

The intra-household allocation of children's time in three developing countries

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Abstract

We study children's time use patterns in Ethiopia, India, and Vietnam, using a component of the Young Lives Longitudinal study that had not been fully explored. We develop a framework that describes how children's time use varies within the household, and show empirically that intra-household patterns reflect the relative productivity of children's time spent on work, study, and leisure. Investigating intra-household differences in time use using household fixed effects regressions, we document a large leisure deficit for girls, highlighting a gender gap that has received little attention. We then analyze the leisure gap and find that it emerges at an early age, and is widely spread along the wealth distribution. Furthermore, leisure-poor girls are more likely to reside in poor households than leisure-poor boys, suggesting that girls are more likely to face a double burden of wealth and time poverty. Our findings relate to the literature on time poverty of women in developing countries, and have implications for promoting gender equality under Sustainable Development Goal target 5.4 on unpaid care and domestic work.

Keywords: Time use, leisure, schooling, intra-household allocation, domestic work, time poverty, Sustainable Development Goals, gender equality.

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Section 1: Introduction

Time is unique as an economic resource in that all individuals - regardless of age, race, or income - are endowed with the same amount of it. Analysis of how people choose to spend that common endowment has developed since the 1960s. From Becker's (1965) seminal theoretical paper on time allocation emerged an empirical development literature in the 1970s and 1980s, summarized in Strauss and Thomas (1995, 1998). This mostly focused on adult time allocation between market and non-market labor.

More recently, concurrent with the global call for recognizing, reducing and redistributing unpaid domestic work to promote gender equality under Sustainable Development Goal 5, there is renewed focus on time allocation research that tracks different types of non-market time uses, such as childcare, chores, and leisure. While data limitations have historically constrained this agenda (Hirway 2010), advances in time use data collection are deepening our understanding of how people in developing countries conduct their daily lives and how policies and programs shift people's time use (Floro and King 2016).

Gender is a particularly salient aspect of time allocation. Rubiano and Viollaz (2018) analyze gender differences in time use for 19 countries (pointing out in the process that time use data is unavailable for 135 countries) and find that men spend about 5 hours per day on market work and 2 hours per day on unpaid domestic work, while those numbers are flipped for women. Arora (2015) documents the excessive work burden of women relative to men in rural Mozambique.

Such gender differentials in time use are known to exist at younger ages, but are less well documented. Data on children's time use in developing countries have only started to become available in recent years. Surveys typically collect information on the socio-economic

characteristics of household members, and infrequently ask about time spent on daily activities unless it is a central purpose of the project (e.g. in the American Time Use Survey). As a result, there is relatively little evidence on how children's time is allocated in developing countries.

At the same time, how children spend their time in formative years is particularly consequential, because it determines not only their current happiness and productivity, but also their future productivity. A growing body of evidence supports common sense that time use is consequential for learning. For example, Fiorini & Keane (2014) demonstrate the importance of study time (particularly with parents) for developing cognitive skills in Australia, while Emerson et al. (2014) find that child labor has deleterious effects on learning outcomes of Brazilian students. Krutikova and Singh (2017) find a consistent and positive association of test scores and time spent on studying at home for adolescents in the older cohort in the Young Lives study. In a long-running experiment in Jamaica, Gertler et al. (2014) find that play can be a stimulating activity for children that promotes cognitive development and future earnings. Time use is also likely to have great bearing on children's general satisfaction with life. Because the activities they engage in from an early age have implications for children's present and future, it is important to understand their time use patterns.

During childhood especially, time exhibits complementarities (e.g. playing together) and substitutions (e.g. taking turns with chores) with the allocations of others. In particular, a child's allocation of time depends on how co-resident siblings allocate their time (Ferreira et al. 2017). Notable studies of children's time use include those by Lloyd et al. (2008), who use data from five developing countries to show that adolescent girls bear a heavier work burden (due to non-market

labor) and spend less time on leisure than boys, and Hsin (2007), who finds the same for younger children using data from Indonesia. However, rarely do such studies have data that allow intra-household comparisons.

We analyze Young Lives' internationally comparable data for children age five to eighteen, using the household roster structure of the data to isolate the effect of gender, age, academic ability, and birth order. To guide our analysis, we use a conceptual framework wherein differential productivity in home production of non-tradeable consumption generates variation in the intra-household distribution of time use. We then explore the correlates of intra-household variation in time use.

Unsurprisingly, we find that older children work and study more (highlighting their relative productivity in both activities) and that good students study more and spend less time on leisure, but do not spend significantly more time working, suggesting that there are not strong complementarities in the skills required for academic performance and domestic labor. Our most consistent finding across the three countries is that girls work more and spend less time on leisure, perhaps reflecting social norms that cast girls as more suited or productive in domestic chores. We further characterize the leisure gap for girls, and find that it emerges at an early age. Further, leisure-poor girls are spread widely across the wealth distribution in all the three countries, and leisure-poor girls are more likely to be wealth-poor than leisure-poor boys, suggesting that girls are more likely to face a double burden of wealth and time poverty.

The rest of the paper is organized as follows. Section 2 describes a conceptual framework of time use distribution within a household. Section 3 describes the data in more detail. In Section 4, we identify the correlates of time use based on intra-household analysis and investigate the female leisure deficit that we observe in that analysis. Section 5 concludes and discusses implications of this study for promoting economic gender equality.

Section 2: Conceptual Framework

We outline a simple conceptual framework that explains the decision making process that determines the distribution of children's time use within a household. Although we heavily draw from the framework laid out in Edmonds (2006), there is one major difference. Like in the model of Ravallion and Wodon (2000), total time is divided among studying, working and leisure instead of just studying and working, and leisure is also part of the allocation problem.

Consider a utility-maximizing household with N children. The household has an endowment Y , which could be derived from wealth or adult labor earnings. Child i 's time endowment T is allocated across three uses: education S_i , work L_i , and leisure H_i . Children's work adds to the household consumption, C as follows:

$$C = Y + \sum_{i=1}^N w(\theta_i)L_i$$

where $w(\theta_i)$ reflects the labor productivity of child i , which depends on a vector of child characteristics θ_i (e.g., age, gender, strength). One can think of $w(\theta_i)$ as the implicit wage for the market and non-market labor undertaken by child i .

In addition, the parents care about children's human capital, which depends on their study time and leisure time. Both these activities contribute positively to children's human capital and this relationship is characterized by $R(S_i, H_i, \eta_i; z)$, where η_i is a vector of child characteristics that affect human capital productivity (such as intelligence, age, personality, some of which may overlap with θ_i) and z is a set of household-level variables that affect productivity (such as parents' education or financial resources).

The reason for including schooling in human capital production is obvious. In the case of leisure, we are motivated by the evidence that both sleep and play (especially time spent with adults) promote both cognitive and non-cognitive child development (Dewald et al. 2010; Ginsburg et al. 2007; Whitebread et al. 2017)¹. One can think of human capital as contributing to the household's utility either due to the intrinsic value of education and leisure or because it raises expected future earnings by producing an educated, well-rounded child. We make the simplifying assumption that the household does not exhibit inequality aversion, and cares equally about each child's human capital.

Utility is increasing and concave in consumption. Unlike Ravallion and Wodon (2000), we assume that consumption and human capital are additively separable. The household's problem is to choose $C, (L_1, \dots, L_N), (S_1, \dots, S_N)$ and (H_1, \dots, H_N) to maximize:

$$U(C) + \sum_{i=1}^N R(S_i, H_i, \eta_i; z)$$

¹ Consumption could also be included in R_i , but we exclude it since the data does not include child-specific consumption and adding it would not substantially change the key predictions for our purposes.

subject to:

$$(1) C \leq Y + \sum_{i=1}^N w(\theta_i) L_i$$

$$(2) S_i + L_i + H_i \leq T, \forall i$$

$$(3) L_i \geq 0, \forall i$$

$$(4) S_i \geq \underline{S}, \forall i$$

$$(5) H_i \geq \underline{H}, \forall i$$

A minimum positive lower bound is used for study time and leisure instead of a non-negativity constraint, as we restrict our data analysis on children that enrolled in school², and there is a biological minimum need for children's sleep time.³ We further assume that $0 < \underline{S} + \underline{H} < T$.

This setup has to be qualified in several respects. In this framework, parents make the decision to allocate children's total time across different uses. While a child may have different preferences, the implicit assumption is the parental allocation accounts for them. One can imagine that through η_i , R captures children's preferences over studying and leisure in addition to the value derived by parents. We also assume that the number of siblings within the household is fixed; parents cannot respond to the equilibrium of this problem by having more children⁴.

The Kuhn-Tucker (KT) conditions that characterize the household's problem are:

² Even without constraint (3) the optimal choices of S_i and H_i will be positive if Inada conditions hold.

³ Almost all the children in our sample are enrolled in school and have positive leisure.

⁴ Since 12 is the average age of children in the data we discuss in Section 3, this is not an unreasonable assumption for our analysis in Section 4.

$$\frac{\partial U(C; z)}{\partial C} + \delta_1 = 0$$

(KT1)

$$\frac{\partial U(C; z)}{\partial L_i} w(\theta_i) + \delta_1 w(\theta_i) + \delta_{2i} - \delta_{3i} = 0, \forall i$$

(KT2)

$$\frac{\partial R(S_i, H_i, \eta_i; z)}{\partial S_i} + \delta_{2i} - \delta_{4i}, \forall i = 0$$

(KT3)

$$\frac{\partial R(S_i, H_i, \eta_i; z)}{\partial H_i} + \delta_{2i} - \delta_{5i}, \forall i = 0$$

(KT4)

The complementary slackness conditions that characterize the household's problem are:

$$\delta_1 \left(Y + \sum_{i=1}^N w(\theta_i) L_i - C \right) = 0$$

(KT5)

$$\delta_{2i} (T - S_i + L_i + H_i) = 0, \forall i$$

(KT6)

$$\delta_{3i} (L_i) = 0, \forall i$$

(KT7)

$$\delta_{4i} (S_i - \underline{S}) = 0, \forall i$$

(KT8)

$$\delta_{5i} (H_i - \underline{H}) = 0, \forall i$$

(KT9)

where δ_1 , $\{\delta_{21}, \dots, \delta_{2N}\}$, $\{\delta_{31}, \dots, \delta_{3N}\}$, $\{\delta_{41}, \dots, \delta_{4N}\}$ and $\{\delta_{51}, \dots, \delta_{5N}\}$ are the Lagrange multipliers for the constraints listed above. It is trivial to assume that the first two constraints hold with equality, and thus, $\delta_1 \geq 0$ and $\delta_{2i} \geq 0, \forall i$. In the case of a positive solution for all time uses (i.e., (4) and (5) are not binding so that $S_i > \underline{S}$ and $H_i > \underline{H}$):

$$w(\theta_i) * \frac{\partial U(C; z)}{\partial L_i} = \frac{\partial R(S_i, H_i, \eta_i; z)}{\partial S_i} = \frac{\partial R(S_i, H_i, \eta_i; z)}{\partial H_i}$$

If we compare any two children i and j in the household, the ratio of marginal productivities of their leisure will be equal to the ratio of marginal productivities of their schooling and the ratio of marginal utilities of their implicit wages:

$$\frac{w(\theta_i) * \partial U(C; z) / \partial L_i}{w(\theta_j) * \partial U(C; z) / \partial L_j} = \frac{\partial R(S_i, H_i, \eta_i, z) / \partial H_i}{\partial R(S_i, H_i, \eta_j, z) / \partial H_j} = \frac{\partial R(S_i, H_i, \eta_i, z) / \partial S_i}{\partial R(S_i, H_j, \eta_i, z) / \partial S_j}$$

Let us examine the implications of this model via comparative statics. Since z is common to siblings, intra-household differences in time use will be driven by η_i and θ_i . If children get better at work as they age (i.e., θ_i includes age), then deviation from the average time spent on labor by children in a household will be higher for older children. If girls are perceived to be more productive than boys in the types of jobs that are most available to school-aged children (largely domestic work) due to conditioned gendered skills or cultural norms, then θ_i will include gender, and we will observe that the deviation from average time spent on labor will be positive for girls. Similarly, the deviation from average time spent on work would be higher for children with younger siblings, because the demand for their domestic labor (childcare and other chores) would be higher.

Thus by inferring how children's demographic characteristics would affect the demand for their labor, we can describe likely intra-household patterns in work time. However, without further characterization of the human capital function $R(\cdot)$ (and in particular, whether θ_i and η_i have elements in common), the effect of children's characteristics on the other two time uses (leisure and schooling) is ambiguous. This is a question we take to the empirics in Section 4, after describing the data in Section 3.

Section 3: Data

We use the Young Lives Longitudinal Study for the analysis. It follows two cohorts of children in four countries - Ethiopia, India (Andhra Pradesh State), Peru and Vietnam. The sample in each country consists of two age groups: a Younger Cohort of 2,000 children who were aged between six and eighteen months when Round 1 of the survey was carried out in 2002, and an Older Cohort of 1,000 children then aged between 7.5 and 8.5 years. Rounds 2, 3, 4 and 5 of the survey were conducted in 2006, 2009, 2013 and 2016, respectively. We focus on the Younger Cohort in this paper. The children in this cohort were selected from twenty sampling sites. These sites were chosen in 2001 to be representative of the region. Within each sampling site, all households were screened to compile a list of eligible households (with children aged one in 2001). From that list of households, a sample of 100 households with children born between January 2001 and May 2002 was randomly selected for each sampling site.

In each round, rich data on the lives of the children in the target age windows for the two cohorts ("index children") were collected, including details on their aspirations, consumption, daily

routine, health, personality, and more. In addition to the data on the index child, limited information was collected on the index children's siblings between ages five and eighteen, including their typical daily time use during the preceding week. The respondent was asked about each child's typical time spent per day at school and studying at home (hereafter study time), sleeping and playing (hereafter leisure time), and on domestic, farm, or market tasks (hereafter work time) to the nearest half hour⁵.

We focus on data from Ethiopia, India, and Vietnam⁶. We use Round 4 and Round 5 for the analysis, because the data on time use was most complete for those rounds. Households in urban areas comprise of 36% of the sample for Ethiopia, 28% of the sample for India, and 20% of the sample for Vietnam. Samples are equally split between boys and girls.

Attrition of index children was very low in India and Vietnam: less than 3% of the children in the Younger Cohort were not tracked across five rounds. In Ethiopia, however, 5% of the children in the Younger Cohort were not tracked across five rounds.

Because siblings aged into and out of the age window for time use collection (5 to 18 years old) between rounds, there is more attrition for the full roster of children than for the index children. The household rosters in Round 4 have about 3,900 children from Ethiopia, 3,800 children from India, and about 3,200 children from Vietnam. The final sample in Round 5 has about 3,900

⁵ The respondent was given 24 pebbles and each represented one hour. For every child in the roster, the respondent assigned these pebbles to a list of eight activities to indicate the child's time use for these activities. It was ensured that all the pebbles were allocated.

⁶ We do not present analysis for Peru as data on some crucial child level covariates for non-index children (performance in the last academic year) that we explore in Section 3 were not available.

children from Ethiopia, 3,700 children from India, and about 2,700 children from Vietnam. Of these, about 2,800 children were surveyed in both rounds in Ethiopia, 2,700 children were surveyed in both rounds in India, and 2,000 were surveyed in both rounds in Vietnam⁷. Nearly all children were still enrolled in Round 4. It is possible that those who were not enrolled were facing extenuating circumstances, and we exclude those rare cases to describe typical allocations of time for children of each profile. By restricting the sample to enrolled children (nearly all of whom were in a formal institution), we retain over 95% of the sample in the three countries.

Table 1 describes the average time use levels across three countries. In Ethiopia, the average child spent 5.8 hours in school (which includes travelling time), 1.5 hours on studying at home, 3.6 hours on working, 3.6 hours at play, and 9.3 hours sleeping in Round 4. Of the time spent on work, 1.7 hours are spent doing domestic chores and 1.3 hours on other unpaid activities. Only 9% children were not involved in any work activity. In India, the average child spent ten hours on either studying at home or at school, 0.9 hours on working, four hours playing, and nine hours sleeping. Of the ten hours of study time, about eight hours are spent at school, and two on studying at home. In sharp contrast to Ethiopia, 40% children in India do not spend any time on work. In Vietnam, the average child spends 5.7 hours at school, 2.7 hours on studying at home, 1.5 hours on work (largely domestic chores), 5.1 hours playing, and nine hours sleeping. In Vietnam, 33% children do not work at all.

⁷ Most of those who were interviewed in Round 4 and not in Round 5 were older children who aged out of the roster, and most of those who were interviewed in Round 5 and not in Round 4 were younger children who were added to the roster.

These average levels of time use mask substantial heterogeneity within (and between) a household, and by child level characteristics. How time use varies by those characteristics is a key question. Therefore, it is important to understand the intra-household distribution of activities, and especially how time use varies with gender. In the next section, we explore this question in detail, before investigating the significant female leisure deficit that we identify.

Section 4: Results

Correlates of intra-household time allocation

We interpret reported time uses as the result of an intra-household allocation decision⁸ that assigns children to different tasks depending on comparative advantages relative to their siblings. If this is the case, substantial variation in children's time use will be driven by variation within the household. To separate the contributions of within-household and between-household components of overall variation in time use, we use the Generalized Entropy Index⁹ with parameter value of two (hereafter $GE(2)$):

$$GE(2) = \frac{1}{2N\mu_{ah}^2} * \sum_{i=1}^N (t_{iah} - \mu_{ah})^2$$

where t_{iah} is the time spent on an activity a by child i in household h , μ_{ah} is the average time spent by all individuals and N is the total number of individuals. The advantage of using $GE(2)$ measure of variation is that it allows us to fully decompose the total variation into its within-household and between-household components.

⁸ We are agnostic about whether that decision is arrived at by a unitary or joint decision-making process. Although this is an important consideration with respect to policy, it has no bearing on our descriptive results.

⁹ See Theil (1967) and Bourguignon (1979) for discussion.

We implement this decomposition for four uses of time. We split leisure into play and sleep, because the variation in sleep is low (Table 2)¹⁰. The within-household variation in all types of time use represents a substantial proportion of the total variation. In Ethiopia, within household variation represents about a quarter of the total variation in study time and work time, and accounts for one-third of variation in sleep and play time. In India, for the three uses of time, within-household variation accounts for about a quarter of the total variation in time uses. The same holds for Vietnam.

Since a high degree of variation in time use is due to the variation within a household, it is instructive to explore its covariates. Our analysis will therefore be able to comment on child-level determinants of time use, but not the household-level variables (such as wealth or parental education) that our theoretical model in Section 2 leaves a role for. That model implies a set of optimal decision rules for each child:

$$t_{iah} = f_a(\eta_i, \theta_i, z)$$

where t_{iah} is the time that child i in household h spends on activity a in hours. To explore the covariates of intra-household variation in time-use, we use intra-household regressions to explore how time use varies with child characteristics. We estimate a linear relationship between t_{iah} and child characteristics:

$$t_{iah} = \beta_0^a + \beta_1^a Performance_{ih} + \beta_2^a Age_{ih} + \beta_3^a Age_{ih}^2 + \beta_4^a Female_{ih} + \beta_5^a Age Rank_{ih} \\ + \gamma_h^a + \varepsilon_{iah}$$

¹⁰ All results that follow are qualitatively similar if we combine sleep and play into a single time use (leisure).

The covariates are largely the same as in the intra-household analysis of Akresh et al. (2012). $Performance_{ih}$ is an indicator for whether the parents thought that the child performed well in the last academic year¹¹. Age_i and Age^2_{ih} denote child i 's age and age squared, respectively. $Female_{ih}$ is an indicator for whether the child is female, and $Age Rank_{ih}$ captures the age rank of the child within her sibship: the oldest child is assigned a rank one, and so on. Household fixed effects are captured by γ_h . We report robust standard errors that are clustered at the level of the sampling unit. These regressions are separately estimated for the three countries, and for Round 4 and 5. For ease of interpretation of the magnitudes of coefficients on child characteristics, we use standardized t_{iah} as our dependent variable.

Results from the Round 4 survey for Ethiopia (Table 3) suggest that there is a strong age gradient for work time, with work time increasing by 0.41 standard deviations per year. Females spend more time working than their male siblings: their work time is 0.18 deviations higher. Higher work time for older children and girls is accompanied by lower play time, while changes in study time are not significant. There is a positive gradient associated with children's academic performance, which is accompanied by lower leisure time. Age rank is not a significant correlate of either study and work time.

Table 4 shows the results for the Indian sample in Round 4. There is a steep positive age gradient for work, with work time increasing by 0.23 standard deviations per year. There is also a large

¹¹ Although $Performance_{ih}$ is lagged, it may still be endogenous. Performance at school is serially correlated, and the omitted current value is determined in part by how much studying is done. However, since the variable is categorical and based on the caregiver's perception of academic prowess relative to siblings, we conjecture that this variable captures something closer to innate ability and that endogeneity is unlikely to be a major concern.

work burden for females, with work time 0.33 standard deviations higher for girls than for boys. These work burdens largely come out of reduced play and sleep time. There is a clear positive relationship between children's academic performance and the time they spend on education related activities and a corresponding negative relationship between children's academic performance and leisure time.

Table 5 presents the results for Vietnam. As in Ethiopia and India, there is a steep age gradient in time spent on work related activities; work time increases by 0.34 standard deviations per year. There is a leisure deficit for girls just as in Ethiopia and India, with girls working 0.20 standard deviations more than boys on average. The distinction between good and bad students is similar to in the other two countries, with good students studying more 0.18 standard deviations (at the expense of leisure). In addition, age rank is an important determinant of intra-household time use, with work time decreasing by 0.39 standard deviations for each younger sibling.

In summary, results from Round 4 for the three countries are qualitatively equivalent and consistent with the model. We find that older children work and study more in India and Vietnam, and work more in Ethiopia, highlighting their relative productivity in these activities. Good students study more and spend less time on leisure, but do not spend significantly more time working, suggesting that there are not strong complementarities in the skills required for academic performance and domestic labor.

Insignificant coefficients on the birth order variable for study time in Ethiopia and India with a positive age gradient indicate that the increase in time spent on working is being driven by the

availability of markets for children's work as they grow older, and not domestic responsibilities due to their position in their sibship. In Vietnam, however, age rank is strongly correlated with time use (negatively with work and positively with leisure), suggesting that work responsibilities are at least partly driven by the need to care for younger siblings. This also seems to be in keeping with the Confucian family ethic that dominates in Vietnam, by which roles are strongly determined by seniority (Nguyen 2016).

The strongest result from the intra-household regressions is that girls spend significantly less time on play (between 0.1 and 0.2 standard deviations less) and sleep. For all three countries, that leisure deficit is due to a higher work burden on girls. The strength of this gender effect is striking because it comes after controlling for not only other child-specific characteristics (age, birth order, school performance), but also after eliminating all inter-household differences (wealth, family size, parental education, etc.) via the household fixed effects specification. Within the same household, girls work more and spend significantly less time on leisure than their male counterparts, perhaps reflecting social norms that cast girls as more suited or productive in domestic chores, which dominate as the form of child labor in these samples.

Tables 6, 7, and 8 show that results from Round 5 are similar to those for Round 4, with older and elder children working and studying more, good students spending less time on leisure, and girls doing more work and less leisure. One major difference is that by Round 5 a negative gender differential in study time emerges for India and positive differential emerges for Vietnam. In Round 5, age rank matters in India: higher ranked children study more at the expense of leisure.

But here again, the female leisure deficit is consistent and large, and clearly not an irregularity observed in Round 4.

Investigating the female leisure deficit

We use the concept of time poverty (Vickery 1977) to further investigate the nature of the leisure (defined as sleep and play) deficit. Time poverty is the state of having insufficient discretionary time for leisure and rest after accounting for time needed for work and other responsibilities. Several studies have identified that adult women suffer from time poverty more than their male counterparts in developing countries (Bardasi and Wodon 2010, Wodon and Blackden 2006, Zacharias et al. 2012).

Applying this concept to children's time use, we follow Wodon and Blackden (2006) in setting a relative time poverty line. We define three age groups (5-9, 10-14, and 15-18), and consider a child to be leisure poor if their leisure hours fall below the 25th percentile of the distribution of leisure time for their age bin. Although this is an arbitrary line, our main conclusions are robust to this choice.

Using this definition of leisure poverty, we find that girls have a heightened incidence of leisure poverty relative to boys, starting from an early age. For Ethiopia and Vietnam (Figures 1 and 3), the gap is evident even from age 5. For India (Figure 2), the gap emerges at age 10.

In addition, plotting the incidence of time poverty over the wealth distribution, we find that the leisure poor girls are distributed quite evenly across the wealth distribution. The gender gap in leisure does not narrow, even for the richest households across three countries. For Ethiopia

(Figure 4), the higher incidence of leisure poverty for girls emerges at the 20th percentile of the wealth distribution and grows. For India (Figure 5) and Vietnam (Figure 6), the gap is evident throughout the distribution of wealth, although in India the gap narrows in the middle of the distribution, whereas in Vietnam the gap is largest in the middle of the distribution. These findings on the intersection of leisure and wealth are comparable to that of Brown et al. (2018) on nutrition and wealth. They analyze survey data from Sub-Saharan Africa and conclude that undernourished women and children are not concentrated in poor households (in fact, 75% of undernourished women and children are not in the bottom quintile of wealth).

Defining wealth poverty as living in a household with wealth index below the 25th percentile, we also find that leisure-poor girls are more likely to also reside in poor households than leisure-poor boys (Table 9). In Ethiopia, 27% of leisure-poor boys are in the bottom quartile of wealth, versus 37% of leisure-poor girls. In India, 16% of leisure-poor boys are in the bottom quartile of wealth, versus 20% of leisure-poor girls. In Vietnam, 28% of leisure-poor boys are in the bottom quartile of wealth, versus 32% of leisure-poor girls. Thus, not only are girls more likely to be leisure-poor than boys starting from an early age regardless of household wealth, they are also more likely than boys to face a double-burden of wealth and leisure poverty.

Section 5: Conclusion

We used Young Lives Longitudinal Study to analyze the intra-household distribution of children's time use. It is noteworthy that significant variation in children's time use is due to the within-household component. Child characteristics determine the intra-household differences of time-use in a way that is consistent with children's expected comparative advantages in domestic work and education.

The strongest result obtained for all three analyzed samples is that girls carry a significantly larger work burden than their brothers, and spend less time at play and sleep. While gender gaps in health and education have been documented in a number of settings, this analysis has demonstrated important gaps on a relatively underexplored dimension: time. The female leisure deficit emerges within families from an early age and persists as children grow older. Furthermore, girls are more likely to face a double burden of wealth and time poverty. Our finding that the gender leisure deficit is consistent across the wealth distribution implies that gender-sensitive development programs for youth (after school clubs, mentorship programs, etc.) should not be targeted by socioeconomic status.

Studies on gendered time poverty suggest that provision of local infrastructure investments (electricity, transportation, sanitation, water supply) may attenuate the gap by reducing the demand for housework in many developing settings (ADB 2015; Koolwal and van de Walle 2013). Cultural norms that favor sons interact with development challenges (such as poor public goods provision) to further exacerbate gendered time poverty (Jayachandran 2015). Cultural norms are not immutable. In a recent study, Dhar et al. (2018) show that a social campaign engaging children in

discussions about gender equality led to more progressive gender attitudes. Explicitly studying the effect of such interventions on time allocation is a promising avenue for future research.

Sustainable Development Goal target 5.4 is to promote “shared responsibility within the household and family” for unpaid care and work. The consistency of the leisure gap at an early age and across the wealth distribution confirms that the domestic workload imbalance that provides the impetus for that target is deeply entrenched. Any policies and programs to address it must intervene early in family life, across all socioeconomic groups.

References

- Akresh, R., Bagby, E., de Walque, D., & Kazianga, H. (2012). Child Ability and Household Human Capital Investment Decisions in Burkina Faso. *Economic Development and Cultural Change*, 61, 157-186.
- Arora, D. (2015). Gender differences in time-poverty in rural Mozambique. *Review of Social Economy*, 73(2), 196-221.
- Asian Development Bank. (2015). *Balancing the burden? Desk review of women's time poverty and infrastructure in Asia and the Pacific*. Manila.
- Bardasi, E., & Wodon, Q. (2010). Working long hours and having no choice: Time poverty in Guinea. *Feminist Economics*, 16(3), 45-78.
- Becker, G. (1965). A Theory of the Allocation of Time. *The Economic Journal*, 75(299), 493-517.
- Bourguignon, F. (1979). Decomposable Income Inequality Measures. *Econometrica*, 47(4), 901-920.
- Brown, C., Ravallion, M. & van de Walle, D. (2018). Most of Africa's Nutritionally-Deprived Women and Children are Not Found in Poor Households. *Review of Economics and Statistics* (forthcoming).
- Dewald, J.F., Meijer, A.M., Oort, F.J., Kerkhof, G.A., & Bogels, S.M. (2010). The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: A meta-analytic review. *Sleep Medicine Reviews*, 14(3). 179-189.
- Dhar, D., Jain, T., & Jayachandran, S. (2018). *Reshaping Adolescents' Gender Attitudes: Evidence from a School-Based Experiment in India* (No. w25331). National Bureau of Economic Research.
- Edmonds, E. (2006). Understanding Sibling Differences in Child Labor, *Journal of Population Economics*, 19, 795-821.
- Emerson, P.M., Ponczek, V., & Souza, A.P. (2014). Child Labor and Learning. *World Bank Policy Research Working Paper* 6904.
- Ferreira, F.H.G., Filmer, D., & Schady, N. (2017). Own and Sibling Effects of Conditional Cash Transfer Programs: Theory and Evidence from Cambodia, in Bandyopadhyay, S. (ed.), *Research on Economic Inequality (Research on Economic Inequality, Volume 25)*. Emerald Publishing Limited, pp. 259 - 298
- Fiorini, M., & Keane, M.P. (2014). How the Allocation of Children's Time Affects Cognitive and Noncognitive Development. *Journal of Labor Economics*, 32, 787-836.

Floro, M. S., & King, E. M. (2016). The Present and Future of Time-Use Analysis in Developing Countries. *Asia-Pacific Population Journal*, 31(1).

Gertler, P., Heckman, J., Pinto, R., Zanolini, A., Vermeersch, C., Walker, S., and Grantham-McGregor, S. (2014). Labor market returns to an early childhood stimulation intervention in Jamaica. *Science*, 344(6187), 998-1001.

Ginsburg, K.R. and the Committee on Communications, and the Committee on Psychosocial Aspects of Child and Family Health. (2007). The Importance of Play in Promoting Healthy Child Development and Maintaining Strong Parent-Child Bonds. *Pediatrics*, 119(1): 182-191.

Hirway, I. (2010). Time-use surveys in developing countries: an assessment. In *Unpaid Work and the Economy* (pp. 252-324). Palgrave Macmillan, London.

Hsin, A. (2007). Children's time use: Labor divisions and schooling in Indonesia. *Journal of Marriage and Family*, 69(5), 1297-1306.

Jayachandran, S. (2015). The roots of gender inequality in developing countries. *The Annual Review of Economics*, 7(1), 63-88.

Koolwal, G., & Van de Walle, D. (2013). Access to water, women's work, and child outcomes. *Economic Development and Cultural Change*, 61(2), 369-405.

Lloyd, C. B., Grant, M., and A. Ritchie. (2008). Gender differences in time use among adolescents in developing countries: Implications of rising school enrollment rates. *Journal of Research on Adolescence*, 18(1), 99-120.

Nguyen, Q. (2016). The Vietnamese Values System: A Blend of Oriental, Western and Socialist Values. *International Education Studies*, 9(12), 32-40.

Ravallion, M., & Wodon, Q. (2000). Does child labour displace schooling? Evidence on behavioural responses to an enrollment subsidy. *The Economic Journal*, 110(462), 158-175.

Rubiano, E., and M. Viollaz. (2018) Gender Differences in Time Use: Allocating Time between the Market and the Household. Unpublished, World Bank.

Singh, A. & Krutikova, S. (2017). Starting Together, Growing Apart: Gender Gaps in Learning From Preschool to Adulthood in Four Developing Countries. *Young Lives Working Paper* 174.

Strauss, J., & Thomas, D. (1998). Health, nutrition, and economic development. *Journal of Economic Literature*, 36(2), 766-817.

Strauss, J., and D. Thomas. (1995). Human resources: Empirical modeling of household and family decisions. *Handbook of development economics*, 3, 1883-2023.

Theil, H. (1967). *Economics and Information Theory*. Amsterdam: North-Holland.

Vickery, C. (1977). The time-poor: A new look at poverty. *Journal of Human Resources*, 27-48.

Whitebread, D., Neale, D., Jensen, H., Liu, C., Solis, S.L., Hopkins, E., Hirsh-Pasek, K. Zosh, J. M. (2017). The role of play in children's development: a review of the evidence. The LEGO Foundation, DK.

Wodon, Q., & Blackden, C. M. (Eds.). (2006). *Gender, time use, and poverty in sub-Saharan Africa*. The World Bank.

Zacharias, A., Antonopoulos, R., & Masterson, T. (2012, July). Why time deficits matter: Implications for the measurement of poverty. In *World Economic Association Conference: The political economy of economic metrics* (Vol. 28).

Appendix 1: Figures

Figure 1: Incidence of leisure poverty by age, Ethiopia

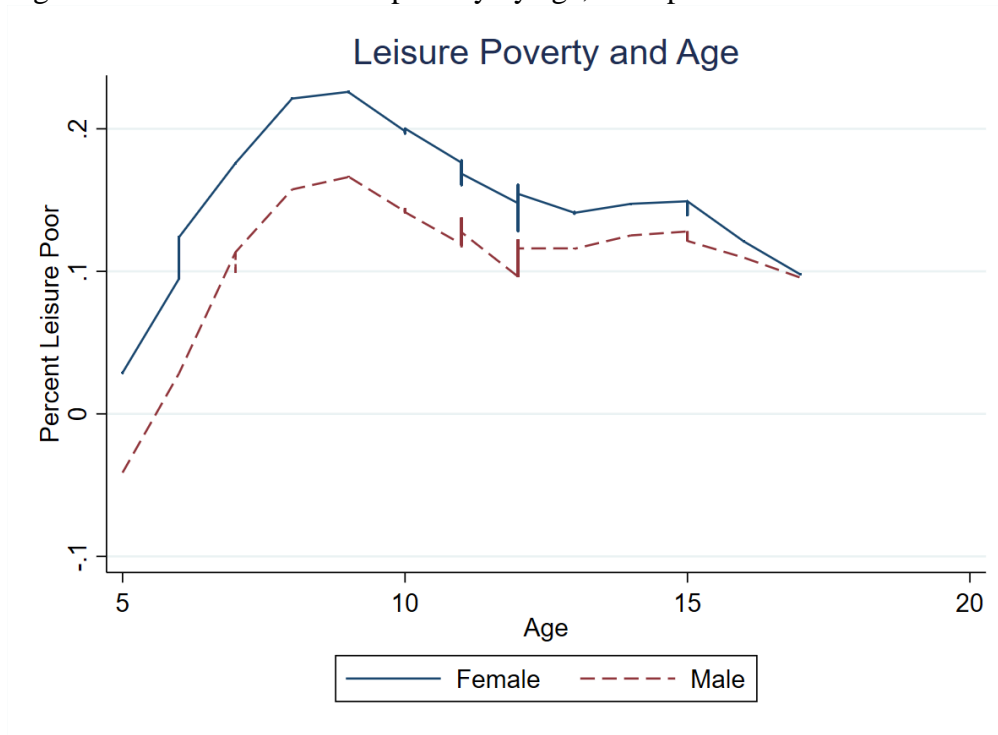


Figure 2: Incidence of leisure poverty by age, India

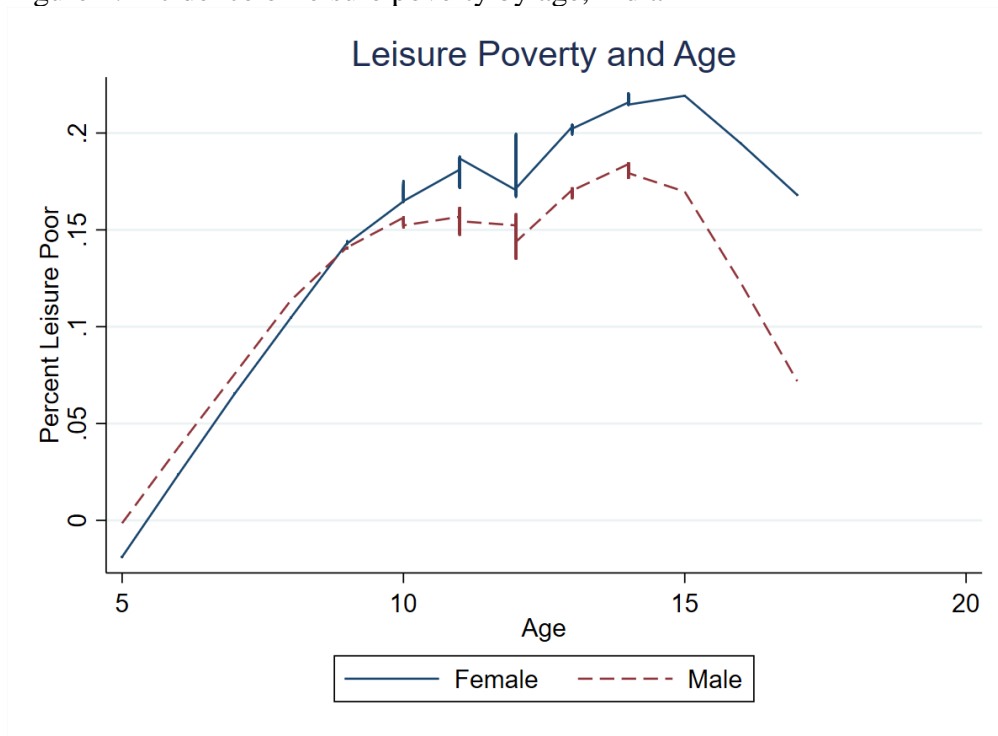


Figure 3: Incidence of leisure poverty by age, Vietnam

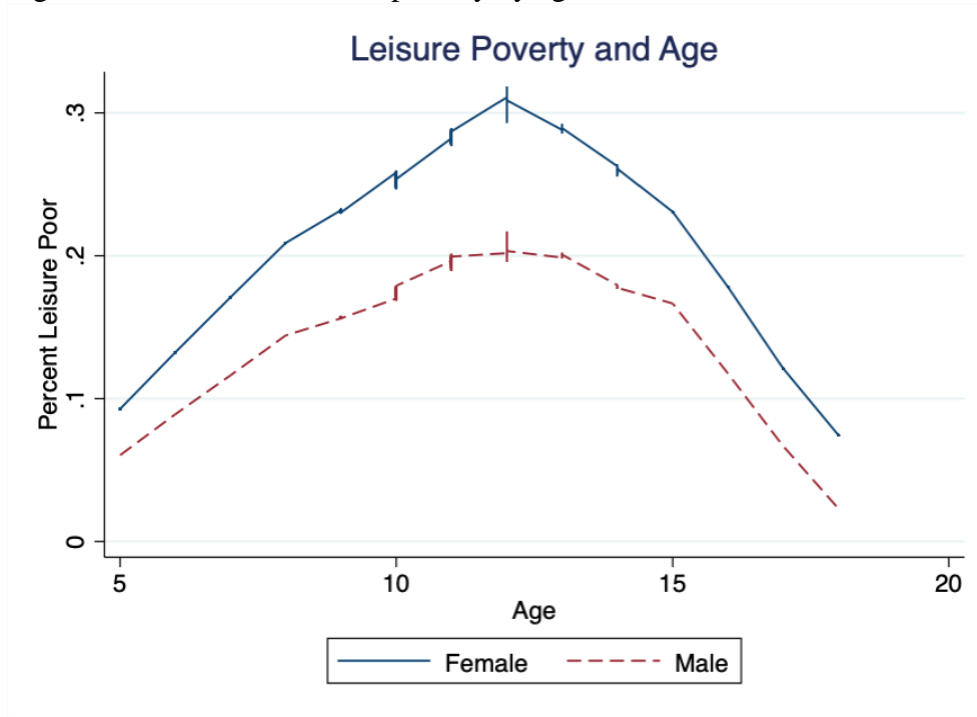


Figure 4: Incidence of leisure poverty by wealth, Ethiopia

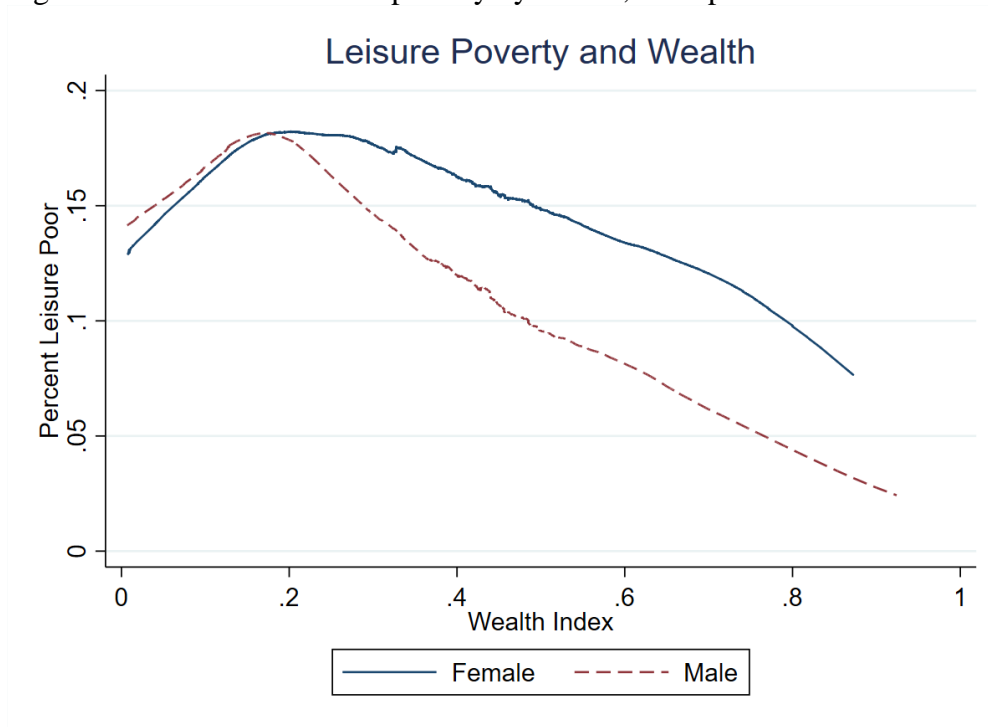


Figure 5: Incidence of leisure poverty by wealth, India

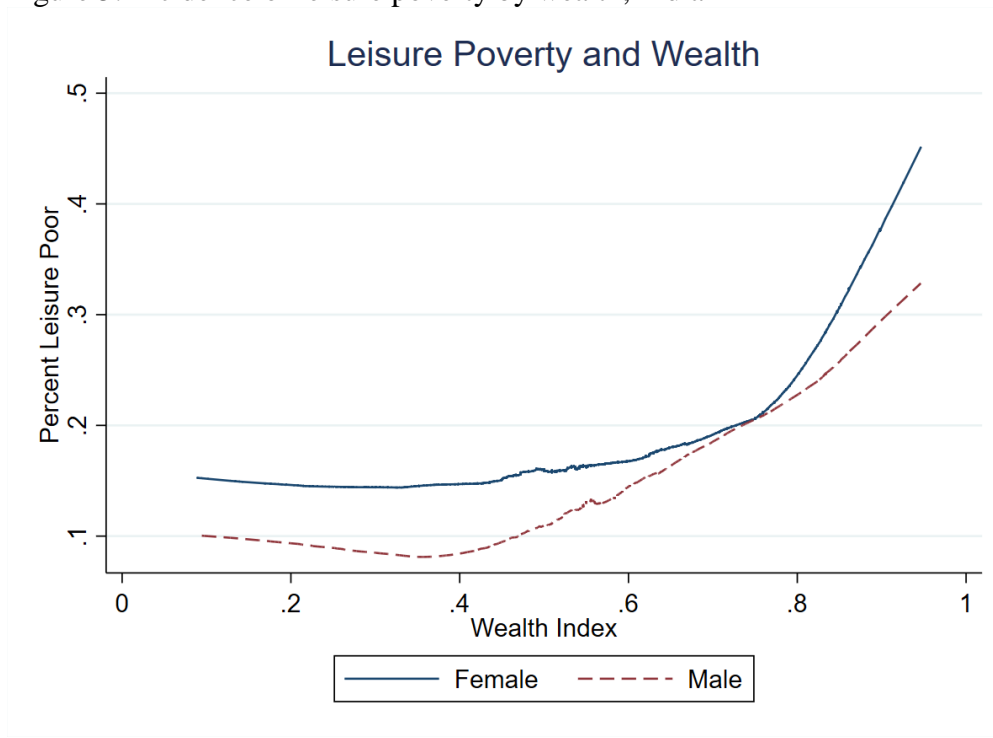
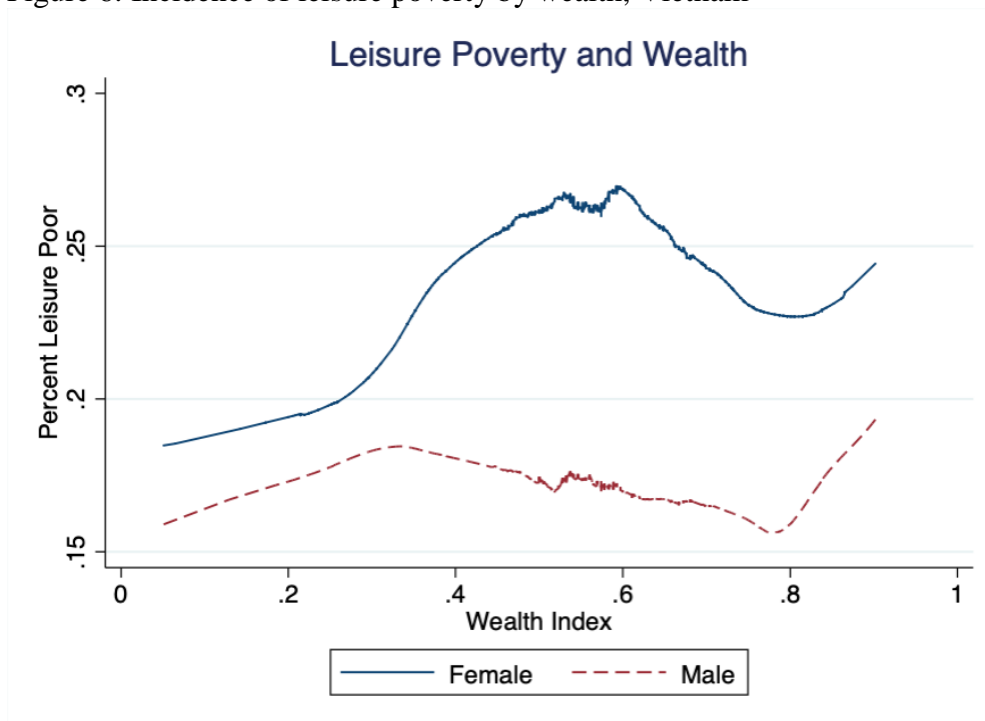


Figure 6: Incidence of leisure poverty by wealth, Vietnam



Appendix 2: Tables

Table 1: Average time use in hours (Round 4)

	Education	Work	Play	Sleep
Ethiopia N=3,970	7.35 (1.65)	3.77 (2.10)	3.64 (1.82)	9.26 (1.11)
India N=3,853	10.0 (0.99)	0.89 (0.99)	4.08 (1.44)	8.99 (0.87)
Vietnam N=3,115	8.39 (1.84)	1.49 (1.56)	5.14 (2.06)	9.00 (1.02)
Notes: Standard deviations in parentheses.				

Table 2: Inequality in Time Use (Round 4)

	Ethiopia				India				Vietnam			
	Study	Work	Play	Sleep	Study	Work	Play	Sleep	Study	Work	Play	S
Total	0.025	0.155	0.125	0.007	0.01	0.516	0.063	0.004	0.025	0.556	0.070	0
Between	0.020	0.113	0.040	0.002	0.008	0.379	0.047	0.001	0.019	0.392	0.061	0
Within	0.005	0.042	0.085	0.005	0.002	0.137	0.016	0.003	0.006	0.164	0.019	0
(%) Within	23%	27%	32%	32%	24%	27%	24.7%	31%	23%	30%	23%	2

Table 3: Intra-household Distribution of Standardized Time-uses, Ethiopia (Round 4)

	Study	Work	Play	Sleep
Female	0.007	0.175**	-0.164**	-0.071
	-0.053	-0.083	(0.067)	(0.046)
Performance	0.174***	-0.047	-0.075	-0.046
	-0.045	-0.043	(0.044)	(0.049)
Age	0.077	0.412***	-0.384***	-0.261***
	-0.061	-0.065	(0.061)	(0.046)
Age Squared	-0.001	-0.014***	0.013***	0.007***
	-0.003	-0.003	(0.002)	(0.002)
Age Rank	-0.091	-0.08	0.055	0.196**
	-0.07	-0.063	(0.054)	(0.074)
Observations	3,798	3,798	3,798	3,798
Adjusted R2	0.695	0.649	0.581	0.678
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 4: Intra-household Distribution of Standardized Time-uses, India (Round 4)

	Study	Work	Play	Sleep
Female	-0.062	0.320***	-0.094**	-0.103**
	-0.043	-0.061	(0.038)	(0.042)
Performance	0.163**	0.073	-0.127**	-0.151***
	-0.059	-0.043	(0.056)	(0.042)
Age	0.247***	0.228**	-0.279***	-0.220**
	-0.084	-0.084	(0.071)	(0.098)
Age Squared	-0.008**	-0.006*	0.009***	0.005
	-0.004	-0.003	(0.003)	(0.004)
Age Rank	-0.104	-0.145	0.108	0.165*
	-0.081	-0.086	(0.066)	(0.079)
Observations	3,846	3,846	3,846	3,846
Adjusted R2	0.559	0.464	0.601	0.587
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 5: Intra-household Distribution of Standardized Time-uses, Vietnam (Round 4)

	Study	Work	Play	Sleep
Female	0.123	0.197***	-0.199***	-0.122***
	(0.074)	(0.065)	(0.059)	(0.043)
Performance	0.187**	-0.063	-0.057	-0.125
	(0.079)	(0.103)	(0.096)	(0.092)
Age	-0.039	0.338***	-.137**	-0.173**
	(0.082)	(0.064)	(0.064)	(0.069)
Age Squared	0.006	-0.013***	0.0039	0.001
	(0.004)	(0.003)	(0.003)	(0.003)
Age Rank	0.063	-0.387***	0.230*	0.015
	(0.112)	(0.084)	(0.116)	(0.100)
Observations	3,170	3,170	3,170	3,170
Adjusted R2	0.479	0.556	0.546	0.612
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 6: Intra-household Distribution of Time-uses, Ethiopia (Round 5)

	Study	Work	Play	Sleep
Female	0.074	0.192***	-0.192***	-0.107**
	(0.052)	(0.046)	(0.050)	(0.044)
Performance	0.316***	0.015	-0.192***	-0.039
	(0.059)	(0.055)	(0.058)	(0.050)
Age	0.315	0.247	-0.127	-0.821***
	(0.232)	(0.174)	(0.193)	(0.182)
Age Squared	-0.010	-0.008	0.002	0.029***
	(0.010)	(0.007)	(0.008)	(0.008)
Age rank	-0.183	0.005	-0.042	0.286**
	(0.137)	(0.114)	(0.131)	(0.114)
Observations	2,617	2,617	2,617	2,617
Adjusted R2	0.545	0.650	0.566	0.674
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 7: Intra-household Distribution of Time-uses, India (Round 5)

	Study	Work	Play	Sleep
Female	-0.110**	0.334***	-0.112**	-0.049
	(0.049)	(0.050)	(0.047)	(0.049)
Performance	0.147**	-0.010	-0.024	-0.199***
	(0.062)	(0.061)	(0.059)	(0.057)
Age	0.725***	0.094	-0.411***	-0.711***
	(0.147)	(0.132)	(0.147)	(0.137)
Age Squared	-0.028***	-0.001	0.014**	0.027***
	(0.006)	(0.006)	(0.006)	(0.006)
Age rank	-0.408***	-0.013	0.111	0.534***
	(0.100)	(0.101)	(0.102)	(0.105)
Observations	2,443	2,443	2,443	2,443
Adjusted R2	0.461	0.463	0.500	0.496
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 8: Intra-household Distribution of Time-uses, Vietnam (Round 5)

	Study	Work	Play	Sleep
Female	0.134**	0.275***	-0.317**	-0.061
	(0.061)	(0.073)	(0.141)	0.197
Performance	0.286***	-0.178*	-0.111	-0.270
	(0.077)	(0.093)	(0.214)	(0.268)
Age	-0.239	1.083***	-0.465	-0.403
	(0.210)	(0.252)	(0.578)	(0.415)
Age Squared	0.013	-0.043***	0.017	0.013
	(0.009)	(0.010)	(0.024)	(0.016)
Age rank	0.047	-0.595***	0.307	0.246
	(0.129)	(0.155)	(0.301)	0.225
Observations	2,069	2,069	2,069	2,069
Adjusted R2	0.609	0.472	0.602	0.547
Notes: ***: p<.01; **: p<.05; *: p<0.1.				
Robust standard errors clustered at the level of primary sampling unit				

Table 9: Percentage of leisure-poor children in the bottom quartile of the wealth distribution (Round 4)

Ethiopia		India		Vietnam	
Girls	Boys	Girls	Boys	Girls	Boys
37%	27%	20%	16%	32%	28%