer to Table 1 for a description of control variables included in the analysis.

¹⁸Class fixed effects refer to the same school year, class and school.

group’s performance values at every term, i.e. what are the scores in case of attendance of regular classes in absence of any treatment. The standardization is obtained by treating scores as follows:

$$z_i = \frac{x_i - \bar{x}_C}{\sigma_C} \quad (2)$$

where z_i is the standardized value of the test score for pupil i , x_i is the raw value of the test score for pupil i , \bar{x}_C is the mean value of the test score in the Control group and σ_C is the standard deviation of the test score for the Control group. Therefore, all treatment effects in Section 5 are presented in this standardized form.

In all model specifications, standard errors are clustered at individual level.

5. Results

5.1. Overview of the children school performance

The first dimension of interest is represented by drop-out rates, being early school leaving a major issue. Out of the initial 134 SAD children interviewed in the first wave (2015/16), only 8 dropped out from the sample in the second wave of data collection (corresponding to 6%), due to families’ moving to other places. Once we looked at the drop-out rate in the Control group, we found an impressively higher value, equalizing 76 out of 264 children (about 29%). Even excluding the 22 children that we ascertained that moved to another school (and that could therefore potentially complete primary education elsewhere), the drop-out rate remaining significant and equally to 21%. The difference between drop-out rates in the two sub-samples is statistically significant at the highest level (z-value<0.001). This preliminary result suggests that the SAD program actually contributes to achieve the set purpose of facilitating children’s schooling.

A second educational outcome to be explored is pupils’ failure rate. Schoolchildren not achieving pass, i.e. receiving a “Fail” on their school report at the end of the school year, are expected to repeat the same grade the following year. Interestingly, Figure 1 shows that failure rate of the Control group is substantially constant across the two observed school years, whereas SAD children experience a relevant decrease in their failure rate. While the share of children failing in 2015/16 was significantly larger for SAD than for Control group (Pearson Chi-sq.= 8.747, p-value=0.003), this difference is no more statistically significant at the end of 2016/17 (Pearson Chi-sq.=0.035, p-value=0.851).¹⁹

These results are worthy of notice: sponsored children not only experience a lower drop-out rate, but also a significant improvement in terms of promotion rate (that is, a decrease in failure rate). SAD initiatives foster activities which are expected to reduce marginalization and to feed social ties, and mitigating the effect of such burdens might help education systems to fully develop their potential in poor settings. Although results cannot be easily generalized, we found evidence suggesting that highly vulnerable children (those selected

¹⁹Please note that for 2016/2017 s.y. this result holds even excluding children repeating their grade due to a previous failure. In this case, the Chi-sq. and p-values are respectively 0.062 and 0.804, again showing no statistical difference between the two groups after treatment.

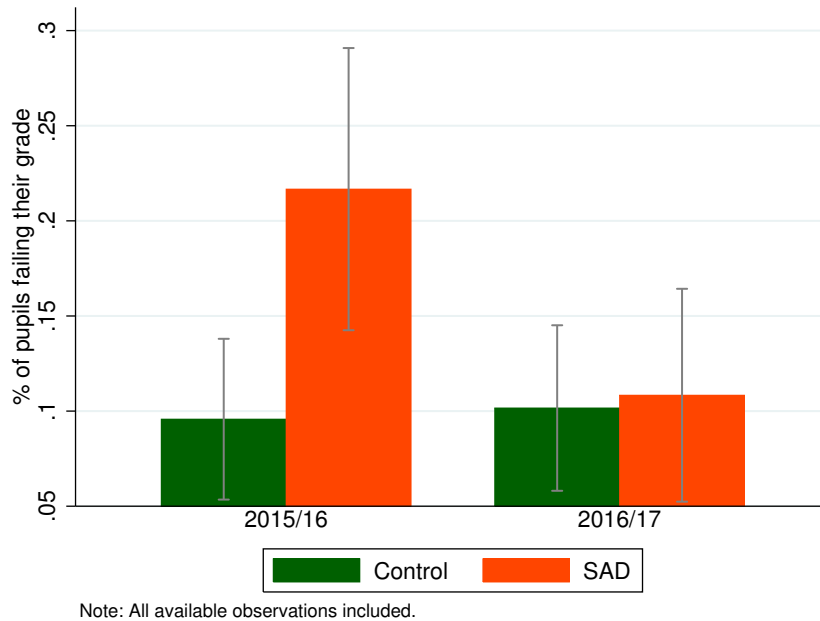


Figure 1: Share of children failing at the end of s.y., by group

for sponsorship due to poverty and precarious health conditions) can actually catch up if endowed with capabilities to attend school.

One original contribution of this paper is the use of micro data gathered from schools to assess both education attainments and learning performance in a challenging environment plagued by high poverty rates. As previously mentioned, scholars are giving increasing attention to learning quality, since this dimension stands out as major obstacle to effectively fulfill the human right to education.

For this reason, we collected and analyzed test scores achieved by pupils in different subjects. Figure A1 provides a comparison of the scores of SAD and Control children over the treatment period, i.e. the first term of s.y. 2015/2016 and the third term of s.y. 2016/2017. As explained in Section 4, performances are comparable across terms since test scores have been re-scaled in relative terms, according to each class specific range, and standardized as described in (2).

Again, the figure shows a clear catch-up pattern for SAD children. Sponsored children, in fact, perform well far behind children in the Control group before the Treatment started, on average. Given such widespread evidence across all grades and subjects, it seems reasonable to explain it both in terms of socio-economic and sanitary constrains, as well as reduced uncertainty about the child's future possibility to regularly attend school (Lybbert and Wydick, 2018). The progression experienced by SAD children is impressive: they improved at higher rate than children belonging to the Control group in all subjects, and, moreover, they actually overcame them in two subjects - namely Mathematics and Civic Education and Religion - at the end of the second year. In the other two subjects included in the analysis - namely French and National (local) Language - although children in the Control group perform better, the catching-up progression is still evident.

Table 3: Summary statistics of school performance scores, by treatment group and school year

Panel A:		School year 2015/16 - First term					
		SAD		Control		Difference	
		Mean	SD	Mean	SD	Diff.	T-stat
CIVEDREL		0.43	0.11	0.47	0.10	0.04**	(3.26)
NATLANG		0.60	0.15	0.66	0.12	0.05**	(3.17)
FRENCH		0.59	0.14	0.66	0.12	0.07***	(4.33)
MATH		0.64	0.17	0.68	0.15	0.04*	(2.17)
TOTAL		0.60	0.11	0.64	0.10	0.04***	(3.47)
Observations		120		184		304	

Panel B:		School year 2016/17 - Third term					
		SAD		Control		Difference	
		Mean	SD	Mean	SD	Diff.	T-stat
CIVEDREL		0.49	0.11	0.47	0.12	-0.01	(-0.99)
NATLANG		0.66	0.15	0.66	0.16	0.00	(0.16)
FRENCH		0.61	0.15	0.64	0.16	0.03	(1.75)
MATH		0.68	0.13	0.66	0.16	-0.02	(-0.95)
TOTAL		0.63	0.11	0.63	0.13	-0.00	(-0.04)
Observations		120		187		307	

Notes:

Harmonized and standardized test scores. T statistics refer to difference between means by group.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

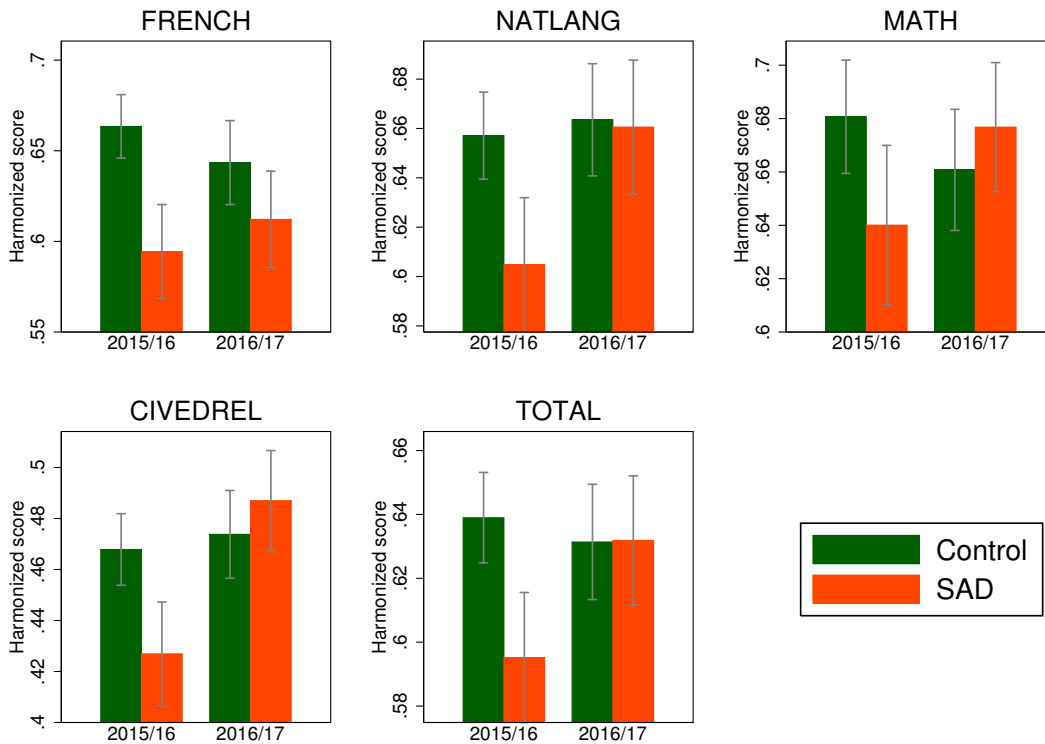


Figure 2: Re-scaled test scores, by group

5.2. Analysis of Treatment Effect

Soundness of our approach was preliminary checked through tests on all pupils' characteristics: results shown in Table 2 confirm that SAD and Control group are substantially balanced in terms of pre-treatment background features, with the only exception of likelihood of being orphan and housing precariousness or inadequacy. For this reason, we included corresponding controls in the analysis.

As regards treatment effect, that is how the SAD program impacts on school performance, we obtain clear evidence about its significance. During the first observed school term, in fact, sponsored children achieved performances which were significantly different respect to those achieved by children belonging to the Control group. A set of balance tests on performance indicators are summarized in Table 4.²⁰

Balance tests substantiate the descriptive analysis provided in the previous section, by highlighting that SAD children are initially lagged behind their peers. This feature can be explained by the fact that the selection process for possible sponsorships explicitly targets more vulnerable children, who are likely to face major challenges in terms of education

²⁰Table 4 includes also information about the number of days of absence. Since possible differences in daily attendance can generate different outcomes in terms of learning attainments, we collected information about this indicator also. We found that differences in variance across groups are null and statistically not significant, thus the number of days of absence results not informative given the research design adopted, and this measure is not included in the analysis. This is compatible with the importance of ICS in alleviating internal constraints, as in Wydick et al. (2013).

Table 4: Balance tests, performance indicators, pre-treatment

	School performances ¹					Attendance ²		Pass ³
	CIVEDREL	NATLANG	FRENCH	MATH	TOTAL	Absences	Presences	
SAD	-0.397*** (0.133)	-0.372*** (0.118)	-0.507*** (0.137)	-0.273** (0.115)	-0.412*** (0.123)	0.364 (0.230)	-0.005 (0.004)	-1.003** (0.430)
Constant	0.004 (0.133)	0.149 (0.118)	-1.490*** (0.137)	-1.014*** (0.115)	-1.583*** (0.123)	-16.662*** (1.014)	5.404*** (0.001)	2.155*** (0.189)
Class FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs	304	304	303	301	300	309	309	217
LL	-359	-377	-374	-364	-361	-874	-1143	-95
AIC	721	756	750	730	725	1795	2288	197
BIC	725	759	753	734	728	1881	2291	211

Notes:

¹ Dep. vars.: harmonized and standardized test scores. Balance tests performed through OLS.

² Dep. var.: binary variable equal to 1 if the child is admitted to following grade. Balance test performed through a Logit model.

Performance scores refer to pre-treatment levels (first term of s.y. 2015/16); pass refers to the end of s.y. 2015/16.

Standard errors in parentheses, clustered at class level.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

attainments.

As shown by the results of the DID analysis (Table 5), SAD children experience a positive and significant improvement in every subject, including the total score. The strongest effect is found in relation to french language (FRENCH) and civic education and religion (CIVEDREL).²¹

Table 5: Treatment effect on School performance, Diff-in-Diff, paired samples

	CIVEDREL	NATLANG	FRENCH	MATH	TOTAL
ATT	0.601*** (0.143)	0.356** (0.159)	0.533*** (0.158)	0.289** (0.147)	0.469*** (0.145)
Controls	Yes	Yes	Yes	Yes	Yes
Class FE	Yes	Yes	Yes	Yes	Yes
Adj. R-sq.	0.22	0.09	0.17	0.19	0.16
Obs	611	611	610	608	607
AIC	1696	1816	1747	1674	1727
BIC	2204	2324	2255	2177	2234

Notes:

Baseline: First term 2015/16; Follow-up: Final term 2016/2017. Standard errors in parentheses, clustered at individual level.

Reference category for number of parents is "Orphan"; reference category for house type is "Hut/Precarious".

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Going back to our research question, the results show a strong positive and significant

²¹As a robustness check, we performed a DID analysis considering an alternative follow-up measure, namely the sum of test scores achieved in the second and third terms of 2016/17. In this way, any potential term-specific effect is averaged between the two scores. Moreover, this measure helps incorporating part of the trend of the children's performance in 2016/17. The corresponding results confirm the outcome shown in Table 5.

effect of the SAD program on the performance scores achieved by sponsored children. Although they start with a disadvantage, SAD children systematically close the gap: this process of convergence corroborates the idea that being supported (in both material and non-material terms) makes the difference. Larger impacts are found in subjects where SAD children appear to have very poor school performances before the Treatment started. It is interesting to note that in Mathematics (MATH), which is standard subject used to elicit learning attainments, SAD children end up performing even better than their peers in absolute terms.

Finally, we did not find any gender-based evidence on performances, suggesting that girls experience the same capabilities' development during the learning process. This figures out as a relevant result, since we know that girls' education goes beyond getting girls into school: it is also about ensuring that girls learn, develop skills and complete all levels of education to be able to make decisions about their own lives, be competitive in labor markets, and contribute to their communities.

5.3. *Robustness Checks: Matching*

Children included in the Control group experience a higher drop-out rate respect to SAD children. This is a source of concern since the DID analysis might suffer of selection bias: the characteristics of Control group's children that do not abandon school, in fact, might be not randomly distributed, and rather driven by some underlying unobserved factors. Therefore, to increase the robustness of our results, we replicated the DID analysis on a sub-sample composed by matched children. Applying a matching algorithm we kept only SAD children sharing the same background characteristics of at least one of Control group children. In this way, we can estimate the ATT having already sorted out possible unobserved confounding effects.

Matching can be performed through a variety of alternative methods. In order to minimize model-dependence and ex-post unbalance, we pre-processed data by relying on the Coarsened Exact Matching (CEM) procedure described in Blackwell et al. (2009). This procedure carries a number of benefits with respect to alternative popular methods, such as propensity score matching (King and Nielsen, 2019), in particular by bounding both the ex-post unbalance and the error in estimating the ATT (Iacus et al., 2012).

Table 6 shows the results of the DID estimation after the CEM matching procedure applied on school, class, age and sex. We selected these observable features since they reflect the underlying structure of our research design.²² Further, control variables referring to parents' number and housing conditions are still included in the model. We obtained consistent results which corroborate the soundness of our analysis.²³

²²The small variance in the remaining control variables makes them unsuited for matching, since they would lead to an excessive loss of observations. In particular, SAD children show characteristics suggesting a higher vulnerability respect to Control group's children, due to the selection criteria applied. Such operational choice was beyond the control of the research team. However, it should be noted that the potential bias occurring due to this selection process is likely to produce a downward bias on the ATT, since highly vulnerable children are expected to face major obstacles in learning attainments. Such reasonable expectation is confirmed by the balance test carried out on the baseline values of outcome variables.

²³The fact that significance levels of the ATT are lower for some subjects is mainly due to reduction in the sample size. As further test of robustness, we restricted the sample to children with fully recorded school reports only (i.e. case-deleting all observations with missing data in at least one subject). The outcome of the

Table 6: Treatment effect on School performance, Diff-in-Diff, matched samples

	CIVEDREL	NATLANG	FRENCH	MATH	TOTAL
ATT	0.496*** (0.162)	0.385** (0.185)	0.395** (0.174)	0.305** (0.155)	0.452*** (0.157)
Time dummy	0.056 (0.108)	0.002 (0.134)	0.057 (0.130)	-0.085 (0.116)	-0.011 (0.114)
SAD	-0.417*** (0.145)	-0.421*** (0.152)	-0.565*** (0.147)	-0.281** (0.142)	-0.479*** (0.141)
Controls	Yes	Yes	Yes	Yes	Yes
Adj. R-sq.	0.03	0.03	0.05	0.01	0.04
Obs	522	522	520	516	512
AIC	1486	1501	1481	1448	1441
BIC	1524	1539	1519	1487	1479

Notes:

Baseline: First term 2015/16; Follow-up: Final term 2016/2017. Standard errors clustered at individual level.

Matched samples (CEM), based on school, class, age and sex. All available subject-specific observations included in the sample; 106 treated and 161 controls.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

6. Discussion and conclusions

Despite the positive results - in terms of school enrollment and education attainments - achieved by low-income countries in the past decades, the educational systems in these countries are still plagued by a number of problems which results in inadequate learning for a significant share of the population.

Many recent development initiatives specifically target education attainments, but the empirical evidence about their impact is still limited.

This paper presents a novel contribution to the debate by exploring the impacts generated by an International Child Support (ICS) program - an under-researched development initiative in the economic literature - on education attainments; using micro data, we provide evidence about the impacts of child sponsorship on schooling and learning outcomes in poor settings.

The analysis is based on the outcomes of a field experiment carried out in ten primary schools located in the outskirts of Goma (Democratic Republic of Congo, Kivu region). In close cooperation with AVSI Foundation - the organization promoting the ICS program, labelled SAD - we followed school performances of children selected to be enrolled in the program and school performances of untreated children randomly chosen within their same school, grade and class, matching age and gender. We observed the treatment for two school years.

Through a Difference-in-Differences analysis we compared the initial performance scores (observed at the first term of school year 2015/16, i.e. before SAD started) with the after-treatment scores (observed at the third term of 2016/17) for the Treated and Control

analysis is substantially unchanged and coefficients as well as significance levels appear stable and robust. Results are available upon request.

groups.

In particular, we tested whether the SAD program impacts on school performances in a broad range of subjects - namely Civic Education and Religion, French, National Language, Mathematics - by analyzing variations in test scores which were gathered from school reports. The results strikingly prove that sponsored children, while lagging behind before the program started, catch-up with Control children in all subjects. Further, sponsored children report also lower drop-out rates and failure rates respect to their peers. A final result that should be noted is the absence of significant differences between boys and girls performances, even in some subjects - such as mathematics - which are commonly used to check possible variance in learning paths.

It could be argued that removing external constraints - such as receiving paid school fees - provide “equal” access to schooling, thus the differential improvement in performances in favour of SAD schoolchildren may deserve further exploration. Our findings in fact are compatible with the argument that ICS programs contribute to alleviate external as well as internal constraints, such as lack of aspirations that may be associated with present school attendance without the reasonable expectation to be able to do it in the future, by sustaining emotional development and agency of children.

This combined effect of relieving internal and external constraints may be generating the impact we identified in the analysis.

Our results suggest that highly vulnerable children can actually catch up if endowed with capabilities to attend school. As a robustness check, we verified the consistency of these results by implementing a sound matching technique (Coarsened Exact Matching) that exploits the structure of the data to produce unbiased estimates and perfect ex-post balancing. All findings are confirmed.

We are aware of the potential limitations of our analysis arising from the impossibility of a full randomization process and the limited external validity of our results; however we believe this research is valuable because of its contributions to a still scarce literature devoted to the measurements of the impacts of child support programs on multiple education attainments.

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Appendix A: Supplementary figures and tables

Table A1: Maximum raw scores achievable, by grade and subject

First / Second Grade				
	Term 1	Term 2	Term 3	Final
CIVEDREL	120	120	120	360
NATLANG	200	200	200	600
FRENCH	160	160	160	480
MATH	200	200	200	600
TOTAL	1120	1120	1120	3360
Third / Fourth Grade				
	Term 1	Term 2	Term 3	Final
CIVEDREL	120	120	120	360
NATLANG	120	120	120	360
FRENCH	280	280	280	840
MATH	200	200	200	600
TOTAL	1120	1120	1120	3360
Fifth Grade				
	Term 1	Term 2	Term 3	Final
CIVEDREL	120	120	120	360
NATLANG	80	80	80	240
FRENCH	280	280	280	840
MATH	280	280	280	840
TOTAL	1200	1200	1200	3600

Table A2: Treatment effect on School performance, Diff-in-Diff, matched samples, all coefficients

	CIVEDREL	NATLANG	FRENCH	MATH	TOTAL
ATT	0.496*** (0.162)	0.385** (0.185)	0.395** (0.174)	0.305** (0.155)	0.452*** (0.157)
Time dummy	0.056 (0.108)	0.002 (0.134)	0.057 (0.130)	-0.085 (0.116)	-0.011 (0.114)
SAD	-0.417*** (0.145)	-0.421*** (0.152)	-0.565*** (0.147)	-0.281** (0.142)	-0.479*** (0.141)
<i>Parents number:</i>					
- One parent	-0.033 (0.189)	0.032 (0.213)	0.091 (0.219)	0.074 (0.214)	0.057 (0.222)
- Both parents	-0.053 (0.181)	-0.039 (0.220)	0.003 (0.216)	0.005 (0.199)	-0.085 (0.221)
<i>House type:</i>					
- Adobe	0.243 (0.216)	0.378** (0.154)	0.375*** (0.137)	0.110 (0.224)	0.359** (0.168)
- Concrete	0.541** (0.272)	0.604*** (0.224)	0.829*** (0.256)	0.157 (0.302)	0.724** (0.288)
Class change	0.013 (0.125)	0.095 (0.122)	-0.057 (0.122)	0.245** (0.120)	0.037 (0.126)
Constant	-0.201 (0.282)	-0.381 (0.270)	-0.435† (0.264)	-0.099 (0.278)	-0.307 (0.274)
Adj. R-sq.	0.03	0.03	0.05	0.01	0.04
Obs	522	522	520	516	512
AIC	1486	1501	1481	1448	1441
BIC	1524	1539	1519	1487	1479

Baseline: First term 2015/16; Follow-up: Final term 2016/2017. Standard errors clustered at individual level.

Matched samples (CEM), based on school, class, age and sex. All available subject-specific observations included in the sample; 106 treated and 161 controls.

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Goma, Democratic Republic of Congo
Location of schools included in the research



Figure A1: Location of the schools included in our sample, Goma, DRC