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INTRAHOUSEHOLD RESPONSES TO IMBALANCED HUMAN CAPITAL SUBSIDIES

EVIDENCE FROM THE PHILIPPINE CONDITIONAL CASH TRANSFER PROGRAM

David A. Raitzer, Odbayar Batmunkh, and Damaris Yarcia

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No. 645 | December 2021

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ABSTRACT

Extensive global evidence suggests that conditional cash transfers (CCTs) encourage long-term investment in human capital by poor households. However, CCTs also have the potential to distort incentives for investment among children. If only some children in the household are monitored/subsidized for compliance with conditionalities, returns to household investment in those children increase relative to siblings who are unmonitored/unsubsidized.

This paper demonstrates that puzzling nutrition effects of the Philippine CCT are driven by effects on children unmonitored for educational compliance, due to a cap of monitoring at most three children per household. Regression discontinuity design interacted with a secondary instrument for monitoring finds that while monitored children have improved human capital investment, such investment declines for unmonitored children relative to nonbeneficiaries. Patterns are consistent for parental expectations, health, anthropometric, and educational outcomes, and are stronger for boys, in accordance with theoretical expectations. Equalized incentives among children can enhance intended CCT effects.

Keywords: social protection, conditional cash transfer, human capital, intrahousehold allocation

JEL codes: D13, D91, I24, I38

I. INTRODUCTION

A. Conditional Cash Transfer Programs to Encourage Human Capital Investment

Conditional cash transfers (CCTs) seek to address market failures that perpetuate poverty. Poor households often face extreme resource constraints, and these resource constraints cause their time preference for consumption to be inflated, as future consumption is uncertain when sustenance needs are barely met in the present. In addition, the poor often have insufficient information to be able to effectively appraise the returns to longer-term human capital investments in health and education. As a result, they tend to underinvest, both because long-term benefits are insufficiently valued relative to short-term costs, and because long-term benefits are insufficiently appreciated (Shultz 1961, 1972). The resulting lack of human capital investment creates a cycle of intergenerational poverty, in which the next generation lacks the human capital to improve livelihoods and perpetuates underinvestment in the human capital of the following generation. CCT programs seek to alter this dynamic by offsetting the opportunity costs of human capital investments and complementing the offset with improved information access regarding the benefits of that investment. While the overall logic of CCT programs is affirmed by much evidence, this study will illustrate that the details of the programs matter and can create unintended consequences of reduced human capital investment in some children of program families.

CCTs have proliferated around the world in recent years. The number of countries with at least one conditional cash transfer program increased from 27 in 2008 to 63 in 2018. This expansion of CCT programs was spurred by the successes of early models of the approach in the 1990s, such as the Progresa[1] program in Mexico and Bolsa Escola and Bolsa Alimentação[2] in Brazil. Positive impacts were observed on education outcomes (Skoufias and McClafferty 2001, Schultz 2004, Todd et al. 2005, de Janvry et al. 2006); on health and nutrition outcomes (Gertler 2004, Rivera et al. 2004); and on consumption and poverty reduction (Hoddinott and Skoufias 2004, Skoufias and di Maro 2006). More recent studies show positive impacts of cash transfer programs on poverty reduction, food consumption, nutrition, utility of health services, child labor enrollment, attendance, and dropout rates but less evidence of impact on longer-term outcomes such as learning, test scores, child morbidity, and child mortality (Bastagli et al. 2016).

Most CCT programs follow a standard modality, in which households are provided with consumption support in the form of cash in exchange for meeting certain conditions. These conditions usually involve (i) enrolling children in school, (ii) attendance during 80% to 90% of school days for the monitored children, (iii) mothers attending prenatal and children attending antenatal checkups with health monitoring, (iv) immunizing children, and (v) attending parental education sessions. In some countries, children under program monitoring are required to pass into the next grade (Cambodia and Nicaragua), or complete secondary education by a certain age (Mexico).

[1] The name of this program was changed to Oportunidades in 2002.
[2] The program was merged with other pre-reform cash transfer programs into Bolsa Familia in 2003.

In most cases, the level of benefits is based on household composition, such as number and ages of children and how long they have been in the program. Due to budgetary constraints and concerns about adverse impacts on fertility, a cap is usually imposed in the form of a maximum number of beneficiary children or maximum transfers per month per household. Correspondingly, in some programs, compliance with conditionalities is monitored only for children falling below the maximum cap. For example, under the original Bolsa Escola Program in Brazil, the benefits—and conditionalities—applied to a maximum of three individual children. The school attendance of additional children was not monitored. This was changed under the consolidated Bolsa Família Program, in which the education conditionalities were monitored for all school-aged children in the family (not just the first three). In other countries, despite caps in the maximum number of children subsidized, all children in the beneficiary household are monitored. In other words, households are considered as the unit for transfers and for compliance monitoring, not individual children. Existing evidence in most cases of program effects pertains to children who are subject to some level of monitoring for educational compliance. The potential intrahousehold implications of incomplete monitoring are not considered in most CCT literature.

In the case of the Philippines, the Pantawid Pamilyang Pilipino Program (4Ps) has, since inception, only monitored beneficiary children for educational compliance and currently effectively monitors few other children for compliance with health conditionalities (Table 1). This means that the program effectively only subsidizes the human capital of some children and not others when the number of children in a beneficiary household exceeds the cap of three. Arguably, the context of the 4Ps CCT also means that there are more children beyond this cap than is the case for most other CCTs. As will be discussed in succeeding sections, this differential subsidy can drive an intrahousehold resource allocation response, which may lead to effects that are counter to the CCT's intentions for children who are not monitored. This paper explains the possible response and offers empirical evidence that it is caused by the program.[3]

[3] A summary version of this paper was previously prepared as a supplemental document to the Expanded Social Assistance Project Report and Recommendations to the President (ADB 2020).

Table 1: Basis of Benefit Variation Based on Household Structure and Coverage of Conditionalities

	Number of Children	Cap	Other HH Members	Age/ Grade of Children	Sex	Length of Time in Program	Children Covered by Conditionalities and Compliance Monitoring	Order of Priority
Mexico (Progresa/ Oportunidades)	x	$1,825 to $2,945 / HH/month	x	<22 years old	x	x	All age-relevant	–
Brazil (Bolsa Familia)	x	Max=3 children		<15 years old			All age-relevant	–
Philippines	x	Max=3 children[a]		<18 years old		x	Eligible only	Open selection[c]
Indonesia (PKH)		Rp2.2 million/ HH/year up to 6 years	x	<18 years old			All age-relevant	-
Argentina (Universal Child Allowance)	x	Max=5 children[b]		<18 years old			All age-relevant[b]	Youngest/ disabled
Colombia (Familias en Acción)	x	Max=3		<18 years old			All (health) Scholarship-holder only (educ)	Eldest
Chile (Subsidio unico familiar [SUF])	x	Flat transfer: $13,401/ family		<18 years old			All age-relevant	–
Ecuador (Bono de Desarollo Humano [BDH])	x	Flat transfer: $15/family/ month		<16 years old			All age-relevant	–

HH = household; Max = maximum..

[a] Only applies to educational grant.

[b] Maximum number of children in the family allowance scheme was eliminated in 2020. Compliance and monitoring to cover all age-relevant children in the household. Argentina Presidencia. Family Allowance Scheme. Decree 840/2020.

[c] Prior to 2015 the program selected a maximum of three children per household by prioritizing the youngest children aged 6 to 14 first, then selecting the eldest from the 3- to 5-year old age group if the maximum number has not yet been reached.

Sources: Chile Atiende. Family Allowance (Chile); Maria Edo and Mariana Marchionni. 2018. “Fading Out Effect or Long Lasting Nudge? The Impact of a Conditional Cash Transfer Program Beyond Starting the School Year in Argentina.” CEDLAS, Working Papers 0225, Universidad Nacional de La Plata (Argentina); Ariel Fiszbein and Norbert R. Schady. 2009. “Conditional Cash Transfers: Reducing Present and Future Poverty.” World Bank Policy Research Report. World Bank, Washington, DC; Laura G. Lárraga Dávila. 2016. “How Does Prospera Work? Best Practices in the Implementation of Conditional Cash Transfer Programs in Latin America and the Caribbean.” Technical Note IDB-TN-971. Inter-American Development Bank, Washington, DC (Mexico); Kathy Lindert, Anja Linder, Jason Hobbs, and Bénédicte de la Brière. 2007. “The Nuts and Bolts of Brazil’s Bolsa Família Program: Implementing Conditional Cash Transfers in a Decentralized Context.” World Bank Social Protection Discussion Paper 709. World Bank, Washington, DC (Brazil); Nadin Medellín and Fernando Sánchez Prada. 2015. “How Does Más Familias en Acción Work? Best Practices in the Implementation of Conditional Cash Transfer Programs in Latin America and the Caribbean.” Technical Note IDB-TN-884. Inter-American Development Bank, Washington, DC (Colombia); United Nations Non-contributory Social Protection Programmes Database. https://dds.cepal.org/bpsnc/about?bd=cct (accessed 15 January 2020); World Bank. 2012. “PKH Conditional Cash Transfer.” Jakarta (Indonesia).

B. Program Context

In 2018, there were about 3 million poor families in the Philippines. About 17.7 million individuals (16.7% of the total population) were living under the nationally defined poverty line, of which 9.3 million were children (PSA 2020).[4] One quarter of children in the country were not able to meet their basic food and nonfood requirements, putting them at an early disadvantage which could carry through to adulthood. To tackle problems of human capital underinvestment, the Government of the Philippines has been implementing the 4Ps via the Department of Social Welfare and Development (DSWD) since 2011 on a national basis.

Similar to other CCTs, the 4Ps is a program that provides poor households with cash grants when they meet certain requirements, such as ensuring that (i) pregnant women avail of prenatal and postnatal care; (ii) monitored children receive regular health checkups, vaccination, and deworming pills, and attend at least 85% of school days; (iii) and at least one responsible person attends family development sessions (FDSs) for parental training at least once a month. Eligibility is determined by classification as poor or near-poor based on predicted income from a proxy means test using data from the National Household Targeting Survey (Listahanan), the presence of either child household members within the eligible ages covered by the program or a pregnant mother, and willingness to comply with the program conditions. As of 2021, eligibility remains based on the poverty status predicted by Listahanan 1, which was enumerated in 2009. The program has a cap of three children who are eligible for educational monitoring and monthly educational grants.

The cash grants initially introduced comprised a ₱300 monthly educational allowance for each school-age child (maximum of three) in the family throughout the 10 months of the school year and a lump sum of ₱500 for the family's monthly health spending for 12 months in a school year. Assuming it has three children attending school, a family would have received a total grant of ₱15,000 (approximately 20% of the minimum poverty line subsistence expenditure). Since 2014, the government has been raising the value of the basic grants and augmenting it through rice subsidies and unconditional cash transfers, particularly in response to high inflation.[5] In 2014, the education grant was raised to ₱500 for high-school students. And in 2020, Republic Act 11310 further raised monthly transfers to senior high-school students to at least ₱700 and health grants to ₱750. With the implementation of additional subsidies in 2017, the adequacy ratio (ratio of transfers to poverty threshold) was restored to 19%.[6] There have been, on average, more than two children per beneficiary household during most of the period of the program (Table 2).

[4] Below 18 years of age (PSA definition).

[5] A monthly rice subsidy per household worth ₱600 was included to the transfers in 2017. And it was further supplemented with an unconditional cash transfer of ₱200/month in 2018, a component of the national government's Tax Reform for Acceleration and Inclusion (TRAIN) program to cushion the poor from the program's impact on petroleum prices. The unconditional cash transfer was to be raised to ₱300 in 2019 and implemented until 2020.

[6] Due to inflation, the purchasing power of a cash transfer to a family with three schoolchildren fell to less than two-thirds its original value from ₱15,000 in 2008 to ₱9,620 in 2018 and the share to poverty threshold for a conditionality compliant family fell to 12%.

Table 2: Total Number of Children per Household

	2008	2012	2014	2016	2020
Children beneficiaries	774,987	8,031,140	11,116,442	9,535,772	7,805,072
Households (HH)	337,418	3,121,530	4,455,116	4,387,689	4,295,738
No. of children/HH	2.3	2.6	2.5	2.2	1.8

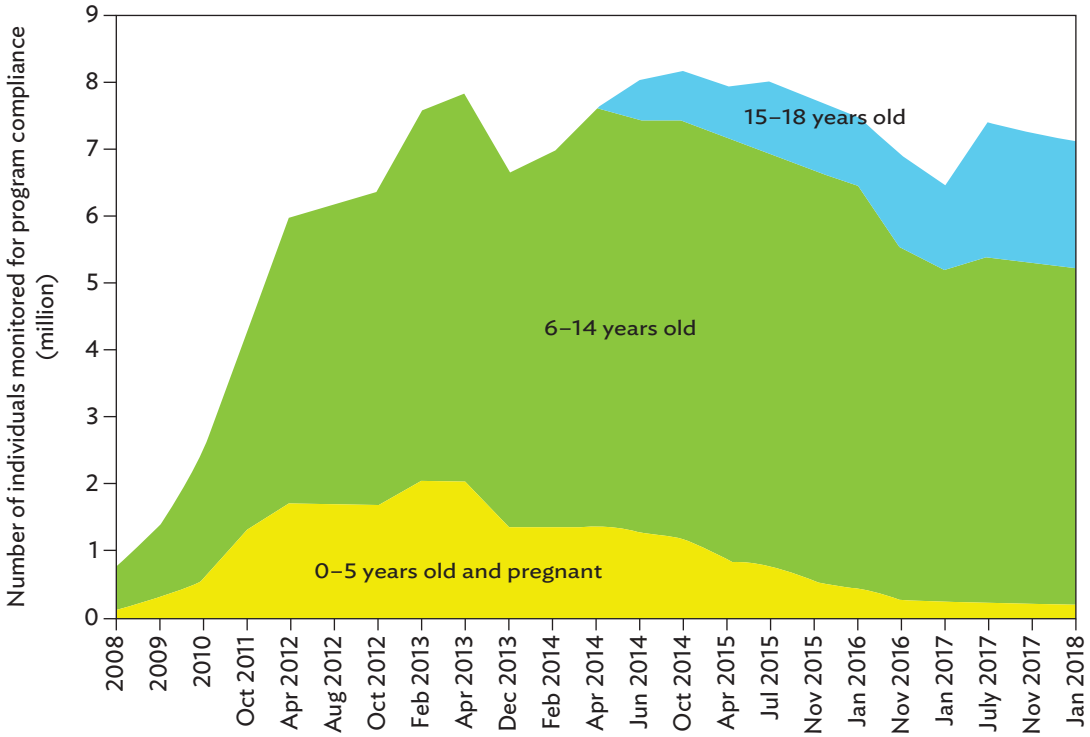
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

The 4Ps program expanded from 340,000 beneficiary households in 2008 to 4.4 million beneficiary households by 2014, and it is the third largest CCT program in the world in terms of number of individual beneficiaries (World Bank 2019). Originally, the program covered children aged 0–14 for a period of 5 years. With the launch of the Kindergarten to 12 Program by the Department of Education in 2015, the 4Ps raised the age limit of children from 14 to 18 years to enable them to complete grades 11 and 12 (i.e., senior high school). In addition, DSWD lifted the 5-year limit on program participation, so that beneficiary households exit from the program only when the last of their (three) children beneficiaries in education graduates from high school or reaches 19 years old, whichever comes first. For most of the program's history, children were selected by the program for monitoring by prioritizing the youngest children from the household in the 6–14 years old range, followed by the oldest children in the 3–5 years old range, until the three-child cap was reached. In 2015, the program allowed parents to manually switch which children are monitored, but instances of this were rare in practice.

The 4Ps has not updated the registry of poor eligible households between 2009 and 2020. As the cohort of families characterized in 2009 has aged, the probability of younger children being eligible for educational subsidies has fallen over time, since many of the most recently born fall into households with the maximum number of children already covered by the program. The program rules technically specify that all pregnancies and children should be compliant with health conditionalities in order to receive the fixed health grant. However, compliance is only monitored for children reported to the program, and beneficiaries themselves must report new pregnancies and births for this monitoring to occur. As the health grants do not increase for additional children, reporting additional births receives no reward. Rather, since all health conditionalities must be met for all children reported to the program, reporting children increases the number of conditionalities that a household must satisfy to continue to receive the health grant. Thus, nonreporting of these children prior to schooling age makes it easier to receive the health grant and is incentivized.

Accordingly, as a rising share of younger children is ineligible for educational subsidies, the monitoring rate of children born to 4Ps households has been falling during the course of program implementation. Figure 1 depicts the age composition of children monitored by year and how nearly only older children are being monitored and that the number of children monitored has declined since 2014. The decline in monitoring rates suggests that any adverse effects on monitoring ineligible children may become a larger issue over time without improvements to program implementation to ensure that all children are registered and monitored.

Figure 1: Profile of Those Monitored for Compliance with Conditionalities of the Pantawid Pamilyang Pilipino Program



4Ps = Pantawid Pamilyang Pilipino Program.
Note: Data exclude children from municipalities in state of calamity.
Source: World Bank estimates using data from the Department of Social Welfare and Development.

C. Previous Findings on Impacts of the Pantawid Pamilyang Pilipino Program

Impact evaluations have helped to confirm the effectiveness of the 4Ps at various times. Prior to 2018, those impact evaluations were conducted in the context of beneficiary households in which nearly all children of eligible age were covered by the program. In 2012 and 2014, DSWD partnered with the Philippine Institute for Development Studies (PIDS) to conduct two "waves" of impact evaluations of the program with the help of the World Bank, AusAID, the Australia's Department of Foreign Affairs and Trade, and the Asian Development Bank (DSWD and World Bank 2012, DSWD 2014). The studies utilized a randomized controlled trial (RCT) design (Wave 1) and regression discontinuity design (RDD) (Wave 2). Previous program improvements were informed by the impact evaluation results, including expansion of the 4Ps program to cover children over 14 years of age in 2014.

Results from the first two waves of impact evaluation indicate that 4Ps was generally improving health service utilization and school enrollment. Positive results include (i) increased use of child health services including growth monitoring, deworming, and vitamin supplementation; (ii) increased enrollment rate particularly among older age groups; and (iii) increased spending on education (Table 3). Some impact observed in 2012 was not found in 2014, such as improved utilization of antenatal care, postnatal care at home after delivery, deworming pills for children 0–5 years old,

increase in medical spending per capita, and use of curative care in case of illness; reduction in severe stunting; increase in enrollment among younger children (3–11 years old); and increase in attendance among 6–17 years old. Wave 2 found new effects, including an increase in rate of facility-based delivery, postnatal checkups by a trained professional, attendance rate among preschool children (3–5 years old), enrollment rate for 12–14 year old children, number of hours worked in previous week, and job search among those employed. The first two waves found no significant impact on immunization rates, per capita consumption/expenditure, and health outcomes such as children being underweight or wasted. No adverse impact on fertility decisions and spending on vice goods such as alcohol and tobacco were found. The program also appeared to be equally effective for boys and girls so far, with limited gender differences found in program impacts on outcomes related to education and health service use.[7]

In 2020, impact evaluation Wave 3 (PIDS 2020a) was published based on 2017 data in the context of beneficiary households having aged, with a large share of younger children in beneficiary households now ineligible for educational subsidies, as the cap of covered children has been met. As of 2017, out of 3,028 surveyed 4Ps households, monitoring data suggest 16% had three children monitored by the program and 32% had two children ever monitored. As in previous waves, Wave 3's RDD explores the effects of the 4Ps program on health service utilization, health outcomes, child nutrition outcomes, school enrollment, income/consumption, and socio-emotional skills. A complementary RCT follow-up (PIDS 2020b) explored whether longer and early access to the program improves child nutrition and educational outcomes. More importantly, significant positive effects were found on school enrollment, use of contraception, access to maternal and child health services, and new indicators on the non-cognitive socio-emotional skill of grit, or perseverance of effort towards goals, which is closely associated with educational and labor market success. However, the effects of the program on mean per capita consumption, child immunization, child and adult labor, and birth outcomes were less clear. In addition, on nutrition, the RCT suggests positive effects of early participation in the program, whereas the RDD identifies an adverse impact on stunting. Moreover, the RDD provides some suggestive evidence that unmonitored children of 4Ps beneficiary households have worse educational outcomes relative to those in nonbeneficiary households.

[7] In Wave 2, boys have more iron supplementation (under 6 years old), more growth monitoring (2–5 years old), more deworming at least once per year (6–14 years old), more attendance to preschool (3–5 years old), and less days worked in past months (10–14 years old) than girls. In Wave 3, there is a higher proportion of female 4Ps children 12–15 years old (by 9 percentage points) enrolled in junior high school compared with female non-4Ps children. There is a lower dropout rate among female children 12–17 years old, and male children 6–14 years old compared with non-4Ps children of the same age and sex.

Table 3: Key Results from Previous Impact Evaluations of the Pantawid Pamilyang Pilipino Program

	IE 2012		IE 2014		IE 2020	
METHOD	**RCT**		**RDD (sharp)**		**RDD (sharp)**	
Bandwidth			CCT bandwidth		CER bandwidth	
Exposure to the program	2.5 years		2 to 4 years		2 to 9 years	
Households	3,742		5,041		6,775	
Municipalities	8		30		30	
Provinces	4		26		25	
EDUCATION						
Enrollment ages 3–5	+10ppts		-		-	
Enrollment ages 6–11	+4.5ppts		-		-	
Enrollment ages 12–14	-		+6.3ppts	/a	+4.46ppts	/b
Enrollment ages 15–17	-		-	/c	-	/d
Attendance ages 3–5	-		+39.0ppts		-	
Attendance ages 6–11	+3.8ppts		-		-	
Attendance ages 12–14	+4.9ppts		-	/a	-	/b
Attendance ages 15–17	+7.6ppts		-	/c	-	/d
HEALTH						
Prenatal care at least 4 visits	+10.5ppts		-		-	
Prenatal care by a skilled professional			-		-	
At least 1 prenatal checkup in a health facility			-		-	
Facility-based delivery	-		+14.2ppts		-	
Delivery assisted by trained professional	-		-		+8.78ppts	/f
Postnatal care at home 72 hours after delivery	+9.6ppts	/e	-		-	
Postnatal care by health-care professional			+20.3ppts		-	
Postnatal checkup in a facility	-		+16.5ppts		-	
Regular weight monitoring for 0–2 yrs old	+15ppts	/g	-		-	
Regular weight monitoring for 2–5 yrs old			+23.7ppts		+9.17ppt	
Deworming pills <6 yrs old	+6.7ppts				-	
Deworming pills at least once a year 6–14 yrs old	+4.7ppts		+9ppts		-	
Deworming pills at least twice a year 6–14 yrs old	+9.3ppts		-		+7.67	
Vitamin A supplementation	+6.2ppts		-		+5.83ppt	
Iron supplementation			+12ppts		-	
Full immunization age 1		/h	-		-	
Ever attended any FDS session			+50.1ppts		+27.12	
OTHERS						
Household						
Education spending per capita	+38%		+₱207		-	
Medical spending per capita	+34%		-		-	

continued on next page

Table 3 *continued*

	IE 2012		IE 2014	IE 2020	
Protein-rich food	+38%				
Total expenditure per capita			-	-	
Food spending per capita			-	-	
Nonfood spending per capita			-	-	
Covered by PhilHealth or PhilHealth Indigent program	+10.8ppts		+37.6ppts	+22.80ppts	/i
Use of PhilHealth benefits during last hospital visit			-	-	
Child's health					
Underweight	-	/k	-	-	
Wasting	-	/k	-	-	
Stunting	-	/k	-	+5.53ppts	
Severe underweight	-	/k		-	
Severe wasting	-	/k		-	
Severe stunting	−10.1ppts	/k		+5.34ppts	
Adult labor					
Employed at least an hour in previous week	-		-	−2.69ppts	
Number of hours worked in previous week	-		-	+2.62days	
Looking for additional work if employed			+6ppts	-	
Looking for work if unemployed			-	-	
Looked for job in the past 7 days	-				
Reproductive health					
Awareness of any modern RH method			-	-	
Ever use any modern RH method			-	+5.3ppts	
Current user of any modern RH method			-	-	
Outlook					
Child will have a better future			-	-	
Child will grow up healthy				+0.92ppts	

4Ps = Pantawid Pamilyang Pilipino Program, CCT = conditional cash transfer, CER = coverage error rate optimal , FDS = family development session, IE = impact evaluation, RCT = randomized controlled trial, RDD = regression discontinuity design, ppts = percentage points, RH = reproductive health, yrs = years.

Notes: Results are based on narrowest bandwidths: CCT bandwidth, Sharp RDD for IE 2014, and CER bandwidth, Sharp RDD for IE 2020.

a / 12–15 years old.

b/ 12–17 years old.

c/ 16–20 years old.

d/ 15–20 years old.

e/ Postnatal care at home 24 hours after delivery.

f/ Delivery assisted by trained professional.

g/ Weight monitoring according to age.

h/ Immunization BCG, Measles.

i/ Household has at least one member of PhilHealth indigent.

j/ Children 12–15 years old are in high school.

k/ Health outcomes for 6–36 months.

Source: Authors.

These results motivated the authors to conduct further research into possible reasons behind the contradictory results found in Wave 3 outcomes on nutrition and possible linkages with the effects observed on unmonitored children's educational outcomes. One key feature of 4Ps implementation that has not been explored in earlier studies is the three-child limit on educational grants and educational monitoring. In effect, monitoring only a subset of the children of many households means that some children have subsidized human capital investment, whereas others do not, so that household returns to investment in monitored children are higher than for the unmonitored. If so, the program may unintentionally induce beneficiary households to redirect resources from unmonitored children, both in terms of education and nutrition.

D. Hypotheses and Theoretical Model

CCTs essentially subsidize human capital, and this capital subsidy can affect intrahousehold resource allocation by changing the returns to investment by the household. An important component of the returns to human capital investments consists of future expected income. Households that act as *resource maximizers* will invest so as to maximize the future aggregate expected income arising from investments, without concern for equality of who is generating the income. On the other hand, *resource equalizers* will seek to ensure equity of expected income across all children (Ayalew 2005; Datar, Kilburn, and Loughran 2010; Pitt, Rosenzweig, and Hassan 1990).

To explore the implications of *resource-maximizing* behavior, a household utility function can be modeled as follows:

$$U = U(c, v_1, \ldots, v_n) \tag{1}$$

where v_i, v_j is the human capital of the *i*th or *j*th child, and c is the total amount of all other consumption.

It is assumed that the function has declining marginal gains to utility from consumptions and human capital. Human capital is a function of a vector of inputs of investments by the household in education, health, and nutrition, and *z,* which is the child's inherited abilities.

$$v = f(x; z) \tag{2}$$

Following Becker and Tomes (1979), equation 3 shows the equilibrium between marginal gains from human capital and the relative prices of increasing human capital. If the prices of adding to human capital were the same across children, and all increases in human capital had the same effects on utility, declining marginal effects of human capital on utility imply that investing more in the less-able child is optimal until overall human capital levels equalize among children. In other words, parents will invest such that they will fully compensate for differences in endowments. However, it is unlikely that the cost to improve "quality" would be the same when endowment differs. If the prices faced by parents of adding to the children's endowments were p_{q_1} and p_{q_2}, investment in each child would proceed until the ratios of marginal utility gains equalized at the ratios of the prices. Given declining marginal effects of human capital on utility, this implies a higher investment level in the child with lower prices for improving quality.

$$\frac{\partial U}{\partial v_1} \Big/ \frac{\partial U}{\partial v_2} = p_{q_1} / p_{q_2} \tag{3}$$

This further implies that a proportional subsidy of s to p_{q1} under a cash transfer conditional only on the education of that child and not other children will shift the equilibrium ratio of marginal returns and optimal investment among children in direct proportion to the cost reduction implied by the subsidy. In other words, optimal educational investment in the subsidized child would be increased until marginal effects fall to an even lower level commensurate with the price reduction (equation 4).

$$p_{q_1}(1-s)/p_{q_2} = \frac{\partial U(1-s)}{\partial v_1}/\frac{\partial U}{\partial v_2} \tag{4}$$

If parents have the ability to decide which child will receive s, equation 3 implies that children with lower educational costs from the beginning will likely be preferred for additional investment. Lower educational costs will be driven in part by higher abilities and endowments. This implies that the conditional cash transfer will favor the children with better initial endowments who already have higher educational investments, and it will further increase the household investment differential toward those children, at the expense of other children in the household.

The above considerations reflect that the relationship between utility and child quality is homogenous across children. However, if human capital has a different association with utility among children, an additional dimension is added to the choice. Even if there is equal preference for the earning potential of all children by parents, children may have other characteristics that condition the effect of quality on earnings potential. Given that there can be substantial gender disparity in favor of males, particularly in labor force participation and to some extent in wage rates in the Philippines, gender may affect the above choice. With higher labor force participation and wages among males, it can be expected that the effects noted above will be stronger among male children than among female children. This does not necessarily imply that male children will be favored for educational subsidies, because girls may have lower costs to improve education than boys, as evidenced by higher average levels of educational completion for girls in the Philippines. Yet the higher marginal utility response to human capital of boys will have a multiplicative effect in equation 4, which makes the effects of subsidies more apparent.

The effects of distortions in intrahousehold investment in education among children can skew other human capital investment in health. Equation 5 models child-specific lifetime income, y, as a function of human capital inputs health and education, following Bleakley (2010) and Bleakley, Costa, and Lleras-Muney (2013):

$$y(e,h) = \int_e^{\infty} \beta(t)\tilde{y}(e,h,t)dt - \hat{c}(e,h) \tag{5}$$

where e is education and h is health investments, $\tilde{y}$ is the discounted sum of period-specific incomes of children i or j mentioned in equation 1, and $\hat{c}$ are costs of education and health inputs.

Then, the marginal return to input x is:

$$\frac{\partial y}{\partial x} = \underbrace{\int_x^{\infty} \beta(t)\frac{\partial \tilde{y}}{\partial x}dt}_{MB_x} - \underbrace{\left(\frac{d\hat{c}}{dx}\right)}_{MC_x}, \quad x = e,h \tag{6}$$

where the first term on the right refers to marginal benefits of schooling or health, MB_x, and the second term refers to marginal cost of schooling or health, MC_x, including the direct costs and opportunity cost (in the case of education).

Optimal investment is reached when $MB_x = MC_x$. The usual assumption is that marginal benefit goes down with increasing inputs while marginal cost increases, that is, the second order partial derivatives will be $MB_{xx} < 0,\ MC_{xx} > 0$. It follows that the optimal health investment response to education investment will be the following:

$$\frac{dh^*}{de} = -\frac{(MB_{he} - MC_{he})}{(MB_{hh} - MC_{hh})} = -\frac{\left(\frac{\partial^2 y}{\partial h \partial e} - \frac{\partial^2 c}{\partial h \partial e}\right)}{\left(\frac{\partial^2 y}{\partial h^2} - \frac{\partial^2 c}{\partial h^2}\right)} \tag{7}$$

The CCT introduces complementarities between health and education that raise the numerator magnitude for the subsidized children. For the first term of the numerator, health may improve skill acquisition during education, which translates to greater long-term income effects, which raise that component. The second numerator term is diminished, as children who attend school may benefit from free or discounted medical monitoring and preventative care in schools or partner institutions, thereby reducing the costs to increase health when education is increased. In addition, children with more education may better understand health information, so that they have lower information acquisition costs to improve health behavior.

Given that the effect is child specific, the increase in optimal health/nutrition investment will only apply to children subsidized by the program, and those children will have higher levels of optimal investment than children who are not subsidized, even within the same household. Under a budget constraint, resource-maximizing households would thus redirect investment in health and nutrition from children not covered by the program to children within the program in the same household. In other words, a maximizing investment strategy implies that households prioritize children who have the lowest cost to attain higher education and associated wage premiums. Since the effect of the educational subsidy on educational investment is expected to be strongest among boys, as discussed from equation 4, it follows that the prioritization of health investment will also be strongest among boys.

This paper hypothesizes that households are maximizing expected returns on human capital investment by investing in children according to the highest marginal rate of return, reinforcing program-induced disparities. Under the hypothesis that investment is according to returns, it can be expected that children subsidized by the CCT will exhibit improved school attendance, higher parental expectations, and improved health and nutrition characteristics. At the same time, these effects will be accompanied by redirection of resources from unmonitored children to those who are monitored. The hypothesis therefore also implies that parental expectations of unmonitored children will be worse than for nonparticipant children, and that human capital investments from nutrition, to health, education, and labor will follow suit. By extension, it is also hypothesized that these effects will be observed more strongly among boys than girls, due to higher expected effects of male human capital on earnings potential.

II. METHODOLOGY

A. Regression Discontinuity Design

The analysis seeks to reveal the causal effects of the 4Ps intervention on household and intrahousehold outcomes. To do so, the analysis must overcome confounding by "selection bias," in

that households are selected and choose to participate in the 4Ps program for specific reasons, so that they have important differences that exist independently of the program. As in the DSWD (2014) and PIDS (2020a) analyses, the approach used here to avoid confounding is regression discontinuity design (RDD), which infers causality based on a comparison of a sample just above and just below a program eligibility threshold regarding an exogenous quantitative characteristic. Because households above and below the threshold have only very minor differences (if they are not able to change the characteristic to gain access to the program), they only, on average, differ substantially regarding access to the program, and any other differences are likely to be effects of the program. In this case, the quantitative characteristic is predicted income from the national household targeting survey in 2009. Households are only eligible for 4Ps if predicated/estimated income (using a proxy means test model) is below the provincial poverty threshold. Thus, the RDD comparison is of households just above and below the threshold in terms of predicted income in 2009.

A simplified RDD model is shown in equation 8, where Y is the outcome of interest, D is the binary treatment indicator, and W is the vector of all observable characteristics of the household that might impact the outcome and/or the assignment variable X, which is predicted household-level income from the proxy means test for determining program eligibility. Province-level poverty threshold is given by φ as the determinant of D in equation 9.

$$Y = \propto + D\tau + \beta_1 X + \beta_2 XD + W\delta + U \quad (8)$$

$$D = 1[X \geq \varphi] \quad (9)$$

The RDD is only valid if households are unable to manipulate the program to become eligible. Evidence of this behavior appears in the density of observations being raised to one side of the eligibility cutoff. A McCrary test (Figure A1) rules out sorting around the cutoff, and using RDD is appropriate in this case.

B. Overall Identification Strategy

The RDD is a nonparametric design, with inference based on a locally optimal bandwidth, a robust misspecification bias correction procedure. The design optimizes the tradeoff between bias (which increases as the sample bandwidth includes observations further from the eligibility cutoff) and variance (which decreases as the bandwidth increases). The RDD is also "fuzzy" due to a substantial no-show rate near the threshold in the sample, as 512 of 3,458 eligible households that were below the provincial poverty threshold did not receive any 4Ps benefits, although the crossover rate is minor with 82 households of 3,322 that were not eligible receiving benefits. This noncompliance has been checked using administrative payroll data provided by DSWD (Table 4).

Table 4: Crossover Rate

4Ps Payroll Data	Not Eligible	Eligible	Total
HH not paid	3,322	512	3,834
HH paid	82	2,946	3,028
Total	3,404	3,458	6,862

4Ps = Pantawid Pamilyang Pilipino Program, HH = household.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Estimation uses a local nonparametric estimator using coverage error rate optimal bandwidths (Calonico, Cattaneo, and Titiunik 2014), with a triangular weighting kernel. RDD can be estimated with various polynomial orders, such that the $\beta_1 X + \beta_2 XD$ term of equation 1 is supplemented with additional polynomial terms, such as $\beta_3 X^2 + \beta_4 X^2 D$, when a quadratic curve better fits the relationship between outcome and assignment variables. In this case, the polynomial order has been selected based on minimization of the Akaike information criteria for a parametric implementation of the estimator in the optimal bandwidths. For most outcome variables a first order polynomial is selected, which is consistent with the recommendations of Calonico, Cattaneo, and Farrell (2020).

A parametric two-stage least squares model with the same functional form, bandwidth, polynomial order, and triangular weighting kernel is used to predict outcomes with and without treatment. Covariates are included on municipality, household size, road accessibility, average year of 4Ps signup at barangay level and the presence of facilities in the barangay. Covariates are detailed in Table A1.[8]

C. Identification Strategy for Analysis of Effects by Monitoring Status

The above approach addresses potential self-selection and placement bias for pooled effects of the program. However, children who are monitored and not monitored for educational compliance may still differ in characteristics that predate the program, as they are nonrandomly selected by the program (until 2015) and households more recently. Because the selection of children for monitoring only exists for households in the program, this may confound comparisons with the entire pool of nonprogram children. For example, if households selected more academically apt children for educational compliance monitoring, aptitude may be conflated with the effects of monitoring in a simple subgroup analysis. To address this, a secondary instrument is interacted with the RDD design in the analysis of effects on monitored and unmonitored children to give a predicted treatment variable Z, for which treatment effects are estimated (equation 10). The design is implemented as an instrumental variable defined by the cutoff variable, the instrument (*I*), the interaction term between those two variables, and a vector of the other covariates (N) (equation 11).

$$Y = \propto + \tau Z + \beta_1 X + \beta_2 XD + \delta W \quad + U \tag{10}$$

$$Z = \vartheta D + \sigma I + \gamma DI + \theta N \quad + U \tag{11}$$

The approach still uses a local estimator in a coverage error rate optimal bandwidth, with triangular kernel weighting, optimized polynomial order, and robust bias corrected inference, based on standard errors generated from a p+1 order specification of the regression. The secondary instruments consist of two elements for different age groups following program eligibility rules for children. Until 2015, the 4Ps program selected children for enrollment by prioritizing those between 6 and 14 years of age in ascending order of age and below 6 in descending order of age. Ranking in the top three of children following these rules (at the time at which enrollment of children started in the barangay) is used as an instrument for monitoring of school-aged children (most of whom would have been enrolled under these rules). In early 2015, DSWD started "open selection," so that parents could select children. Rules are less clear thereafter, and especially for children below school age in late 2017. However, being child number four or higher born (counting from children age 14 or less at the initial year of implementation) in the family increases the likelihood that all three monitoring slots for a household are already occupied (so that the child is monitoring ineligible). This ranking of fourth or

[8] The online appendix can be accessed here: https://www.adb.org/publications/human-capital-subsidies-philippine-cct.

higher is the instrument for children below 6 years of age, with a covariate included in the specification to control for general birth order effects. The instruments are confirmed as exogenous, as they have no significant impacts on key child health and education outcomes for non-4Ps households in placebo test regressions as shown in Table A10. The instruments are relevant, as they have highly significant effects on actual monitoring status of children among 4Ps households.

The regression essentially allows unbiased estimation of two treatment arms within 4Ps children compared with untreated children—(i) 4Ps children subjected to monitoring by the program, and (ii) 4Ps children not subjected to monitoring. Each treated subgroup is compared against comparable children not in 4Ps households, according to exclusion criteria that only allow for children of parents with eligible ages of children at the time of 4Ps enrollment in the year of initial 4Ps enrollment in the local barangay.

D. Data

Data collection was based on the intention to apply RDD, using a survey with sampling targeted to a bandwidth near the eligibility threshold. A sampling of 6,775 households in 180 barangays across 30 municipalities and 25 provinces was done at barangay level, with the 20 available households closest to meeting the threshold and 20 available households most barely exceeding the provincial cutoff selected as respondents. The sampling was done using data from the national household targeting system, which is the database that contains proxy means test scores and includes both beneficiary and non-beneficiary households. The sample consisted of households with at least 2 years of program exposure and maximum of 9 years in the program.

A highly detailed household survey was conducted in late 2017 by Social Weather Stations, a Manila-based survey firm contracted by DSWD. The paper questionnaire consisted of six different modules. The main module covered household characteristics, consumption, and roster of household members. Other household modules covered mothers, school-aged children, and child anthropometry. There was also a barangay and health facility questionnaire.

Additional administrative data from DSWD are merged with the survey dataset to create the dataset used in the analysis. This includes the (i) educational monitoring status of children, (ii) payroll data that included number of payments by category and the overall amount transferred to each household by September 2019, and (iii) households enrolled between 2010 and 2018 and ages of all children in the sample dataset that were actually monitored and selected for monitoring by DSWD. Actual educational monitoring is used to characterize the monitoring status of school-aged children.

Educational monitoring of children begins only at the point of school enrollment, which is typically at age 6. Children under 6 years of age thus mostly are of unknown monitoring status, which complicates characterization of the effects of monitoring on nutrition outcomes, which are only measured for children under 6. At the same time, the 4Ps program has a cap on educational monitoring and compliance payments of three children. This means that younger children of households with three older children who are already monitored are monitoring ineligible in the future. Other children of 4Ps households may be monitored for educational compliance when of school age. However, considering the cap of three children and actual numbers of children of 4Ps households below school age, only approximately 50% of those children can be monitored. Thus, the comparison for outcomes of children under age 6 is between monitoring ineligible and those who may be monitored. However, those who may be monitored are not necessarily those who will be monitored, as more children may be born to these households, and parents can choose which children will be

monitored. Although monitoring status is more definitive by school age, this paper will use the terms "monitoring eligible" and "monitoring ineligible" for consistency across all causal effects presented in the results section.

Initial enrollment conditions include the presence of a child of eligible age or pregnancy, with a focus on the mother of that child and coverage of subsequent children born to her up to the cap. In accordance with that targeting, the analysis is restricted to children of a mother that had pregnancy or children of eligible age during the year when each barangay was being enrolled into the 4Ps program. This means that children not related to household, or grandchildren, or more distant relatives of the original 4Ps eligible mother are not included in the analysis, as they would rarely be enrolled into the program.

III. RESULTS

A. Descriptive Statistics

For contextual purposes, summary statistics are presented on the means of program participants and nonparticipants. These are not causal effects.

Table 5 shows that most eligible children in households are enrolled for educational monitoring and grants. At the same time, there exists important scope to increase monitoring, as about 25% of potential slots for educational monitoring for households with three children or more remain unutilized. Table A11 presents simple tabulations of the 4Ps conditionalities by administrative payroll variable. Except for participation in parenting sessions, 4Ps households were similar in many variables that track compliance with program participation.

Table 5: Monitoring of Children by Household Size

No. of Children in Household	Average Number Monitored	Share of Eligible Monitored
1	0.83	83%
2	1.57	76%
3	2.19	73%
More than 3	2.24	75%

4Ps = Pantawid Pamilyang Pilipino Program.

Note: Restricted to children of 4Ps eligible mother.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

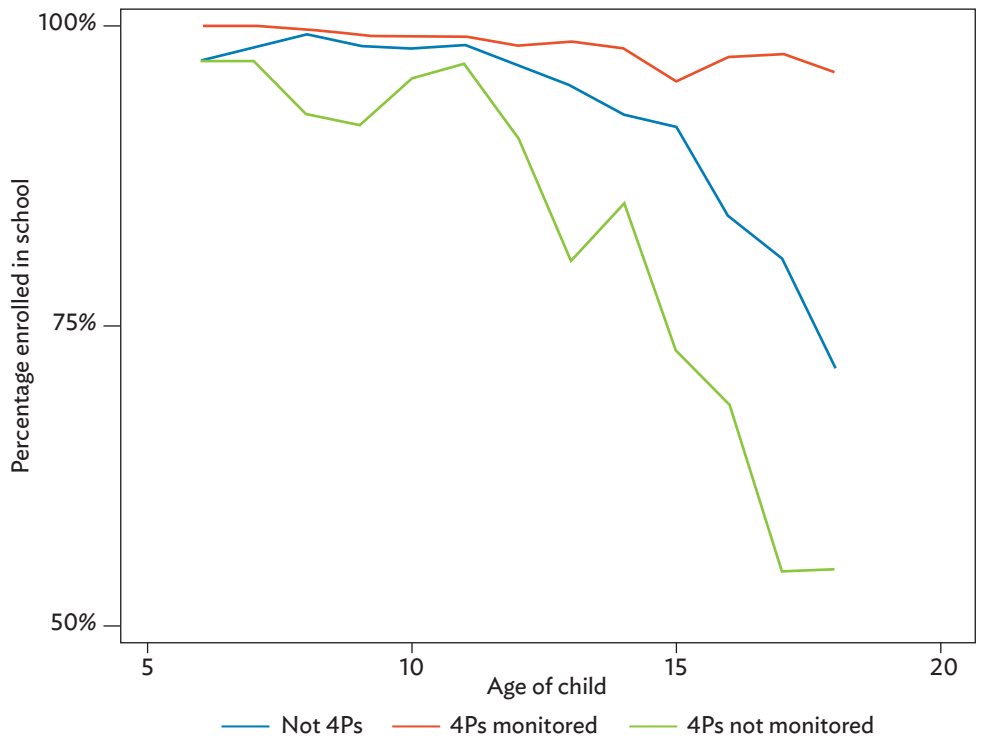
Balance tests are conducted on variables that do not directly relate to final outcome variables, using the first older polynomial and sharp RDD (Table A12). Within the bandwidth 4Ps and non-4Ps, households were balanced on several variables such as involvement in agriculture, household size, and total income sans 4Ps grants, but a few statistically significant differences were observed. 4Ps

households were more likely to be led by a male household head, be higher in age, and less likely to engage in forestry or hunting. However, households are not balanced on variables that are affected by treatment status, such as total household income being ₱15,884 higher in 4Ps households, compared with non-4Ps households. Women of reproductive age were similar in age of first birth, probability of working, and being pregnant. 4Ps mothers reported similar access to health facilities and daycare facilities compared with non-4Ps beneficiary mothers. The only significant difference near the cutoff is that wives in 4Ps are 7% more likely to own their dwelling unit, than wives in non-4Ps households.

School-aged children are found to be balanced on age, gender, child labor, and age ranking within the household. They only significantly differ in program-related outcomes, such as school-aged children in 4Ps households having 59% higher probability of being monitored and 8% more likely to be enrolled in school if they are aged 12–15. Children under 5 years old were also balanced on age, gender, probability of being measured, and enrollment in daycare or kindergarten.

Figure 2 illustrates the lower enrollment rate for 4Ps—not monitored children compared with non-4Ps children—in terms of summary statistics (these are not causal estimates). Siblings not monitored by the 4Ps program but are still living in 4Ps households display a significant drop in school enrollment compared with siblings that are monitored and those that are not in 4Ps households. The question that this raises is whether the drop is attributable to the program.

Figure 2: School Enrollment by Age



4Ps = Pantawid Pamilyang Pilipino Program.
Note: The figure compares summary statistics, rather than impact estimates.
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

B. Pooled Results

Overall causal results confirm that the program has important significant effects.[9] Prenatal behavior, Child school enrollment outcomes and socio-emotional skills of children are significantly improved on average for children of 4Ps households. Household consumption is significantly increased, and reported hunger is reduced. Effects on child nutrition outcomes are the sole deviation from effects that are otherwise positive and significant, or insignificant.

1. Income/Consumption

Given that labor force participation and employment of the parents in households receiving the program are unaffected, there is no indication that the transfer disincentivizes work or creates dependency (Figure 3). Per capita household income increases by 64% when the value of grants is included in household income, but without grants no significant change to per capita income is detected. This increase in household income translated to increase in per capita household consumption, with clothing/footwear (+95%), health-care (+36%), and food (+10%) categories showing significant and substantial increases. Program households report being 25% less likely to experience hunger in the last 3 months (Figure 3). No impact on vice consumption was detected.

2. Maternal Health

Maternal health outcomes show limited effects, as expected, given the decline in monitoring of health conditionalities over time (Figure 3). No effects are statistically significant.

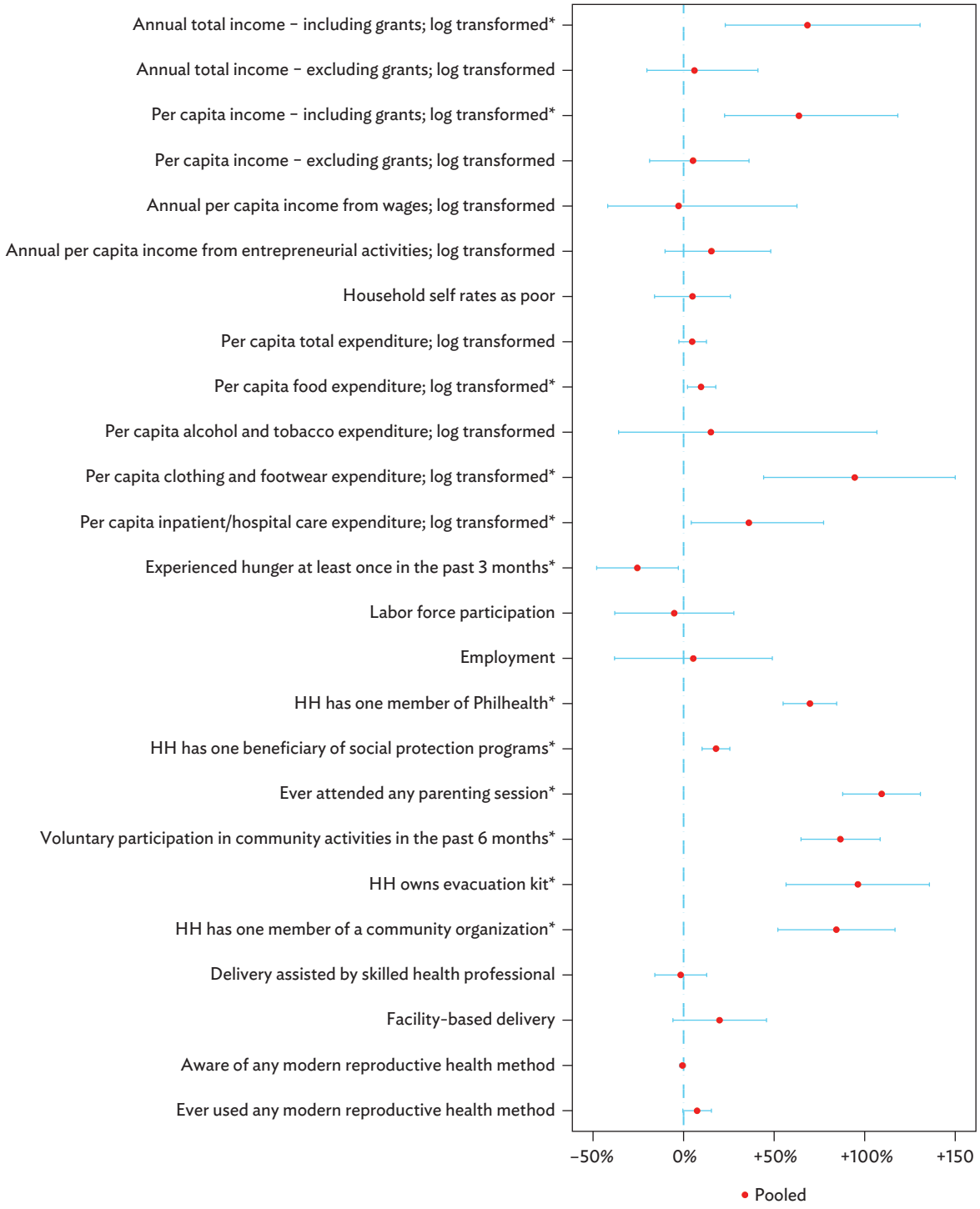
3. Parenting

As part of the 4Ps beneficiary requirements, the parents or caregivers of children attend weekly family development sessions (FDSs). The analysis finds a 109% effect on the caregiver ever attending such a session (Figure 3). FDS participation appears to be associated with a substantial 87% increase in participation in community activities.

Parents' expectations for their children to finish elementary school improve by 3%, with most of this increase isolated to male children. Children in 4Ps households exhibit more grit, a key socio-emotional skill, compared with children in non-4Ps households (Figure 4). An index constructed based on four questions related to grit as a character trait shows a 5% improvement for the pooled sample, with the increase isolated to boys.

[9] Results are presented in this section as percentage changes against the mean values in the absence of treatment. Actual mean values for the treated net of treatment effects are used in the denominator of the calculation, unless predicted mean values absent treatment are higher, in which case predicted means are used to be conservative. Results in levels along with further details are presented on a pooled basis in Table A2, by gender in Table A3, by monitoring eligibility in Table A4, and by gender and monitoring eligibility in Table A5.

Figure 3: Pooled Household- and Mother-Level Results

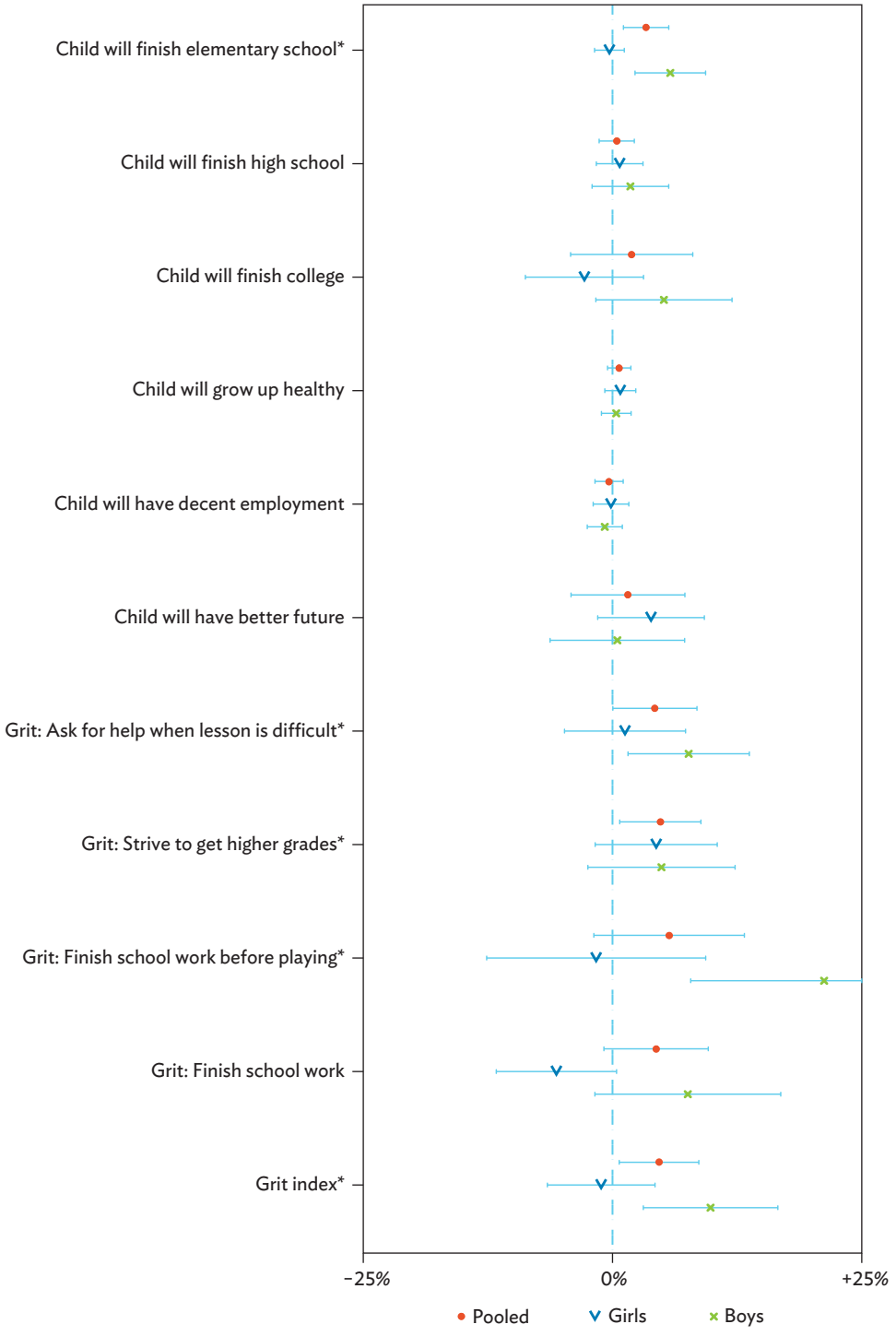


HH = household.

Note: *Marks statistically significant coefficients.

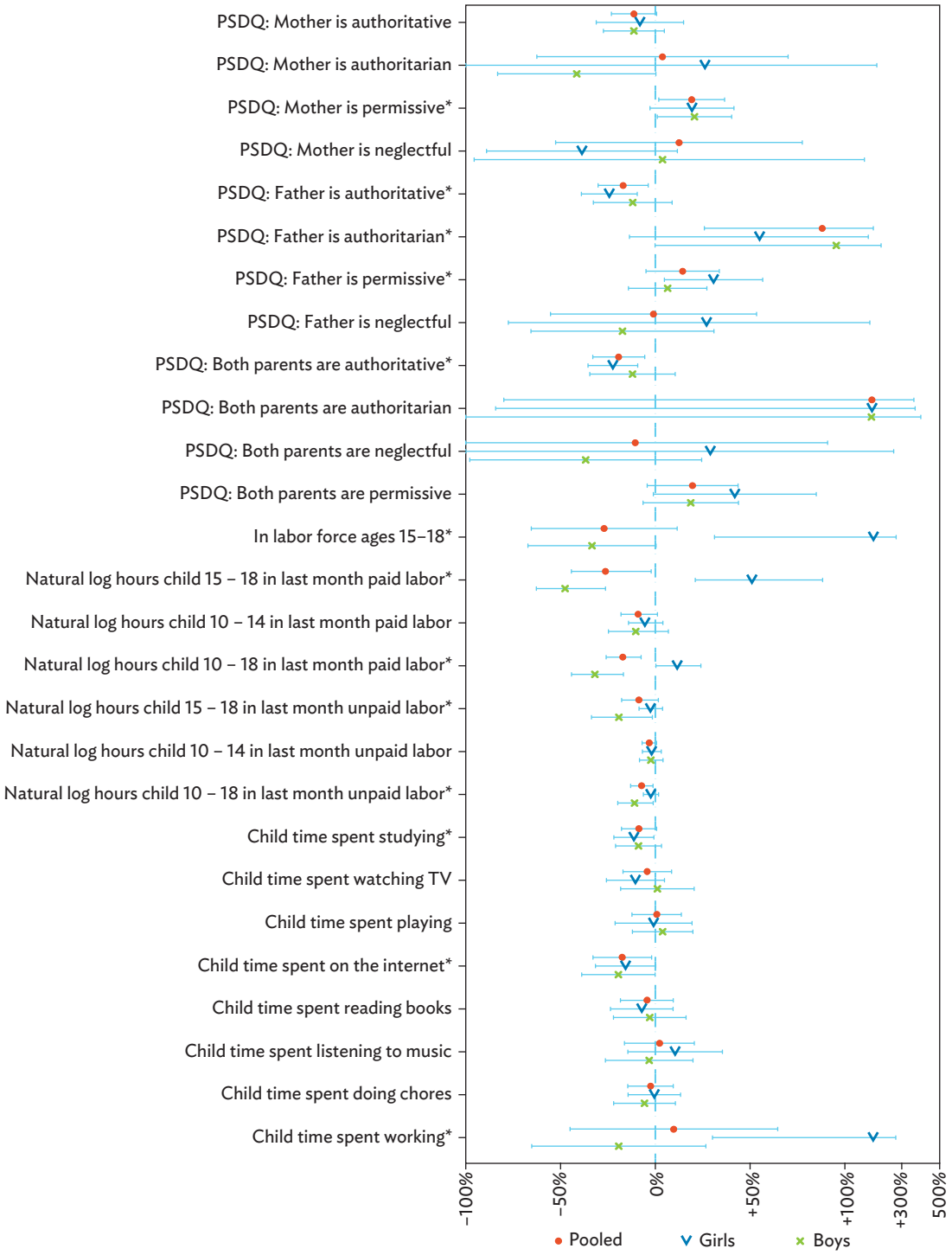
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Figure 4: Pooled Child Results Disaggregated by Gender (Part 1)



Note: *Marks outcomes with at least one statistically significant coefficient.
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Figure 5: Pooled Child Results Disaggregated by Gender (Part 2)

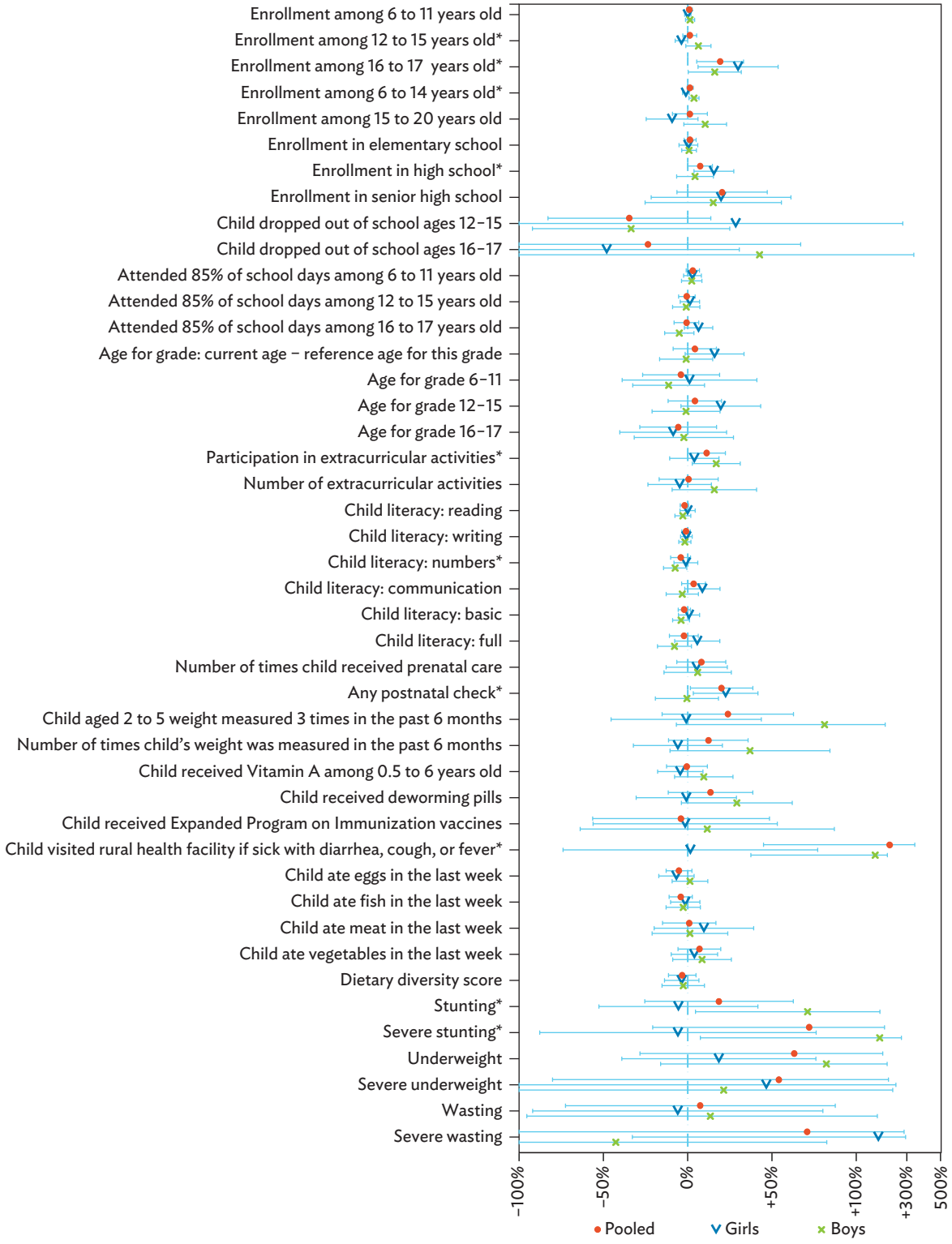


PSDQ = Parenting Styles and Dimensions Questionnaire developed by Clyde Robinson, Barbara Mandleco, Suzanne Roper, and Craig Hart. 2001. The Parenting Styles and Dimensions Questionnaire (PSDQ). *Handbook of Family Measurement Techniques* 3: 319–21.

Note: *Marks outcomes with at least one statistically significant coefficient.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Figure 6: Pooled Child Results Disaggregated by Gender (Part 3)



Note: *Marks outcomes with at least one statistically significant coefficient.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

4. Education and Child Labor

The program has led to a 19% increase in enrollment of 16–17 year old children in beneficiary households, with girls showing an even larger 30% increase. However, the pooled effects of the program on enrollment of children in elementary and middle school are not statistically significant. Child paid labor, defined by number of hours worked by children, is reduced for 10–18 year olds, with most of the reduction driven by effects for those aged 15–18 in the last month, which decreased by 26% for the pooled sample. However, this masks an important gender difference, as girls experience a 51% increase, whereas boys have a 48% reduction in paid labor for that age group (Figure 5). Hours spent in unpaid work also decrease for the same age groups, but this is significant only among boys, who report an 11% decrease, whereas there is no significant change for girls. A significant increase in time reported for work is also found for girls.

5. Child Health and Nutrition

Overall per capita spending increases by 5% in 4Ps households, driven by an 10% increase in food expenditure. The dietary diversity index of children does not show any statistically significant results, but the coefficients are negative for the pooled sample. No significant impact on children's anthropometry outcomes was detected for the pooled sample, but a 71% increase in stunting for male children and 136% increase in severe stunting of male children is found (Figure 6). Children in 4Ps households are 20% more likely to have a postnatal check than children in control households, and are 194% more likely to visit a rural health station if they are sick with symptoms of diarrhea, cough, or fever. The latter finding is driven by more male children visiting rural health stations than comparable male children in comparison households.

C. Results for Children by Monitoring Eligibility

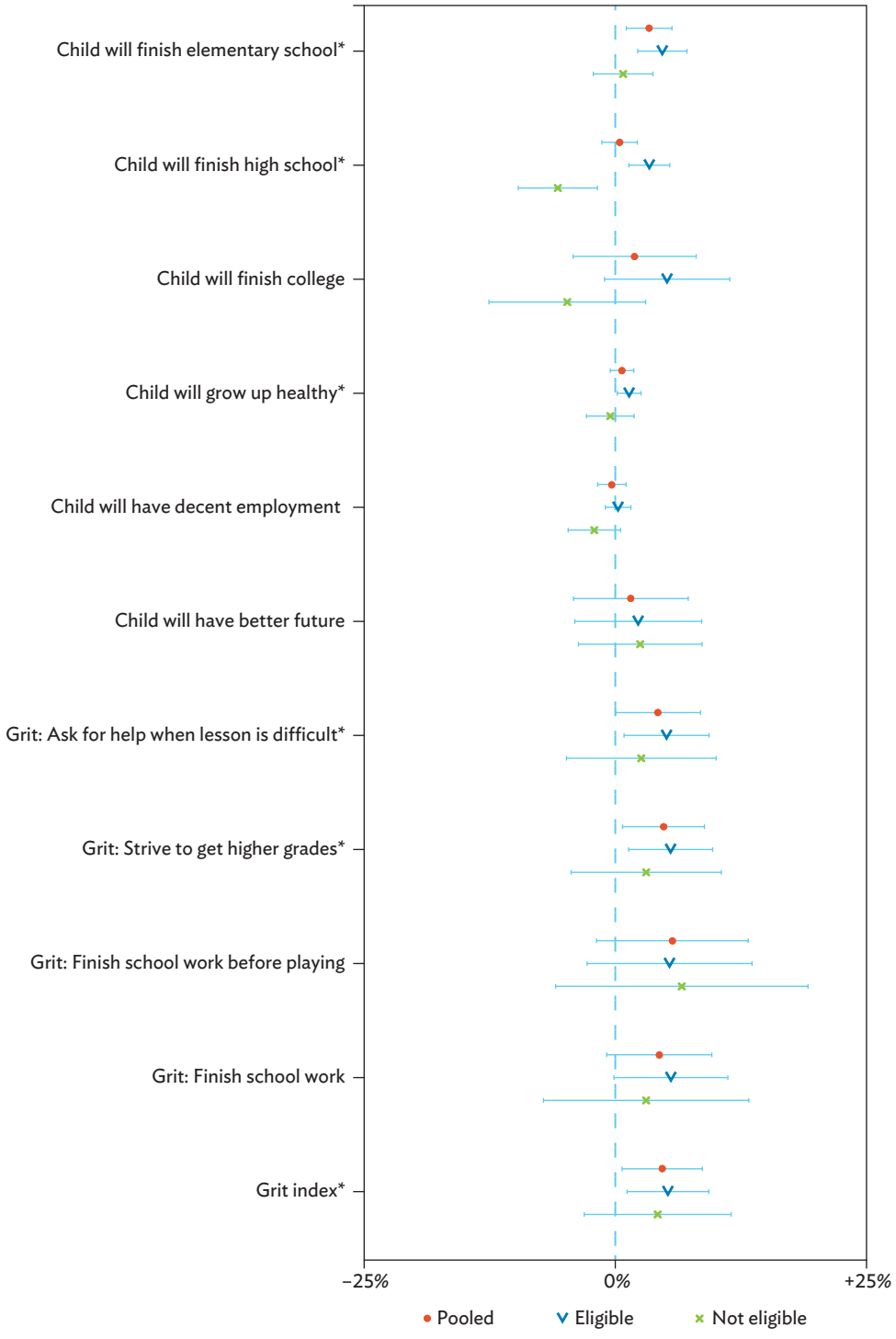
The above results are averages for children of eligible mothers within 4Ps households. However, these results mask substantial differences in effects for children who are eligible to be monitored and ineligible for monitoring for conditionality compliance. Results are described below. Figures A2.1-A2.6 visualize discontinuities for key results graphically.

1. Parenting

Although 4Ps parents reported significantly increased (3%) aspirations for their children to finish elementary school, this increase is only among those eligible for educational monitoring. A monitoring eligible child in a 4Ps households has a 3% higher probability of parental expectations of completion of high school, a 5% increase in expectation of completion of elementary school, and a 1% increase in expectation of growing up healthy (Figure 7). These educational expectation effects are much stronger for monitoring eligible boys, for whom there is an 11% increase also in expectation of completing college (girls have no significant effect) (Figure 10). This contrasts with a 6% decrease in expectation of finishing high school for monitoring ineligible children, which is observed for both girls and boys. In other words, parents have consciously reported that they have reduced expectations of children who are not directly subsidized to go to school, but increased expectations of those subsidized, especially boys.

In terms of parenting styles, fathers become significantly more authoritarian toward monitoring eligible boys, but not other children (Figure 11). Children respond to these altered expectations. A significant 5% increase in the grit index is observed among monitoring eligible children, especially among boys who experience an even larger 11% increase (Figure 10). However, those who are monitoring ineligible have no significant effect.

Figure 7: Results by Monitoring Eligibility (Part 1)



Note: *Marks outcomes with at least one statistically significant coefficient.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

2. Education

School enrollment outcomes show a stark divergence between monitoring eligible and ineligible children, which align closely with stated expectations. School enrollment significantly increases for 12–15 and 16–17 year old cohorts in the monitoring eligible group, as does enrollment in high school and senior high school. Effects are strongest for male monitoring eligible children (Figure 12). In contrast, ineligible children have a significant 20% decrease in school enrollment among the 12–15 year old cohort, which is more pronounced for boys (26% reduction) than girls (14% reduction). These negative school enrollment outcomes also translate to lower child literacy and numeracy for children that are not monitoring ineligible. A 10% pooled decrease in writing and 16% decrease in numerical comprehension (Figure 6) is driven by a 17% decrease in writing and 21% decrease in numerical comprehension among boys, and is complemented by a 17% decline in basic literacy among boys. Higher enrollment for the monitoring eligible is not associated with increased literacy and numeracy performance in the results. Age for grade significantly increases among the monitoring ineligible, indicating lower-grade progression or later entry into school, and this effect is significant for both boys and girls.

3. Child Labor

Changes in child labor force participation are somewhat aligned with reported changes in parental educational expectations of children. Children who are monitoring eligible have significantly reduced paid labor, as monitoring eligible children have a 19% decrease in hours spent in paid labor, while no significant reduction is detected in the monitoring ineligible group (Figure 8). The effects are highest for 15–18 year olds. Decreases occur among boys, which aligns with the stronger effects on boys in terms of educational enrollment. In contrast, older monitoring eligible females (15–18 years of age) have increased hours of paid work, which may be due to higher employability due to increased education levels. Boys who are monitoring ineligible at the same age have significantly reduced paid labor, perhaps as a result of reduced parental expectations or skills (Figure 11). The main significant effect on time utilization is an increase in total reported time working, which only occurs among monitoring ineligible girls.

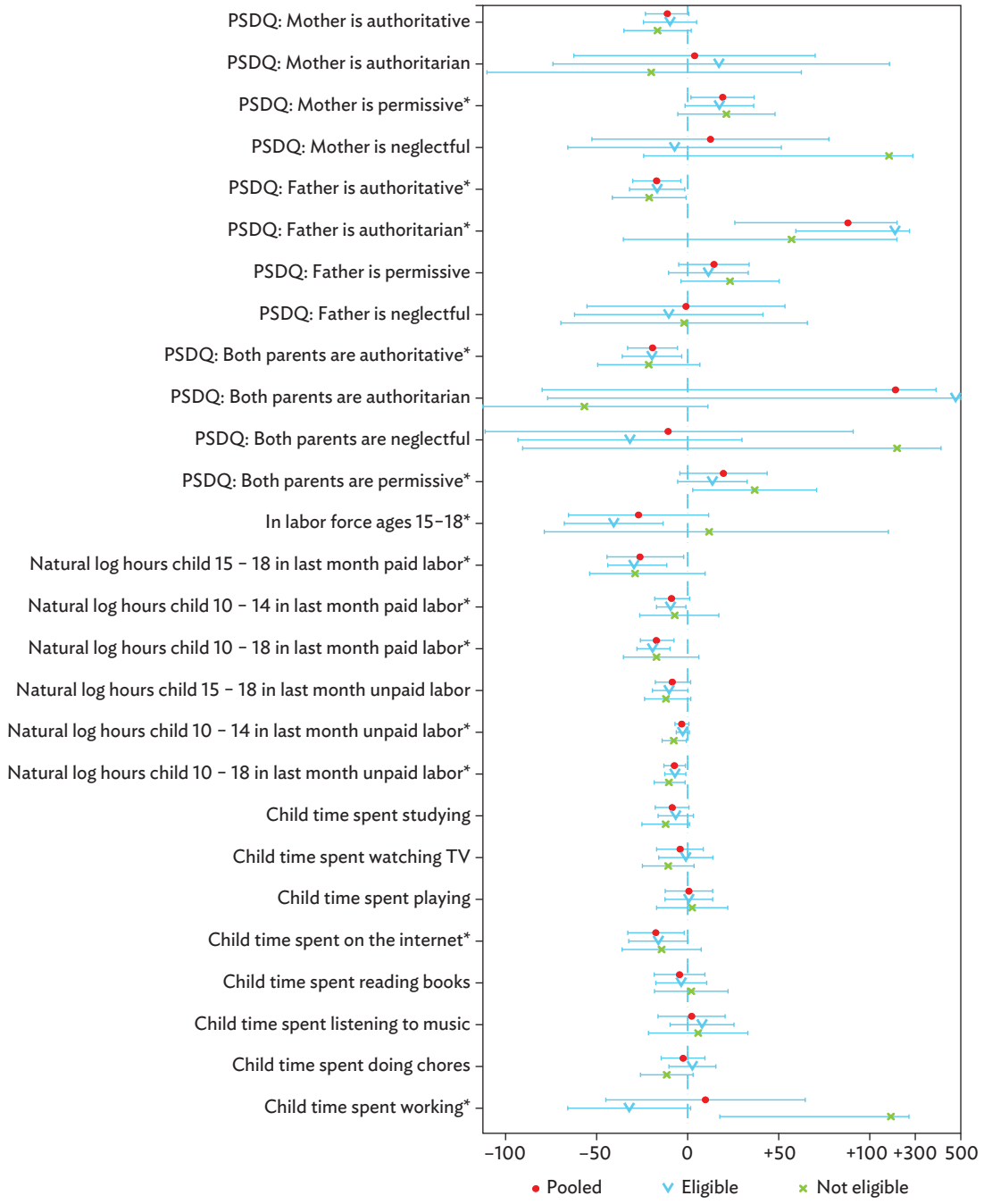
Given that the coefficients are calculated with children in non-4Ps households as the comparison group, the large decrease in child labor for monitored male children can be thought as male children in non-4Ps households leaving school to start working, while similar male children in 4Ps households are staying in school and are not working. However, the findings that female children are now more likely to be engaging in labor, are also calculated with similar female children in non-4Ps households as the comparison group. This suggests that girls in 4Ps households are engaging in labor that would have otherwise been performed by their male siblings, perhaps to facilitate their educational progression (Figure 11).

4. Child Health and Nutrition

Investment in health is aligned with parental educational expectations, with effects visible even before birth. Monitoring eligible children receive significantly more pre and postnatal care, with monitoring eligible children receiving 21% more prenatal visits, compared with children in non-4Ps households. Monitoring eligible children also received more postnatal care, with higher frequency of weight measurements and higher probability of receiving vitamin A. The 180% increase in likelihood of going to rural health stations when sick with diarrhea, cough, or fever occurs only among monitoring eligible children. Monitoring ineligible children see no increase in any of the pre and postnatal outcomes

reported above (Figure 9). When the monitoring eligible group is disaggregated by gender, the increase in frequency of weight measurements and vitamin A intake is distributed evenly among eligible girls and boys. The increase in probability of visiting a rural health station for symptoms of diarrhea, cough, or fever is isolated to eligible boys (Figure 12).

Figure 8: Results by Monitoring Eligibility (Part 2)

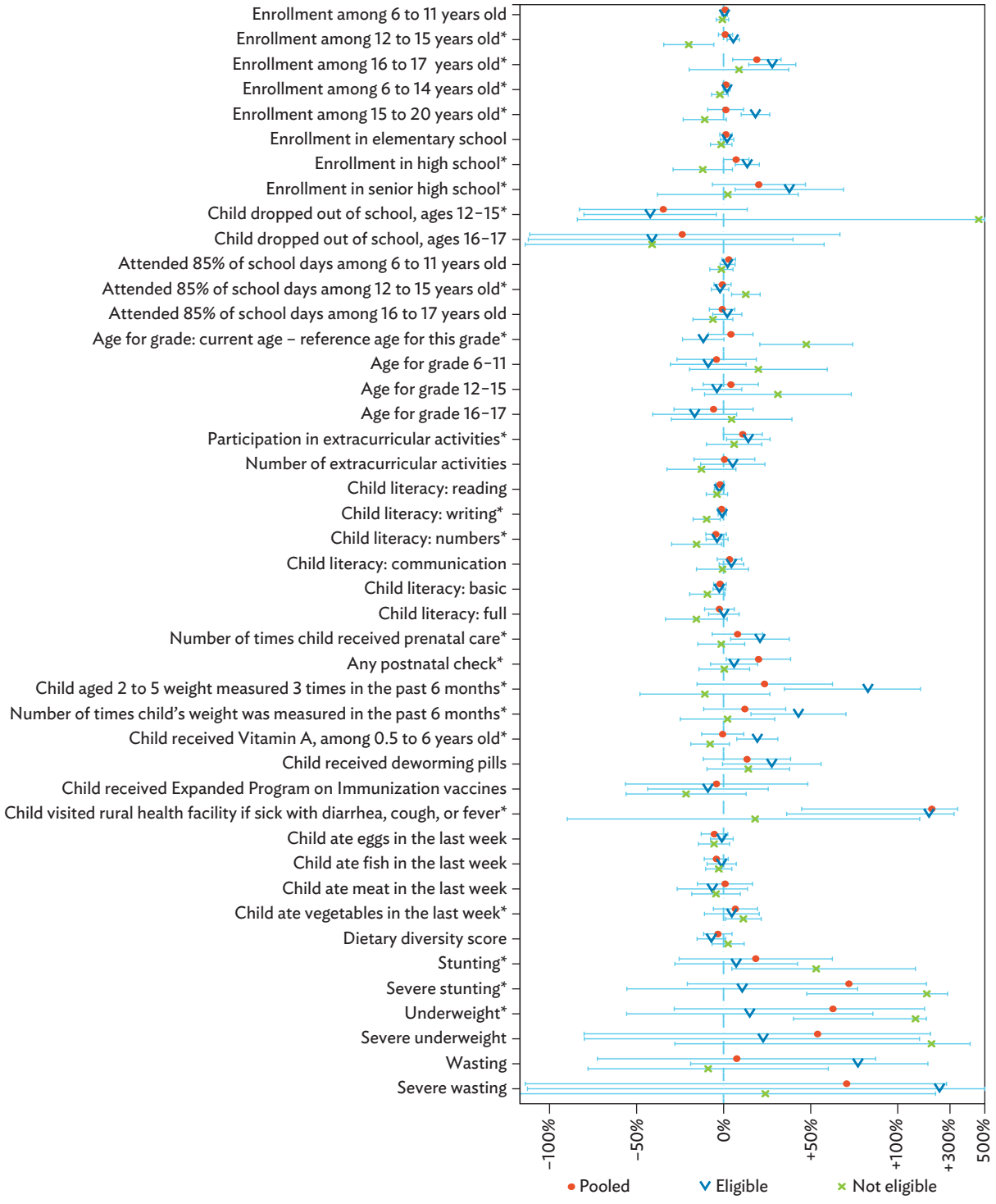


PSDQ = Parenting Styles and Dimensions Questionnaire developed by Clyde Robinson, Barbara Mandleco, Suzanne Roper, and Craig Hart. 2001. The Parenting Styles and Dimensions Questionnaire (PSDQ). *Handbook of Family Measurement Techniques* 3: 319-21.

Note: *Marks outcomes with at least one statistically significant coefficient.

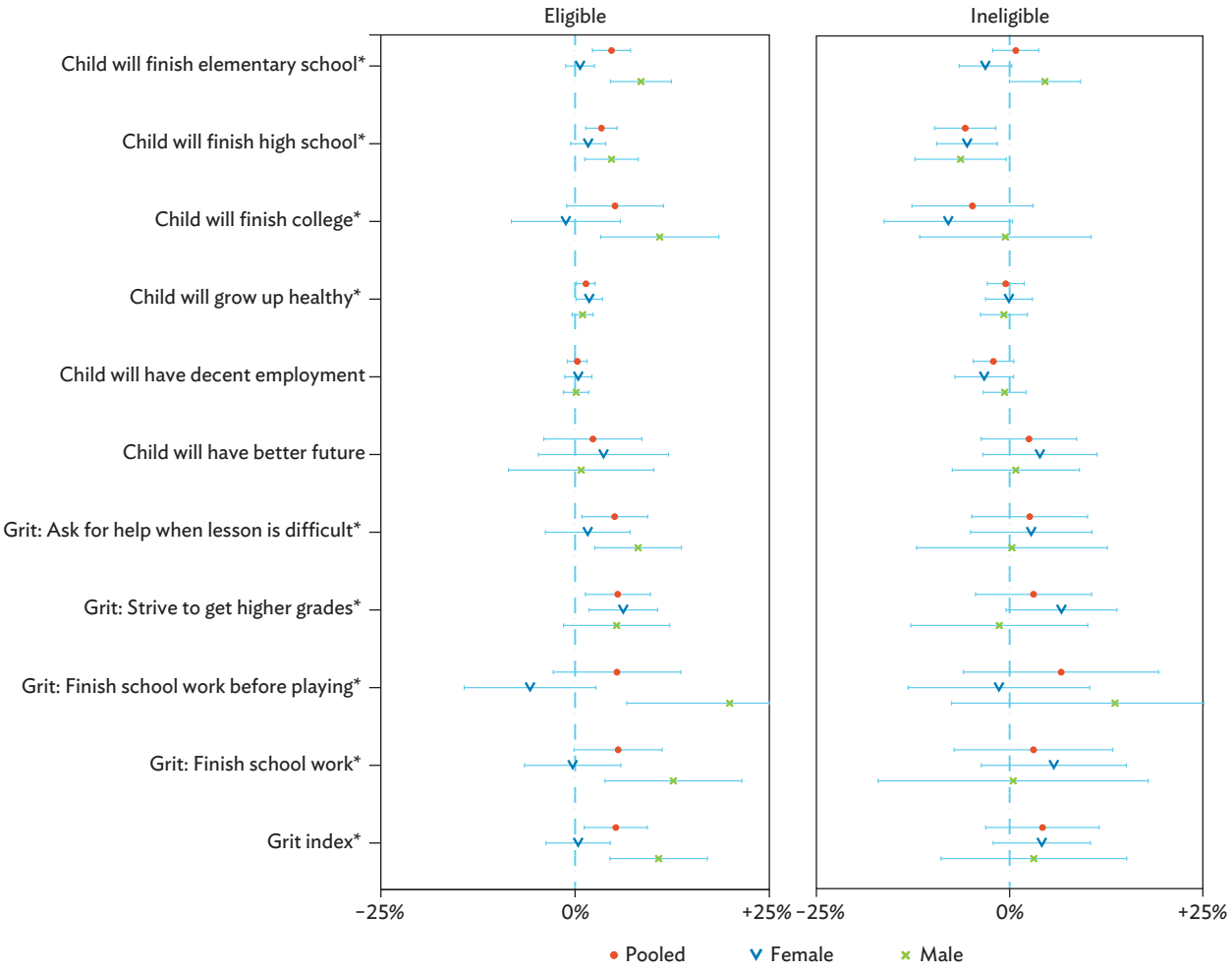
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Figure 9: Results by Monitoring Eligibility (Part 3)



Note: *Marks outcomes with at least one statistically significant coefficient.
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

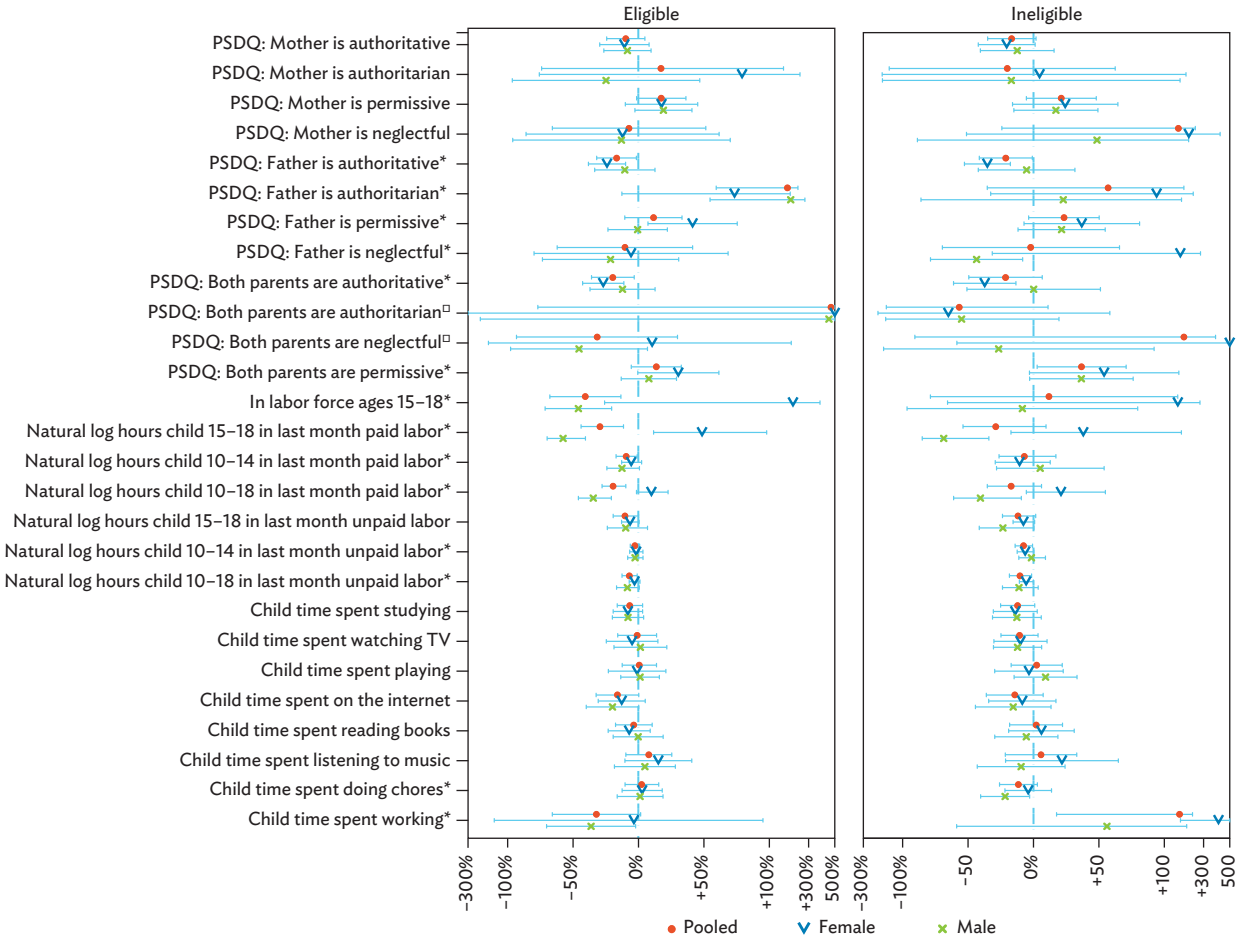
Figure 10: Effects on Monitoring Eligible/Ineligible by Gender (Part 1)



Note: *Marks outcomes with at least one statistically significant coefficient.
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Anthropometric outcomes among children (measured for those below 6 years of age) who are monitoring ineligible are significantly adverse on a host of different outcomes. Stunting, severe stunting, and being underweight are all significantly increased among those who are monitoring ineligible by 53%, 167%, and 102%, respectively. In comparison, there is no significant effect on these outcomes among monitoring eligible children (Figure 9). These effects are only found among monitoring ineligible boys, while monitoring ineligible girls show no significant difference (Figure 12). In other words, anthropometric outcomes mirror a broader pattern in which human capital investment in monitoring eligible boys is significantly increased at the expense of human capital investment in monitoring ineligible boys.

Figure 11: Effects on Monitoring Eligible/Ineligible by Gender (Part 2)

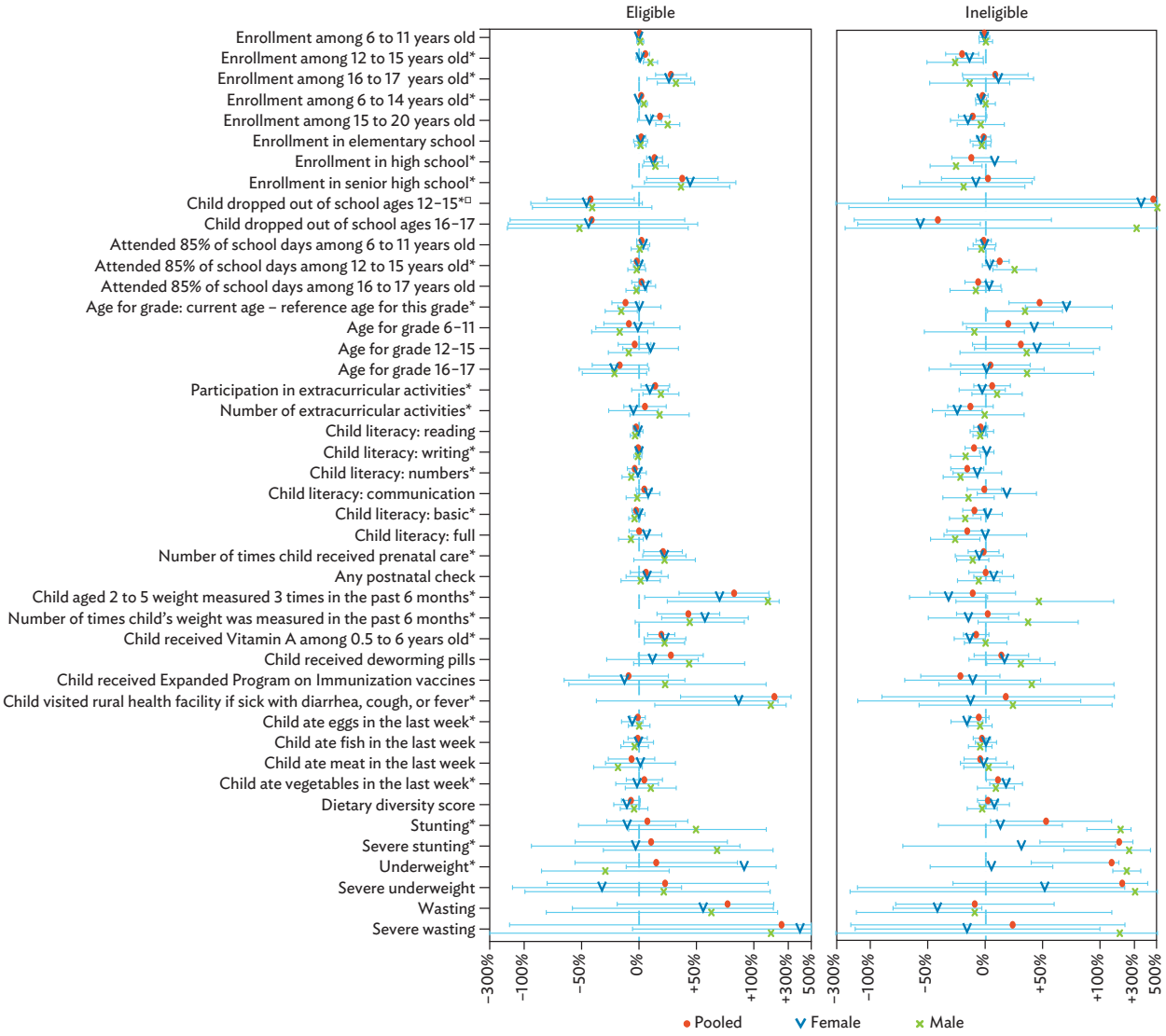


PSDQ = Parenting Styles and Dimensions Questionnaire developed by Clyde Robinson, Barbara Mandleco, Suzanne Roper, and Craig Hart. 2001. The Parenting Styles and Dimensions Questionnaire (PSDQ). *Handbook of Family Measurement Techniques* 3: 319–21.

Notes: *Marks outcomes with at least one statistically significant coefficient.
□Marks outcomes where the coefficient was larger than 500% and trimmed to fit in this graph.
Both parents are authoritarian: eligible female +592%, but the coefficient is not significant.
Both parents are neglectful: ineligible female +1009%, but the coefficient is not significant.

Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

Figure 12: Effects on Monitoring Eligible/Ineligible by Gender (Part 3)



Notes: *Marks outcomes with at least one statistically significant coefficient.
□Marks outcomes where the coefficient was larger than 500% and trimmed to fit in this graph.
Child dropped out of school ages 12–15: ineligible male +622%, but the coefficient is not significant.
Source: Authors' estimates from data provided by the Department of Social Welfare and Development.

D. Robustness Checks

The basic results are robust to a range of tests of both data and methods. Results from observations where households share the primary language of the enumerator are similar to the full sample, indicating that language issues have not affected results (Table A6). The purpose of the inclusion of covariates in the RDD model is to improve precision, but if covariates are correlated with the running variable, they can introduce multicollinearity and bias results. Covariates should thereby improve significance but not the magnitude of effect estimates. To test this, the models are run again without

covariates. The results show similar coefficients but fall in statistical significance, as expected (Table A7). Fuzzy regression discontinuity regressions without instrumentation are also utilized as a point of comparison for the magnitude of coefficients and statistical significance shown in the instrumental variables approach, and the results are similar (Table A8). The results presented utilize the coverage error rate optimal bandwidth, which is relatively narrow, as to minimize bias, potentially at the expense of variance. The main child educational and child anthropometry outcomes were tested using a wider mean square error bandwidth selection method, which can better handle variance. With a wider mean square error bandwidth the coefficients and signs are similar to the coverage error rate optimal bandwidth (Table A9). Across all outcomes and robustness tests, results are consistent with the main analysis.

IV. DISCUSSION

The results obtained confirm the hypotheses set out for the study. Although many household and aggregate outcomes benefit from the CCT, households are also found to exhibit resource-maximizing responses to imbalanced subsidies to the human capital of children. While subsidized children are caused to have increased household investment, in terms of greater aspirations, grit, health, education, and reduced child labor, unsubsidized children have reduced aspirations, lower heath investment, poorer nutrition, reduced schooling, and reduced learning as a result of the program. Across a range of indicators, household resources are being withdrawn from unsubsidized children and redirected toward those who are subsidized. The results are robust to specification and occur via simple subgroup analysis as well as via the core instrumental variables approach.

In accordance with expectations, these effects are more visible among boys than girls. As the marginal effect of human capital on earnings potential is stronger on average for boys, with their higher average labor force participation rates and wages, the effects of distortions to human capital costs among children are much more pronounced, both in terms of increased investment for those subsidized, and in terms of decreased investment for those who are not. This is evident in responses ranging from parental expectations to educational enrollment, grit, and nutrition, where monitored boys have much stronger positive responses to subsidies and negative response to being unsubsidized in a 4Ps household.

The results by monitoring status also explain the inconsistency between previous impact evaluation waves and Wave 3 regarding nutrition. Given that households were enrolled into the program based on predicted poverty status in 2009, they represent an aging population cohort, with expanding numbers of children over time. In earlier periods, a greater share of young children was monitoring eligible. By late 2017, most children do not have "space" to be monitored for educational compliance, and the program slowed down in terms of enrolling younger children in monitoring. The share of young children who will not be monitored was much higher for RDD Wave 3 than previous evaluations, so that negative nutritional effects dominated for the age cohorts for which anthropometric measurements were taken. While these results may be in contrast to expectations of family-level spillovers and resource-equalizing behavior, they are actually consistent with a number of earlier studies.

A. Comparison with Other Literature

Although most literature on CCTs does not explore effects on intrahousehold resource allocation, a few studies do so. Barrera-Osorio et al. (2008) uses child-level randomization of CCT enrollment and found similar negative impacts of conditional cash transfer programs on non-enrolled siblings in Colombia. Barrera-Osorio et al. (2008) find that the sibling who was randomly selected into CCT had better educational achievement and lower child labor, compared with his/her nominated unregistered sibling. When the not-selected but nominated child with a CCT-enrolled sibling is compared with a child where both siblings were nominated but none selected, the educational enrollment of the not-selected child is reduced. Their findings suggest that the household's intrahousehold allocation of educational investment can harm non-monitored siblings in the beneficiary household, especially if the not-monitored child is female. Majid (2018) finds suggestive evidence of both resource-maximizing and equalizing responses within Progresa beneficiary households in Mexico, and that resource-maximizing behavior is most evident in poorer, rural, and indigenous households. Ferreira, Filmer, and Schady (2017) find similarly, but less strongly, that the impacts of a CCT program in Cambodia on reducing child labor and increasing school enrollment are only observed in children who were registered with the program, but not their siblings who were not registered with the CCT program.

More broadly, much classical literature on intrahousehold allocation is also consistent with these findings, and demonstrates that household investments are often resource maximizing, especially when resources are very scarce. Rosenzweig and Shultz (1982) find that investment in nutrition and education by gender follows resource-maximizing principles in India. Behrman (1988) finds that in India, the intrahousehold allocation of food among children follows a pure investment strategy during the lean season, and Behrman, Rosenzweig, and Taubman (1994) find that investment in schooling reinforces initial endowment differences among twins in the United States, a conclusion that is reaffirmed by Frijters et al. (2013) based on cognitive ability differences. Conversely, in the context of equal endowments and opportunity costs among identical twins in Chile, Abufhele, Behrman, and Bravo (2017) find no differences in investments in child health or education. In the People's Republic of China, parents have even been found to actively invest in schooling according to an investment strategy and compensate the children with less schooling investment later with other household assets, such as land, so that initial resource maximization is accompanied by compensatory strategies later in life (Brandt, Siow, and Wang 2015).

The Philippines is a family-oriented society. In the 2017–2020 World Values Survey (Haerpfer et al. 2020), Filipinos report higher importance for the family than many other countries. Within families, Filipinos have been found to display unitary decision-making regarding the migration of daughters as a source of household income (Lauby and Stark 1988). During adulthood, resource pooling is accepted and pronounced, as evidenced by the fact that the Philippines is one of the top remittance recipients globally. In this type of context where resources are pooled and familial hierarchy is strong, resource maximization behavior in human capital investments is most logical to expect, as equity concerns can be addressed through transfers later in life that would not be acceptable in more individualistic societies. It remains as a future research question as to whether less familial societies would exhibit similar reinforcing responses to human capital subsidies among only a subset of children.

B. Policy Implications

These findings imply that conditional cash transfer programs need to be carefully designed to avoid setting unintended incentives. In the case of this program, a well-intentioned cap on covered children motivated by avoiding incentives for increased fertility among program households has led to

incentives for preferential investments in specific children. Fortunately, relatively simple program reforms may make incentives more balanced.

First, even within the existing cap of three children per household, it appears that households are not registering all eligible children for educational monitoring, perhaps due to limited outreach. Registration of all children could reduce intrahousehold disparities for an important share of 4Ps households that have three children or fewer. This suggests that a renewed effort is needed to register all children.

Second, the 4Ps program is designed to promote investment in human capital, and those investments in terms of health are already intended to span all children. However, this is hampered by limited outreach to ensure that new pregnancies and births are registered and that health conditionalities are enforced. Were health monitoring conducted of all children, the health effects of underinvestment in certain children would be more apparent to health-care providers. This would both enable corrective action by the local health authorities, as well as create possible incentives through "Hawthorne" effects on parents who are aware that health consequences for all children are observed.

Third, program incentives can be further equalized across children, even if there is a payment cap related to three children for educational subsidies. All children, even those beyond the cap of three, could be monitored for educational conditionality compliance to create Hawthorne incentives to educate all children. To go further, penalties can be introduced into the cash transfer payment calculations for noncompliance of any children with conditionalities, or introducing nonfinancial penalties for noncompliance of any children, such as disclosure and follow-up during family development sessions. Alternatively, the program could focus monitoring and compliance efforts on children with the greatest estimated risk of dropping out of school, rather than children self-selected by households.

More broadly, given that CCTs usually have modest effects on school enrollment in grades for which enrollment rates are already high among the poor, there have been calls to target eligibility to higher grade levels at which enrollment is lower (de Janvry and Sadoulet 2006). These results suggest that there is risk in such a strategy, as it is likely that such criteria would create more disparities in eligibility among children in program households.

V. CONCLUSIONS

Although many impact evaluations have been conducted on CCT programs, most studies have focused on aggregate household effects and effects for children subjected to monitoring and compliance verification. This study is unique in that it is conducted in the context of a CCT that does not monitor all children of eligible households and that has a substantial share of program households with children who from birth are known to be ineligible from educational monitoring. As a result, it offers a unique opportunity to discern how parents respond when only certain children have subsidized human capital.

For children who can be monitored for educational conditionalities, this study finds that the program generates many significant intended effects consistent with prior literature. Those children have increased parental aspirations, as well as higher levels of human capital investment across a range

of indicators. The new contribution to understanding is that the program family children who are not eligible to be monitored have reduced aspirations and investments to facilitate increased investment among those who are monitored.

These effects are strongly consistent with resource-maximizing behavior by resource-constrained households. While in aggregate, such behavior is likely to maximize total expected income, it also means that disparities are exacerbated within families. To help ensure broader increases in human capital investment, simple reforms can be undertaken to equalize incentives across children.

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Intrahousehold Responses to Imbalanced Human Capital Subsidies

Evidence from the Philippine Conditional Cash Transfer Program

Much evidence supports the potential of conditional cash transfer programs to increase household human capital investment. However, these programs can also distort incentives for investment if conditionalities are not monitored for all children. Using an innovative identification strategy, this paper finds that the Philippine conditional cash transfer program increases household human capital investment in monitored children, but decreases human capital investment in unmonitored children in beneficiary households. Effects are consistent across outcomes, ranging from parental expectations to health, nutrition, education, and skills, and are most pronounced among male children, as expected given higher male labor force participation.

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