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How is Adolescents' Time Allocation Associated with their Self-Esteem and Self-Efficacy? Evidence from Four Developing Countries

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ABSTRACT *Adolescents' time allocation is an important determinant of non-cognitive skills formation, but evidence from developing countries is limited. This study builds upon two previous studies using data from four developing countries. I estimate how adolescents' time allocation determines their self-esteem and self-efficacy – two measures of non-cognitive skills – and I show how these estimates are sensitive to trade-offs across different types of activities. In every country, an additional hour of domestic work that reduces time for school or study reduces children's self-efficacy, significant for all countries except Peru. Work is most harmful for girls in India and Vietnam, but not for boys in Ethiopia. However, domestic or economic work that shifts time away from leisure is no more or less determinative of adolescents' self-efficacy or self-esteem in all countries analyzed. Attending school and studying outside school improve both self-efficacy and self-esteem for adolescents in Peru, but are statistically insignificant in the other three countries. Overall, these findings are mainly relevant for self-efficacy compared to self-esteem. The harmful effects of adolescents' work are contextual, depending on the activity substituted, and the country studied.*

KEYWORDS: Child labor; non-cognitive skills; time use

JEL CLASSIFICATION CODES: J13; J22; J24

1. Introduction

Non-cognitive skills are found to be important predictors of future education, labor market and social outcomes in Europe and the USA (Almlund, Duckworth, Heckman, & Kautz, 2011; Heckman, Jagelka, & Kautz, 2021; Heckman, Stixrud, & Urzua, 2006). Given their importance, there is growing research interest in examining the determinants of non-cognitive skill formation in childhood. Studies in Australia, Europe and the USA find that adolescents' skills formation is determined by how parents spend time with their children, and how they allocate

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adolescents' time (Caetano, Kinsler, & Teng, 2019; Del Bono, Francesconi, Kelly, & Sacker, 2016; Fiorini & Keane, 2014; Hsin & Felfe, 2014). For developing countries, evidence of this relationship is scant. Challenges stem from a lack of both data, and valid measures of adolescents' non-cognitive skills, and that adolescent's everyday activities in developing countries involve domestic and paid work. In developing countries where adolescents may face barriers to access and to quality schooling, important life skills may be fostered during various activities, including work and play. This paper studies the relationship between activities adolescents typically perform and the formation of two measures of non-cognitive skills – self-esteem and self-efficacy – in four developing countries.

There are two drawbacks to existing studies linking adolescents' time allocation and their skills formation in developing countries. One, most studies examine adolescents' time allocation solely as the trade-off between working and school attendance. However, work and school are not the only two activities adolescents engage in. Recent work by Keane, Krutikova, and Neal (2020) demonstrates that treating school attendance as the only counterfactual to work overestimates its negative effects. Second, few empirical studies examine non-cognitive skills as an outcome of interest for adolescents' human capital development, despite having been advocated by Heckman et al. (2021) as an important component of human capital accumulation as cognitive skills. The only study I am aware of that uses non-cognitive outcomes is by Borga (2019) who uses Young Lives (YL) data from 2009, to examine both cognitive and non-cognitive skills. He finds that undertaking paid work and unpaid family work (that is, household tasks, not including domestic work) are detrimental to adolescents' non-cognitive skills in Ethiopia, India and Vietnam.

My study contributes to the literature by linking these two gaps, building upon these two key studies cited, using YL data (Borga, 2019; Keane et al., 2020). I extend Borga's work, demonstrating the importance of examining trade-offs across different types of activities when analyzing the relationship between time inputs and skills formation (following Keane et al. 2020). I contribute evidence about how adolescent time inputs are important determinants of skills in developing countries, where evidence is scarce because of greater focus on direct parental inputs, cognitive skills, and the majority of evidence are in developed countries. I extend on Keane et al. (2020) by giving special attention to measures of non-cognitive skills, important because these skills form differently to cognitive skills. For example, non-cognitive skills are more sensitive to environmental influences at later ages (Borghans, Duckworth, Heckman, & ter Weel, 2008; Cunha et al., 2006) and more studies are still required to examine the evolution of non-cognitive skills across the life cycle (Heckman et al., 2021). In addition, I make two further extensions to work by Borga (2019). First, I use an updated cohort (2001/02 instead of 1994/95) with better validated measures of non-cognitive skills.¹ The younger cohort represent adolescents who are more likely to attend school and less likely to do paid work, but hidden unpaid work is still prevalent despite lower participation in paid labor. Second, I examine an additional YL country, Peru, which is valuable because, unlike the other three countries, the sample is nationally representative, and provide an important narrative from a primarily urban sample (rather than primarily rural).

Using longitudinal YL data in Ethiopia, India, Peru and Vietnam, I examine the relationships between five types of activities from adolescents' full time budget: (i) domestic work (ii) economic work (iii) leisure (iv) attending school and (v) studying outside school, and their generalized self-esteem and self-efficacy. Generalized self-esteem measures the extent the individual views him/herself favorably, and generalized self-efficacy measures the general belief in one's own ability to overcome challenges. Despite being related, these two measures are conceptually distinct (Bandura, 1997; Chen, Gully, & Eden, 2004). Self-efficacy captures more of a motivational belief regarding task capabilities while self-esteem captures more affective components (Chen et al., 2004). These skills are commonly used measures of non-cognitive skills in psychology and economics and have been found to determine outcomes such as schooling decisions,

and participation in risky behaviors (Heckman et al., 2006). Additionally, these measures are often cited as the life skills adolescents learn through work in qualitative literature such as feeling a sense of belonging and pride to the family, and to build resilience to stressful situations (Aufseeser, Bourdillon, Carothers, & Lecoufle, 2018). Following methodology by Keane et al. (2020), I model adolescents' self-esteem and self-efficacy production at age 15 based on their time allocation using extended value-Added (VA) models. Extended VA models are widely used in the literature on adolescent's human capital accumulation, reflecting inputs made throughout the adolescent's life up to the specified period (Cunha & Heckman, 2008; Todd & Wolpin, 2007). The models partially account for unobserved heterogeneity by using lagged skill scores as a proxy for the adolescent's innate ability, as well as a proxy for parental investment decisions conditional on the adolescent's ability. The model is only causal under strong assumptions, which may not necessarily hold. While not causal, my study sheds new evidence on the direction of the relationships between adolescent's activities and measures of non-cognitive skills.

My findings show that domestic work is the 'more harmful' type of work for adolescents' skills, and estimates are more relevant for self-efficacy than self-esteem. Economic work is also associated with lower self-efficacy but is statistically insignificant in all countries except India. Work is more detrimental to girls' skills in India and Vietnam, but not for boys in Ethiopia. Beneficial activities such as attending school and studying outside school are statistically significant for adolescents' self-esteem and self-efficacy, but only in Peru, and the associations are driven by girls. Moreover, I find that work may be no more or less productive than leisure time. In all countries, neither form of work that shifts time away from leisure is statistically significant or has near zero associations to self-esteem or self-efficacy. In Peru, an additional hour of leisure instead of attending school is significant and negatively associated with both self-esteem and self-efficacy. In sum, domestic work is harmful for adolescents' self-efficacy if it shifts time away from attending school, but the benefits of other activities such as leisure and educational activities depend on the country, and the activity substituted.

2. Mechanisms

There are several ways in which adolescents' activities may matter for their non-cognitive development. There may be productive activities, for example, attending school which improves non-cognitive skills through education or interaction with peers and role models. More time in work that reduces time attending school may mean less time to gain from these beneficial activities. Some studies in developed countries support the conclusion that educational and socialization activities are important in improving adolescents' skills. Del Bono et al. (2016) for the UK and Hsin and Felfe (2014) for the USA find that a mother's time spent with the child (up to age seven and 12 respectively) such as reading to the child or playing music, improves adolescents' cognitive and non-cognitive outcomes. However, studies also find that different activities may matter for different skills. Fiorini and Keane (2014) find that for Australian adolescents aged one to nine, educational activities such as being read to and playing educational games improve adolescents' cognitive skills, but not their non-cognitive skills.

Conversely, there may be unproductive activities. Adolescents' work in developing countries may be difficult and stressful, and more time spent in work could hinder their development. Research on child labor has mainly focused on adolescents' cognitive skills as the main outcome of interest and presents conflicting evidence, depending on the country studied and empirical strategy. Studies that use fixed-effects estimates find that child labor reduces adolescents' cognitive skills, measured by mathematics and language test scores (Emerson, Ponczek, & Souza, 2017). Dumas (2012) however, using an instrumental variables strategy finds no evidence of a negative relationship between past years of work for adolescents in Senegal and their cognitive

achievement measured by French and mathematics scores eight years later. She even finds a positive impact of adolescents' work on oral mathematics scores.

Work may also provide important adult and peer socialization opportunities for adolescents. This opportunity may be especially important for poor families where socialization with family members take place during household chores or tending to the family farm or business. Qualitative studies such as by Morrow and Boyden (2018) based on YL countries argue that adolescents and parents see economic work as a way to gain knowledge and learn new practical and social skills such as establishing a foothold in the labor market and learning responsibility as 'part of their adulthood'.

Leisure is also rarely explored as a determinant of adolescents' skills development in developing countries. In developed countries, studies in pediatrics argue that constructive play enhances brain function and promotes socioemotional and self-regulation skills (Ginsburg, 2007; Yogman, Garner, Hutchinson, Hirsh-Pasek, & Golinkoff, 2018). Hsin and Felfe (2014) suggest that 'structured' leisure activities, such as playing sports with the child, in the USA are important activities in improving adolescents' non-cognitive skills while 'unstructured' leisure, for example, watching television, are not. Certain kinds of play may help adolescents' skills development, but this relationship has rarely been explored in developing countries.

Additionally, the displacement between the full set of these activities may matter. Often, child work literature treats adolescents' work and school attendance as strict substitutes. Edmonds (2007) argues that only using school and work indicators assumes that work is the only activity adolescents engage in besides school. Using UNICEF's Multiple Indicator Cluster Surveys (MICS) data, Edmonds (2007) shows that adolescents' work hours can increase up to a certain level with little effect on school attendance, demonstrating non-constant elasticity of substitution between work and school. Keane et al. (2020) further develop this issue using adolescents' full time budget from the YL data, focusing on cognitive skills. They find that domestic and economic work are not detrimental to adolescents' cognitive development if work only substitutes leisure, but are detrimental if work substitutes for school time. The authors further show that treating work and school as mutually exclusive activities overestimate the detrimental effects of child labor. My study will be the first to use methodology by Keane et al. (2020) to explain how different activities adolescents engage in may affect their non-cognitive skills, which may have different mechanisms to cognitive skills development.

Finally, the studies cited above are analyzed in different countries with varied findings. Putnick and Bornstein (2015) study the relationship between child labor and school enrollment across 30 developing countries using MICS data and find that economic work outside the home only reduced the likelihood of school enrollment in 35 per cent of the countries. The authors argue that the country differences show that there is no one universal policy intervention that easily explains adolescents' time-allocation behaviors.

3. The Young Lives data

I use the YL survey, a longitudinal survey that tracks two cohorts of adolescents in four low and middle-income countries: Ethiopia, India (states of Telangana and Andhra Pradesh), Peru and Vietnam. The survey tracks the adolescents across 15 years with five rounds of data. I use data for the younger cohort (YC) who were born in 2001/2 and aged approximately 1-year-old in Round 1, and five, eight, 12 and 15 years old in each consecutive round. There is a total initial sample of about 8000 YC adolescents and families are followed-up with if they remained within the country. The attrition rate between Round one and five is low for each YL country; 5.3 per cent for Ethiopia, 3.7 per cent for India, 8.2 per cent for Peru and 2.5 per cent for Vietnam. Approximately 2000 YC adolescents were randomly sampled by selecting 100 adolescents and households from each country's 20 sentinel sites/clusters. A sentinel site is a form of purposive sampling where the site or cluster is seen to represent a certain type of population,

Table 1. Illustrative national statistics in YL countries

Country	Agriculture as % of GDP	% of population below national poverty line	Primary NER (%)	Secondary NER (%)
Ethiopia	31	24	85	31
India	15	21	92	62
Peru	7	21	96	84
Vietnam	15	10	98	89

Notes: NER stands for net enrolment rate. Source for all statistics is World Bank (2018), except secondary NER in Vietnam. Secondary NER in Vietnam refers to lower secondary education (grades 6 to 9) in 2014, and upper secondary NER in Vietnam (grades 10–12) is 63.1 per cent in 2014 (OECD, 2017).

and is expected to show typical trends affecting the people of these areas. The older cohort (OC) were excluded because generalized self-esteem and self-efficacy scores were only administered at age 19 and 22, making the analysis of their time allocation complex because of transitions into adulthood and potential family formation. Although time use, agency, and pride scores are available for YC and OC at ages 12 and 15, I do not do a cross-cohort comparison because agency scores in Rounds two and three were not internally consistent or reliable, as reported in Yorke and Portela (2018).

The sentinel sites selected represented each region, district or province in each country. The sentinel sites in Ethiopia, India and Vietnam were semi-purposively sampled to represent each country's socio-economic and geographic diversity, with a pro-poor bias. Peru instead adopted a random sampling of sentinel sites. The districts were ranked according to factors such as infant mortality, housing, schooling, and infrastructure. Excluding the top 5 per cent, the districts were divided into equal population groups, ordered by a poverty index, and each district had a probability of being selected proportional to its population size.

The YL data are not nationally representative except for Peru. However, studies by Escobal and Flores (2008), Outes-Leon and Sanchez (2008), Nguyen (2008) and Kumra (2009) show that in comparison to larger representative samples such as the Demographic Health Surveys, the YL samples cover a broad range of characteristics and attributes of the population. The strength of the YL data lies in its rich longitudinal data which contain information about the adolescent and his/her household, and allows representative analysis of differences between groups (for example, by sex and ethnicity) and across the adolescent's life. The same modules for time use and measures of non-cognitive skills were administered in all four countries. Using four different countries allows me to examine common- trends or variations in this relationship in different settings.

3.1. YL countries background

Table 1 shows some national figures for each of the YL countries. While all four economies experienced high economic growth, poverty and income inequalities are still present. Nearly a quarter of the population in Ethiopia is below the poverty line, a fifth in India and Peru and a tenth in Vietnam. Agriculture is an important sector for all YL countries except Peru, which instead has mining and manufacturing as its largest economic sectors. The importance of agriculture is reflected in the YL data where most of the adolescents sampled live in rural areas in Ethiopia, India and Vietnam and primarily work on the family farm, while adolescents in Peru are mostly urban.

The official age for starting primary schooling is seven years old in Ethiopia and six in the other three countries. Compulsory education from primary school to the end of secondary school lasts for eight years in Ethiopia and India, and 10 years in Peru and Vietnam. Primary net enrolment rates (NER) – the percentage of students in the appropriate age group enrolled

Table 2. Average background characteristics of 15-year-olds in YL countries

	Ethiopia	India	Peru	Vietnam
Child characteristics				
Female	0.47	0.45	0.49	0.48
Age in months	180.99	180.01	179.21	182.34
Height for age at age 5	-1.43	-1.62	-1.52	-1.33
Mathematics IRT score age 12	415.39	465.25	508.46	580.93
Ethnicity				
Oromo	0.19			
Amhara	0.29			
Tigrrian	0.23			
Majority Kinh	0.00			0.87
Other ethnicity	0.29			0.13
Caste (for India only)				
Backward Caste		0.46		
Scheduled Caste		0.18		
Scheduled Tribe		0.15		
Other Caste		0.20		
Mother's main language is Spanish (for Peru only)			0.71	
Religion				
No religion	0.00	0.00	0.05	0.86
Christian	0.00	0.05	0.00	0.01
Muslim	0.17	0.07	0.00	0.00
Buddhist	0.00	0.01	0.00	0.07
Hindu	0.00	0.88	0.00	0.00
Catholic	0.01	0.00	0.81	0.00
Protestant	0.11	0.00	0.00	0.01
Orthodox	0.70	0.00	0.00	0.00
Evangelist	0.00	0.00	0.13	0.00
Mormon	0.00	0.00	0.00	0.00
Ancestor worship	0.00	0.00	0.00	0.04
Cao Dai	0.00	0.00	0.00	0.01
Other	0.01	0.00	0.00	0.00
Caregiver/parental characteristics				
Mother's age when child was age 1	27.47	23.62	26.78	26.77
Caregiver's education				
≤Incomplete primary education	0.79	0.79	0.36	0.36
Up to lower secondary	0.16	0.16	0.26	0.26
Up to upper secondary	0.00	0.00	0.24	0.24
Higher education	0.05	0.04	0.14	0.14
Household characteristics				
Child is oldest in household	0.22	0.41	0.39	0.39
Number of siblings	4.01	1.61	2.63	2.63
Both parents in household	0.80	0.91	0.86	0.86
Household size	5.82	4.79	5.26	5.26
Household in urban location	0.36	0.30	0.75	0.75
Wealth index	0.42	0.64	0.63	0.63
	1551	1756	1698	1697

Note: The wealth index is a measure constructed and publicly archived by YL which is a simple average of housing quality, consumer durables, and access to services.

in primary education related to the total population of children of that age group – are highest in Peru and Vietnam and lowest in Ethiopia. While all secondary NER is lower, the rank is still the same; lowest in Ethiopia, followed by India, Vietnam and Peru. While each country has ratified international policy conventions against the worst forms of child labor, the topic is still a high-profile issue, and estimates from ILO (2018) report that the highest estimates of child labor incidences are in these four continents: Africa, the Americas, Asia, and Oceania.

Table 2 describes the adolescents' background in each country. There is an even balance of girls and boys across all countries with similar ages. The majority caste in India is Backward Caste, and the majority ethnicity in Vietnam is Kinh. In Ethiopia, there is an even proportion of adolescents in three ethnic groups, Amhara (29 per cent), Omoro (19 per cent), and Tigrian (23 per cent). In Peru, 70 per cent of adolescents' mothers speak Spanish.

On average, mothers were 27 years old when the adolescent was one year old, except in India where the average mother is younger by four years. Family formation may be earlier for Indian women, which may have gendered consequences on how adolescents' time is allocated. Caregiver's education is much lower in Ethiopia and India than in Peru and Vietnam. In Ethiopia and India, about 80 per cent of caregivers did not complete primary education. In Vietnam, the majority of caregivers have completed education up to lower secondary (56 per cent), whilst in Peru about 26 per cent of caregivers completed up to lower secondary and 24 per cent completed up to upper secondary.²

Ethiopian adolescents have the most siblings on average, followed by Peru, India and Vietnam respectively. Ethiopian households are also the largest with an average of five to six people, compared to four to five people in the other three YL countries. While the majority of adolescents in each country have both parents in the household, this proportion is lower in Ethiopia and Peru (80 per cent and 86 per cent respectively). Most households live in rural areas except for Peruvian households which are primarily urban.

3.2. Measures of self-esteem and self-efficacy

I use two main measures of non-cognitive skills measured in the YL data, which are the generalized self-esteem and self-efficacy scores. The scores for each skill are made up of several Likert-type questions, ten questions for self-efficacy scores and eight questions for self-esteem scores, as detailed in Section 1 of the [Supplementary Material](#).³ The adolescent responds to one of the five responses in each question, ranging from 'strongly agree' to 'strongly disagree'. These same questions were administered in Rounds four and five, and across countries. A higher score implies greater generalized self-esteem or self-efficacy.

Self-esteem refers to an individual's judgement of their self-value and is measured using the Rosenberg self-esteem scale (Rosenberg, 1965). Self-efficacy is the measure of one's belief in his/her capabilities to produce expected results and to cope with adversity. Its scale was developed by Schwarzer and Jerusalem (1995). These indicators are distinct from each other, and time inputs may influence each skill differently. As noted by Bandura (1997), there is 'no fixed relationship between beliefs about one's capabilities and whether one likes or dislikes oneself' (p. 11).

The scale is only administered in Rounds four and five because it was designed for adolescents above the age of 12. Both these scores are consistently used in psychology and economic studies in developed countries and are found to be positively associated with future economic outcomes in high-income countries (Almlund et al., 2011; Heckman et al., 2006, 2021). Studies by Luszczynska and Gutiérrez-Doña (2005) and Scholz, Gutiérrez-Doña, Sud, and Schwarzer (2002) demonstrate that while country-differences exist, generalized self-efficacy is a consistent and universal construct tested across 25 and five countries respectively, with meaningful associations with other personality constructs like self-esteem.

Yorke and Portela (2018) demonstrate that both these generalized scales are consistently measured at age 12 in the four YL countries. At age 15, Section 2 of the [Supplementary Material](#) report that the average inter-item correlations fall between the recommended range of 0.15 and 0.50 (Clark & Watson, 1995), and the alpha scores of reliability are close to the threshold of 0.7. Figure 1 reports how these raw scores may change by age, and between high and low wealth terciles. For self-efficacy, there is an overall increase in scores between the ages 12 and 15, suggesting that skills accumulate across time. This validates the use of VA models which use

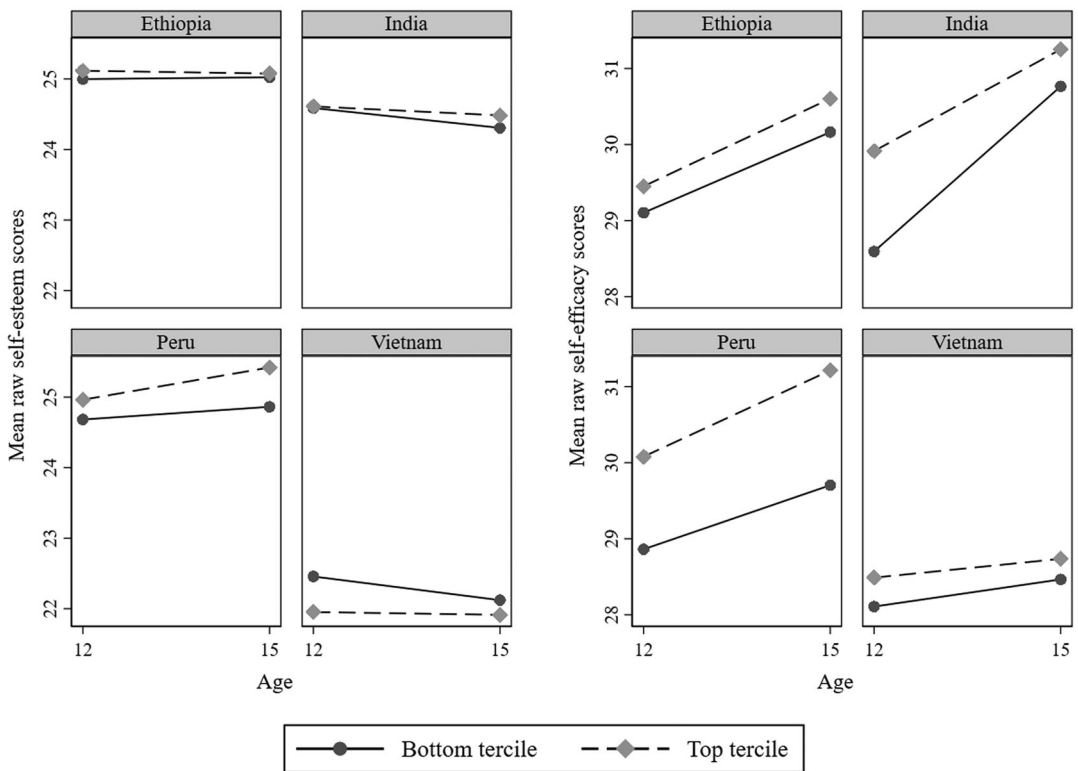


Figure 1. Wealth gradients of raw self-esteem and self-efficacy skills at age 12 and 15.

previous skills as a proxy of unobserved characteristics of adolescents' future skills. The average self-esteem scores however, remain somewhat similar across age groups with little wealth gaps, which may explain why we see greater significant associations in self-efficacy scores.

I standardize the generalized self-esteem and self-efficacy scores separately by country, with a mean zero and standard deviation of one to measure the changes in scores more intuitively. Table 2 in the [Supplementary Material](#) shows the distribution of the standardized scores in each country and age. While these questions were administered in the same way across all YL countries, I cannot account for different local norms or interpretations of the questions. Therefore, I compare common trends across the countries, not ranking their scores against each other.

3.3. Adolescents' time allocation on a typical day

To measure time allocation, the adolescents were first asked to think of the most recent typical week (excluding festivities), and then to think of a typical day. A typical day is defined as a weekday or a normal school day that excludes days of rests, such as holidays, festivals and the weekend. The adolescents are then provided 24 pebbles/beans which represent 24 h in a day, and asked to allocate them into eight cups/circles that illustrate eight different activities on a typical day in the past week. The adolescents are first required to allocate hours into sleep, and then asked to distribute the pebbles/beans among the remaining seven activities; leisure, time spent in school, time spent studying outside school, domestic chores, care work, work for the household, and paid work outside the household. Since sleep has little variation in the data, I exclude interpreting estimates of sleep in my analysis.

I group household tasks and paid work outside the household broadly as 'economic work', as both encompass similar types of tasks, and less than 10 per cent of adolescents perform paid

Table 3. Time use description in the Young Lives data

Activity	Description
Economic work	<i>Household tasks:</i> Work inside the household which generates income; this includes farming, cattle herding, shepherding, piecework or handicrafts done at home and other family businesses <i>Paid work outside the household:</i> Paid (remunerated) work or activities outside of the household or for someone not in the household including (if applicable) travel time to and from work
Domestic work	<i>Care work:</i> Taking care of other household members, such as younger siblings, elderly, or members with disabilities within the household <i>Household chores:</i> Work or task done to help at home, for example, fetching water, firewood, cleaning, cooking, washing, shopping and so on; excludes caring for others
At school	Time spent at school including time used to get from home to school and from school to home
Studying outside school	Time child spends studying at home and doing homework or attending classes or tutorials outside school class hours
Leisure	Time child spends playing or having fun, having meals, bathing and so on
Sleep	Includes when time child takes a nap

Notes: Definitions are taken from YL (Briones, 2018), complemented with further information on each activity from the YL fieldworker manuals. Domestic work refers to work done within the adolescents' household only.

work outside the household. I also group care work and household chores as 'domestic work'. I am unable to further break down leisure, as it is broadly categorized in the data. In my analysis, I use five activity categories as described in Table 3 below, observed at ages 12 and 15.

4. How YL adolescents spend their time on a typical day

Table 4 reports engagement in activities, while Table 5 reports the average hours spent in each activity including those who do not perform the activity (unconditionally), and if they perform the activity (conditionally). Adolescents typically combine some form of educational activity and domestic work. Division of labor by sex is evident; more girls participate and spend more time in domestic work while more boys engage in economic work. The gender gap is most pronounced in India. Section 3 of the [Supplementary Material](#) demonstrates leisure time falls while time in work increases between the ages five to 15. Time at school and for study rises slowly across age. At age 5, adolescents in Ethiopia spend the most unconditional hours in domestic work, and the least unconditional hours attending school compared to the other three countries. In the other three countries, the most prominent rise in unconditional hours in work, primarily domestic work, is seen at age 12.

The majority of adolescents engage in educational activities: 84 per cent to 96 per cent of adolescents attend school and 81 per cent to 96 per cent study outside school. The hours in school reflect the average country school lengths of 6–8 h a day in India, 6 h a day for Ethiopia and Peru, and 9 h in Vietnam including co-curricular activities (7 h excluding co-curricular activities). The average commuting time is approximately 1 h to and from school. In all YL countries except Peru, more girls engage in attending school as well as studying outside school, but with little difference in hours spent in these activities.

The typical work adolescents engage in all four countries is domestic work. However, those involved in economic work spend more hours in it compared to domestic work, primarily from helping in their family household tasks. Since I lack disaggregated information on types of work, qualitative YL research shows that most adolescent' economic work in rural areas is related to agriculture such as herding livestock, harvesting, and stone crushing (Morrow &

Table 4. Prevalence of adolescents engaged in activity, age 15

Percentage of children in activity (%)	Ethiopia			India			Peru			Vietnam			
	Total	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Total	Girls	Boys	Diff
In school	93.6	95.5	91.9	90.1	88.5	91.5	95.6	96.3	95.0	83.5	87.7	79.6	-8.1***
Studying outside school	90.5	93.2	88.1	87.7	87.8	87.6	95.5	96.3	94.8	80.7	86.4	75.4	-10.9***
Any form of work	97.6	99.2	96.2	77.7	81.2	74.8	89.0	89.6	88.5	90.1	91.4	89.0	-2.3
Domestic work	91.3	98.5	84.8	76.4	80.7	72.9	87.2	88.7	85.8	86.4	88.9	84.0	-4.9***
Economic work	48.7	33.6	62.5	12.9	8.6	16.4	18.2	15.5	20.8	35.7	31.4	39.7	8.3***
Play/leisure	98.5	98.5	98.4	99.5	99.7	99.4	99.8	99.8	99.8	100.0	100.0	100.0	0.0
Sleep	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.0
Observations	1551	736	815	1756	798	958	1698	839	859	1695	821	874	

Note: Domestic work includes household chores and care work. Economic work includes work for pay outside the household and household tasks. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Table 5. Unconditional and conditional hours in activities, age 15

	Ethiopia						India								
	Total	Min	Max	95% CI	Gender gap (boys-girls)	Total	Min	Max	95% CI	Gender gap (boys-girls)	Total	Min	Max	95% CI	Gender gap (boys-girls)
Unconditional average hours spent in activity (including those not performing activities)															
In school*	5.5	0.0	11.0	[5.3, 5.5]	-0.3***	8.0	0.0	14.0	[7.9, 8.1]	0.3**	8.0	0.0	14.0	[7.9, 8.1]	0.3**
Studying outside school	1.9	0.0	8.0	[1.9, 2.0]	-0.1**	2.1	0.0	8.0	[2.1, 2.2]	-0.1**	2.1	0.0	8.0	[2.1, 2.2]	-0.1**
Any form of work	4.5	0.0	16.0	[4.4, 4.6]	0.07	2.1	0.0	17.0	[2.2, 2.3]	-0.4***	2.1	0.0	17.0	[2.2, 2.3]	-0.4***
Domestic work	2.7	0.0	13.0	[2.6, 2.8]	-1.7***	1.3	0.0	10.0	[1.9, 2.2]	-0.5***	1.3	0.0	10.0	[1.9, 2.2]	-0.5***
Economic work	1.8	0.0	15.0	[1.6, 1.9]	1.7***	0.7	0.0	13.0	[0.6, 0.8]	0.1	0.7	0.0	13.0	[0.6, 0.8]	0.1
Play/leisure	3.3	0.0	14.0	[3.3, 3.4]	0.2**	3.5	0.0	15.0	[3.5, 3.6]	0.1	3.5	0.0	15.0	[3.5, 3.6]	0.1
Sleep	8.8	5.0	14.0	[8.8, 8.9]	0.1**	8.3	5.0	12.0	[8.2, 8.3]	0.1**	8.3	5.0	12.0	[8.2, 8.3]	0.1**
Conditional average hours spent in activity (if activity performed)															
In school*	5.8	2.0	11.0	[5.8, 5.9]	-0.13	8.9	5.0	14.0	[8.8, 8.9]	0.0	8.9	5.0	14.0	[8.8, 8.9]	0.0
Commute (to and from school)	1.1	1.0	4.0	[1.1, 1.1]	0.00	1.1	1.0	8.0	[1.1, 1.2]	0.0	1.1	1.0	8.0	[1.1, 1.2]	0.0
Studying outside school	2.1	1.0	8.0	[2.1, 2.2]	0.01	2.5	1.0	8.0	[2.4, 2.5]	-0.1**	2.5	1.0	8.0	[2.4, 2.5]	-0.1**
Any form of work	4.6	1.0	16.0	[4.5, 4.7]	0.25	2.6	1.0	17.0	[2.5, 2.8]	-0.3	2.6	1.0	17.0	[2.5, 2.8]	-0.3
Domestic work	3.0	1.0	13.0	[2.9, 3.1]	-1.39	1.7	1.0	10.0	[1.7, 1.8]	-0.5***	1.7	1.0	10.0	[1.7, 1.8]	-0.5***
Economic work	3.6	1.0	15.0	[3.4, 3.8]	1.56	5.6	1.0	13.0	[5.1, 6.1]	-2.6***	5.6	1.0	13.0	[5.1, 6.1]	-2.6***
Play/leisure	3.4	1.0	14.0	[3.3, 3.5]	0.23	3.5	1.0	15.0	[3.5, 3.6]	0.1	3.5	1.0	15.0	[3.5, 3.6]	0.1
Sleep	8.8	5.0	14.0	[8.8, 8.9]	0.14	8.3	5.0	12.0	[8.2, 8.3]	0.1**	8.3	5.0	12.0	[8.2, 8.3]	0.1**
Total observations				1551					1756						
Peru															
Vietnam															
Unconditional average hours spent in activity (including those not performing activities)															
In school*	6.9	0.0	12.0	[6.8, 7.0]	-0.2*	5.2	0.0	11.0	[5.1, 5.4]	-0.5***	5.2	0.0	11.0	[5.1, 5.4]	-0.5***
Studying outside school	2.1	0.0	9.0	[2.0, 2.1]	-0.2***	2.6	0.0	10.0	[2.6, 2.7]	-0.7***	2.6	0.0	10.0	[2.6, 2.7]	-0.7***
Any form of work	2.5	0.0	16.0	[2.4, 2.6]	0.0	3.0	0.0	16.0	[2.8, 3.1]	-0.02	3.0	0.0	16.0	[2.8, 3.1]	-0.02
Domestic work	2.0	0.0	16.0	[1.9, 2.1]	-0.3***	1.7	0.0	11.0	[1.6, 1.8]	-0.3***	1.7	0.0	11.0	[1.6, 1.8]	-0.3***
Economic work	0.5	0.0	14.0	[0.4, 0.6]	0.3***	1.3	0.0	15.0	[1.1, 1.4]	0.3***	1.3	0.0	15.0	[1.1, 1.4]	0.3***
Play/leisure	3.4	0.0	12.0	[3.4, 3.5]	0.2**	4.6	1.0	16.0	[4.5, 4.8]	0.9***	4.6	1.0	16.0	[4.5, 4.8]	0.9***

(continued)

Table 5. (Continued)

	Peru					Vietnam				
	Total	Min	Max	95% CI	Gender gap (boys-girls)	Total	Min	Max	95% CI	Gender gap (boys-girls)
Sleep	8.7	4.0	14.0	[8.6, 8.7]	0.1**	8.5	4.0	18.0	[8.4, 8.5]	0.2***
Conditional average hours spent in activity (if activity performed)										
In school*	7.2	2.0	12.0	[7.2, 7.3]	-0.1	6.3	0.0	11.0	[6.2, 6.3]	0.0
Commute (to and from school)	1.2	1.0	8.0	[1.1, 1.2]	0.0	1.1	1.0	4.0	[1.0, 1.1]	0.0
Studying outside school	2.2	1.0	9.0	[2.1, 2.2]	-0.2***	3.3	0.0	10.0	[3.2, 3.4]	-0.4
Any form of work	2.8	1.0	16.0	[2.7, 2.9]	0.0	3.3	0.0	16.0	[3.1, 3.4]	0.1
Domestic work	2.3	1.0	16.0	[2.2, 2.4]	-0.3***	2.0	0.0	12.0	[1.9, 2.0]	-0.3
Economic work	2.9	1.0	14.0	[2.7, 3.2]	0.7**	3.5	0.0	15.0	[3.3, 3.8]	0.1
Play/leisure	3.5	1.0	12.0	[3.4, 3.5]	0.2**	4.6	1.0	16.0	[4.5, 4.8]	0.8
Sleep	8.7	4.0	14.0	[8.6, 8.7]	0.1**	8.5	4.0	18.0	[8.4, 8.5]	0.2
Total observations										
										1695
										1698

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

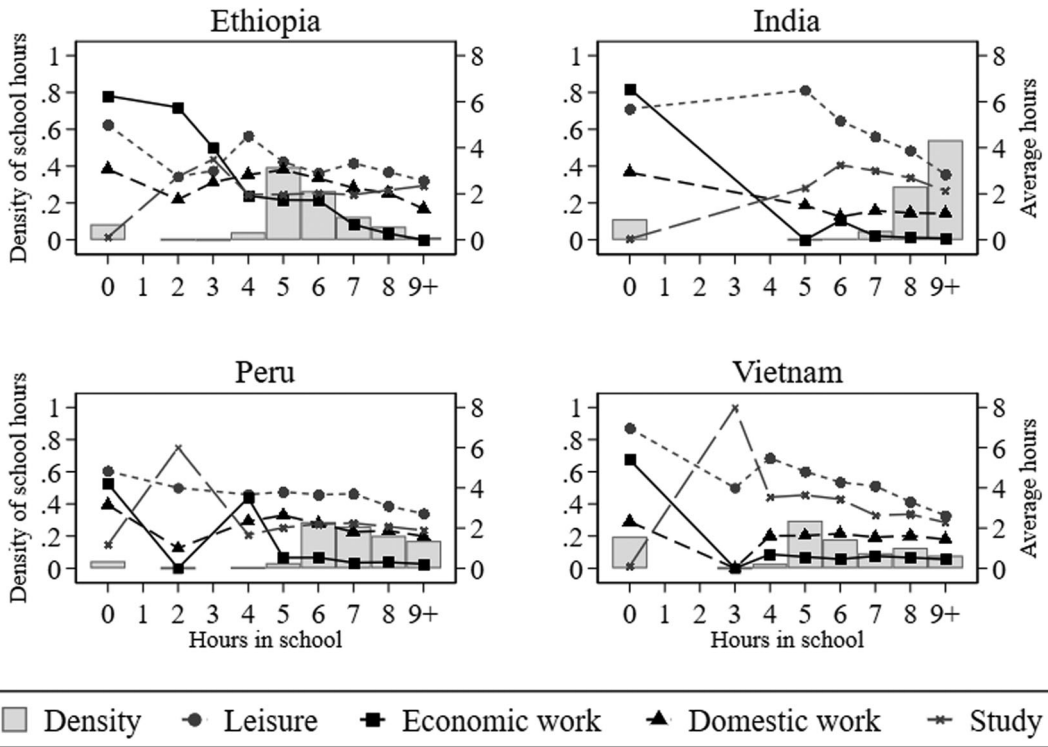


Figure 2. Average hours in play and work against average hours in school activities.

Boyden, 2018). In Peru, Cussianovich and Rojas (2014) describe urban adolescents' work as mirroring their parents' economic activity, usually in informal trade such as selling flowers or food on the street, or as a vendor.

Ethiopia has the highest percentage of adolescents involved in domestic or economic work, nearly double that to the percentage of adolescents in India and Peru. Of those involved in domestic work, Ethiopian adolescents also spend the most hours on it (4.6h on average). Ethiopian adolescents' time is more evenly spread between each activity, implying lower elasticities of substitution. In the other three countries, adolescents are mainly engaging in domestic work and educational activities. Adolescents in India engage the least in economic work (13 per cent), but those who do spend an average of 5.6 h in this work, the highest of all four countries. This suggests a large trade-off between economic work and school. Morrow and Boyden (2018) describe how in times of difficulty, boys in India were expected to work to contribute to family finances.

4.1. Trade-offs between activities on a typical day

With only 24 h in a day, investing more hours in one activity means less for another. Figures 2-4 plot the average hours spent in an activity on the right y-axis against hourly increases of a base activity across the x-axis. Densities of the baseline activity are reported on the left y-axis. For example, Figure 2 uses school attendance as the baseline category. The top left chart shows that adolescents in Ethiopia who mostly spend 5 h in school (base category) spend on average 3 h in domestic work and leisure and 2 h in economic work.

Changing the counterfactual category in these figures show us different snapshots of how adolescents' time is divided. Figure 2 shows us the difference between adolescents who attend school and those who do not, with some variation in the average hours of school attendance.

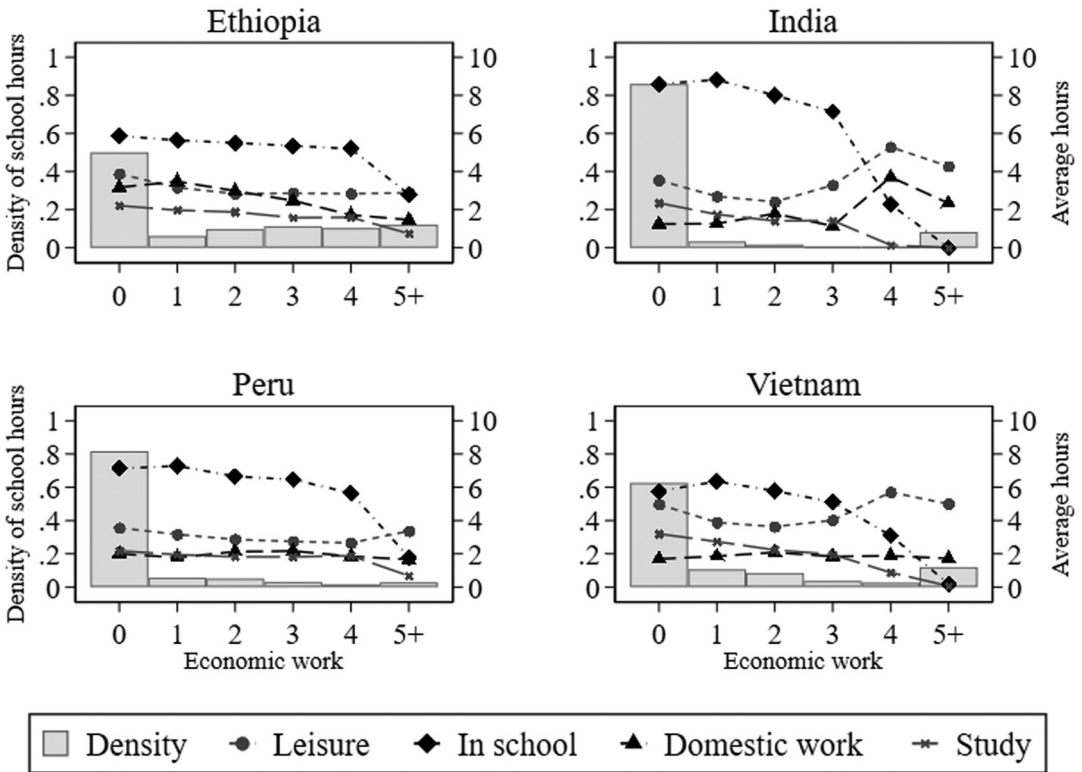


Figure 3. Average hours spent in activities conditional on economic work as baseline activity.

At zero school attendance, adolescents in all four countries spend on average between four and 7 h in economic work and leisure respectively, and about half that in domestic work. When adolescents spend an average number of hours in school (the highest density), less time is spent in leisure. Additionally, in all countries except Ethiopia, economic work time falls to near zero.

However, time devoted to domestic chores remains similar at 2–3 h. Adolescents who report spending more than 9 h in school do not participate in economic work, but still spend an average of 1–2 h in domestic work, indicating that domestic work is a persistent work activity even among adolescents with greater hours of educational activities.

Figures 3 and 4 meanwhile, show how adolescents divide their time conditioned on time spent in economic or domestic work. Although few in number, adolescents who do more than 5 h of domestic and/or economic work show a rise in leisure time in India and Vietnam, but not in Ethiopia and Peru. On the one hand, adolescents engaging in economic work may prioritize leisure, taking time away from education (for example, India). On the other hand, leisure may be sacrificed, to maintain similar levels of education and work (for example, Ethiopia). How activities are divided in a day are important and differ according to the activity substituted.

Elasticities of substitution between work and educational activities appear to be largest in India. For example, in Figure 4 for India, adolescents who spend 3 h in domestic work compared to 1 h in domestic work spend about 2 h less in school, and 0.5 h less in studying outside school. Compare this to Ethiopia where the same change show adolescents spending 0.3 less h in school and nearly no difference in study time.

5. Empirical framework to model self-esteem and self-efficacy formation

I use extended VA models to evaluate how adolescents' time spent in an additional hour of an activity, compared to a counterfactual activity, is associated to their self-esteem and self-

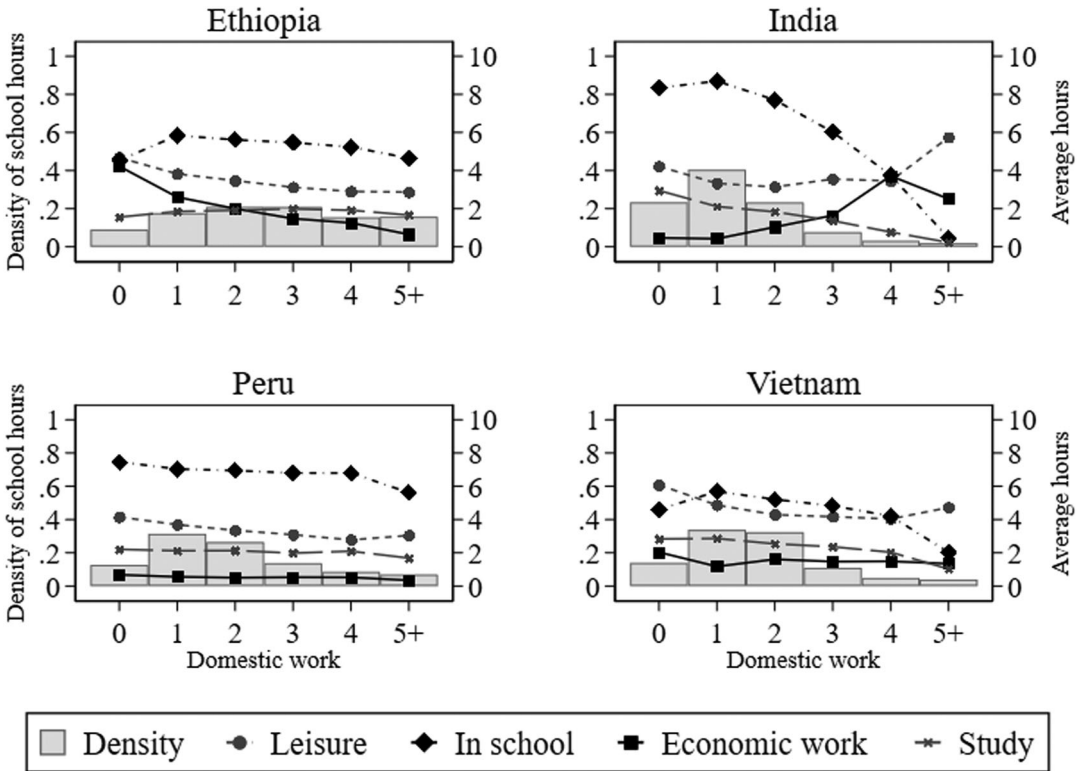


Figure 4. Average hours spent in activities conditional on domestic work as baseline activity.

efficacy. VA models are widely used in the literature on adolescent skills formation (for example, Cunha & Heckman (2008); Del Boca, Monfardini, & Nicoletti, 2017; Fiorini & Keane, 2014; Todd & Wolpin, 2007) to reflect decisions made in the adolescents' life up until the observed point, and hinge on the identifying assumption that lagged skills capture the contribution of all previous observed, unobservable inputs, and adolescent's ability. Lagged skills are assumed to be sufficient proxies if the effects of all past time-varying inputs (observed, unobserved and ability) on adolescents' current self-esteem or self-efficacy decline at a constant rate across time, from the time the input was applied. For example, farm work at age eight has a larger effect on skills at age eight than at age 15. To relax this assumption, I include time inputs at age 12, instead of assuming a constant rate of decline between ages 12 and 15.

For each adolescent in each household in each country, I estimate:

$$S_{15} = \alpha + \gamma S_{12} + \delta M_{12} + \beta T_{15} + \pi T_{12} + \sigma X_{15} + \rho C_{15} + \epsilon, \quad (1)$$

where S_{15} is the adolescent's measured skill score at age 15, that is, generalized self-esteem and self-efficacy scores. S_{12} is the adolescent's respective lagged skill score, and M_{12} is the lagged cognitive (mathematics) score. T_{15} and T_{12} are the vectors of hours spent in the five different activities described in Table 3 at ages 15 and 12 respectively. My coefficient of interest is β which measures the effect of an additional hour spent in an activity of interest compared to a counterfactual activity on the adolescent's skill at age 15. To examine the shifts between different activities, I re-estimate the same model but use different counterfactual activities and re-examine the β coefficient estimates.

X_{15} are measures of observed adolescent, caregiver and socioeconomic contemporaneous background characteristics. Adolescent characteristics include the adolescent's age, sex, religion, height-for-age z-score at age five, and ethnicity/caste. Caregiver's characteristics are education

level which proxies for socioeconomic status, and pride and agency scores when the adolescent was eight years old which provides a proxy for a caregiver's influence on the adolescent's skills through upbringing. Socioeconomic characteristics are household size, whether the adolescent is the oldest sibling, number of siblings, whether both parents live in the same household, the urban/rural location of the household, mother's age when the adolescent was born, and whether the household is in the bottom wealth tercile. Since YL data adopts semi-random sampling of sentinel sites, adolescents within sentinel sites are likely to have similar access to local labor markets, education and health infrastructure. Therefore, I include country-specific cluster fixed effects at age 15, C_{15} , and cluster all standard errors at the sentinel site level. I also estimate model (1) separately for girls and boys to examine differences by sex.

The model relies on assumptions for causal interpretation of the estimates, potentially challenged by two sources of endogeneity. First, the presence of unobservables affects both the adolescents' skill formation and parental investments. For example, the adolescent's unobserved confidence may be positively correlated with the caregiver's perceived returns from economic work and the adolescent's self-esteem or self-efficacy. If caregivers of confident adolescents prefer them to work in the family business rather than attending school, then an ordinary least squares (OLS) estimation of my baseline would overestimate the actual impact from an additional hour in economic work, and vice versa if caregivers favor school attendance. Depending on the correlation between the unobservables, time allocation and skill scores, OLS estimates of β could be biased upwards or downwards. A second source of endogeneity is through reverse causality, that is, the caregiver may observe the adolescent's prior skills and consequently adjust the adolescent's time spent in work, school or leisure, T_{15} , again leading to inconsistent estimates using OLS.

Studies such as by Caetano et al. (2019) demonstrate that using a rich set of controls, lagged scores and the full set of adolescents' activities absorb endogeneity from omitted variables and measurement error in VA models. However, it still may not account fully for omitted variable bias and reverse causality. There is another possibility that instead of declining across age, the effects of unobservable inputs and latent ability are time-invariant. To test this, I run fixed effects estimations that difference the models across time to remove time-invariant unobservables, but limits the estimation from examining time-variant determinants.

6. Results

6.1. Main specification

Figures 5 and 6 show how adolescents' time spent relative to a baseline activity is associated with their self-esteem and self-efficacy. In each figure, there are a total of six activities, and one is used as a baseline activity. Each figure has a different baseline activity; attending school in Figure 5, and leisure in Figure 6. Omitting different baseline activities show how each of the five activities are associated with adolescents' skills relative to the omitted activity, but uses the same model.

There are two plots in each figure, one for each indicator. The coefficient estimates are interpreted as the association from an additional hour spent in the specified activity on the vertical axis, relative to the baseline activity. The horizontal axis is the scale of the coefficient estimate in standard deviations away from zero. Section 4 in the [Supplementary Material](#) shows the corresponding full regression estimates, demonstrating that estimates with or without lagged time inputs (age 12) are largely similar, and Section 5 shows that the narratives are similar after multiple hypotheses testing. The coefficient plot using studying outside school as an omitted category is not shown here as estimates are less precise.⁴

Figure 5 shows that an additional hour of domestic work instead of attending school reduces adolescents' self-efficacy in all countries except Peru, all else constant. The associations are also statistically significant for self-esteem, but only in Ethiopia. Economic work is also negatively associated with adolescents' self-esteem and self-efficacy in all countries, but are statistically

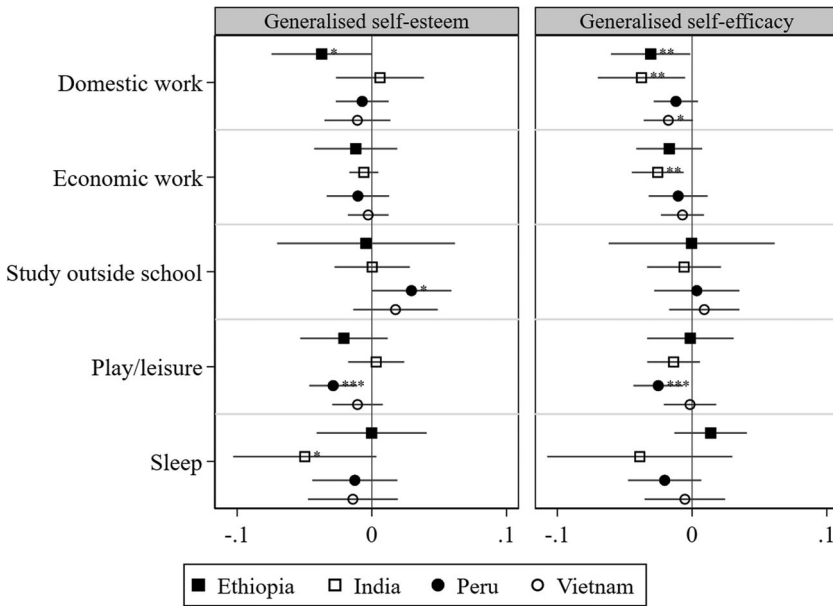


Figure 5. Coefficient estimates of time use on self-esteem and self-efficacy age 15, attending school omitted.

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

insignificant except for self-efficacy in India. In India, both domestic and economic work are negatively associated with Indian adolescents' self-efficacy (-0.04 and -0.03 standard deviations respectively), significant at the 5 per cent level. The average change of Indian adolescents' self-efficacy between ages 12 and 15 is 0.45 standard deviations, so a coefficient estimate of -0.04 standard deviations from domestic work is equivalent to 8.2 per cent of a decrease of

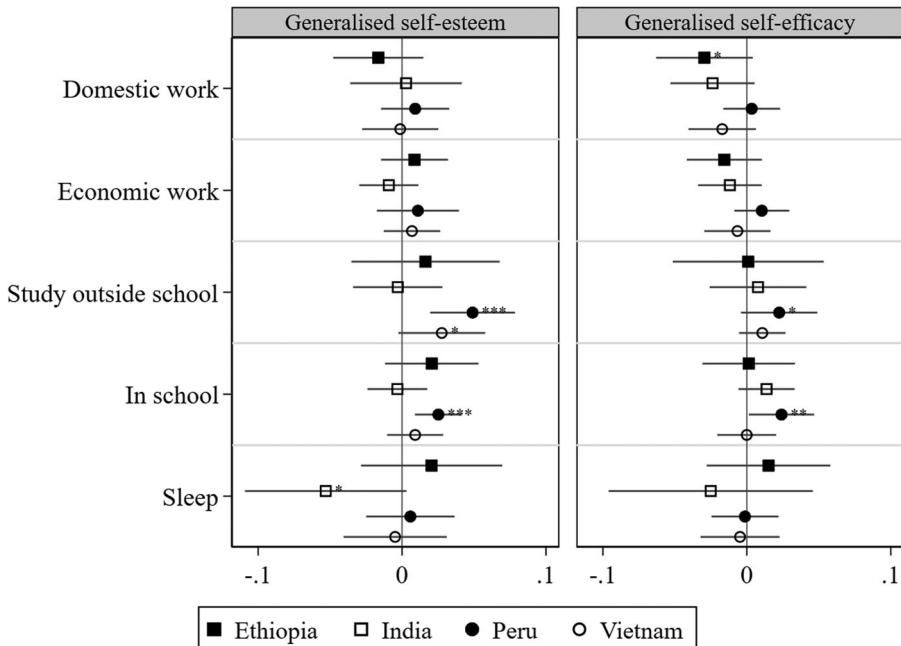


Figure 6. Coefficient estimates of time use on self-esteem and self-efficacy age 15, leisure omitted.

Note: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Indian adolescents' self-efficacy between ages 12 and 15. These estimates confirm my descriptive analysis that educational activities and economic work are largely substitutes in India.

Figure 6 shows that when omitting leisure instead, leisure is neither more nor less productive than work activities in any of the countries. Recall that leisure measured in the YL data is a broad set of activities including playing, personal hygiene and eating. This measure could be capturing 'unstructured' leisure time or 'idle' time which according to Hsin and Felfe (2014) is unproductive for adolescents' skills development. Dedicated, structured play time could instead be captured by time spent in other activities such as domestic work and/or studying outside school. Controlling for the type of school shows that estimates remain robust (see Section 7 in [Supplementary Material](#)). In Peru, there is a consistent negative association on self-esteem and self-efficacy from an hour of leisure instead of school. This may be due to the *Jornada Escolar Completa* (JEC) program in Peru, in 2015, which extended the school day by 2 h.

In Peru, attending school or studying outside school that reduces leisure time improves both self-esteem and self-efficacy. These estimates for the other three countries are close to zero or weakly significant. For Peru, regardless of the omitted activity, domestic or economic work produces near zero estimates and are insignificant. There may be two empirical reasons for this. One, the sample of adolescents in Peru are primarily urban while the other three are more rural. Adolescents in urban settings may have access to better quality education or work that is better balanced with attending school. For example, working in a family shop is less labor intensive than a family farm. Second, the Peruvian sample is the only nationally representative sample compared to the other three countries.

The fixed effects estimations in Section 8 of the [Supplementary Material](#) which assume that the effects of unobservables are time-invariant show a similar narrative whereby domestic work and leisure are unproductive inputs, and attending school is productive. The exceptions are to some self-efficacy estimates. Economic work which reduces school time is negatively associated with Peruvian adolescents' self-efficacy while, studying outside school instead of school are unproductive for self-efficacy in Ethiopia and India. Attending school instead of leisure meanwhile, raises self-efficacy but reduces self-esteem in India.

6.2. *Linearity in the relationship*

The detrimental associations of work or leisure on self-esteem or self-efficacy may be non-linear, that is, more detrimental with high hours of work or leisure due to excessive stress or idle time. To examine these non-linearities, I re-run my baseline model with the squared hours in leisure, domestic work, and economic work. Firstly, not reported here, I do not find any statistically significant increases in detrimental associations between leisure and adolescents' self-esteem nor self-efficacy in all countries, suggesting a linear relationship.

Secondly, Section 9 in the [Supplementary Material](#) reports the estimates including squared terms for domestic and economic work. There are no statistically significant non-linear associations between work hours and self-esteem or self-efficacy, except for Ethiopia and Vietnam. Even if statistically significant, magnitudes of the squared terms are close to zero. Using Vietnam as an example, an additional hour of work from zero hours of economic work instead of attending school reduces generalized self-efficacy by 0.05 standard deviations, holding all else constant. Each additional hour of economic work increases the slope of this association by 0.005 standard deviations up to a turning point (about 5–6 h). However, from 2 h of work, confidence intervals become very large, and non-linearities are imprecisely estimated. In sum, estimates are linear, or non-linear associations are small.

6.3. *Heterogeneity by sex and location*

Tables 6 and 7 show differences in work relationships to skills by sex. Much like the baseline estimates, self-efficacy is most negatively associated with domestic work. Table 6 shows that

Table 6. Estimates for self-efficacy by sex

	Ethiopia		India		Peru		Vietnam	
	Male	Female	Male	Female	Male	Female	Male	Female
Leisure omitted								
Domestic work	-0.034 (0.021)	-0.022 (0.024)	-0.007 (0.021)	-0.027 (0.021)	0.014 (0.014)	-0.002 (0.014)	-0.007 (0.019)	-0.022 (0.014)
Economic work	-0.012 (0.015)	-0.034 (0.021)	-0.001 (0.013)	-0.011 (0.012)	0.010 (0.011)	0.004 (0.019)	-0.002 (0.014)	-0.003 (0.015)
Studying outside school	0.007 (0.031)	0.000 (0.030)	0.031 (0.025)	-0.002 (0.015)	0.011 (0.019)	0.044* (0.022)	0.015 (0.011)	0.005 (0.011)
Attending school	0.000 (0.018)	0.002 (0.023)	0.021* (0.012)	0.014 (0.012)	0.028** (0.010)	0.034* (0.017)	-0.005 (0.014)	0.014 (0.010)
Sleep	0.042* (0.021)	-0.011 (0.039)	-0.015 (0.036)	-0.029 (0.035)	-0.004 (0.019)	0.007 (0.021)	0.023 (0.017)	-0.037** (0.016)
Lagged self-efficacy	0.043 (0.042)	0.137*** (0.043)	0.148*** (0.033)	0.092** (0.038)	0.168*** (0.050)	0.251*** (0.035)	0.155*** (0.052)	0.189*** (0.040)
R-squared	0.179	0.218	0.176	0.142	0.118	0.173	0.118	0.162
Domestic = economic work	0.250	0.570	0.730	0.463	0.823	0.799	0.771	0.135
Study = leisure	0.855	0.954	0.648	0.422	0.445	0.725	0.305	0.573
Domestic work = leisure	0.165	0.317	0.250	0.050	0.268	0.021	0.936	0.012
Economic work = leisure	0.448	0.099	0.082	0.002	0.148	0.221	0.706	0.109
School omitted								
Domestic work	-0.034 (0.023)	-0.024 (0.023)	-0.028 (0.024)	-0.041* (0.019)	-0.001 (0.012)	-0.025** (0.012)	-0.001 (0.016)	-0.035** (0.012)
Economic work	-0.012 (0.015)	-0.036* (0.021)	-0.022* (0.012)	-0.025*** (0.007)	-0.013 (0.011)	-0.021 (0.022)	0.003 (0.007)	-0.017 (0.010)
Studying outside school	0.007 (0.040)	-0.002 (0.028)	0.010 (0.021)	-0.016 (0.019)	-0.006 (0.018)	0.017 (0.026)	0.021 (0.018)	-0.008 (0.014)
Leisure	-0.000 (0.018)	-0.002 (0.023)	-0.021* (0.012)	-0.014 (0.012)	-0.022* (0.012)	-0.038** (0.016)	0.006 (0.014)	-0.014 (0.009)
Sleep	0.042* (0.021)	-0.013 (0.033)	-0.036 (0.037)	-0.043 (0.036)	-0.023 (0.020)	-0.022 (0.022)	0.028 (0.017)	-0.050** (0.018)
Lagged self- efficacy	0.043 (0.042)	0.137*** (0.043)	0.148*** (0.033)	0.092** (0.038)	0.173*** (0.050)	0.256*** (0.033)	0.156*** (0.052)	0.189*** (0.039)

(continued)

Table 6. (Continued)

	Ethiopia		India		Peru		Vietnam	
	Male	Female	Male	Female	Male	Female	Male	Female
R-squared	0.179	0.218	0.176	0.142	0.116	0.169	0.119	0.162
Domestic = economic work	0.250	0.570	0.730	0.463	0.488	0.864	0.779	0.156
Study = leisure	0.813	0.989	0.228	0.898	0.470	0.0208	0.168	0.577
Domestic work = leisure	0.128	0.371	0.739	0.226	0.260	0.522	0.724	0.159
Economic work = leisure	0.432	0.117	0.933	0.376	0.551	0.424	0.840	0.836
Observations	815	736	958	798	859	839	874	821

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimates control for adolescent, caregiver and household characteristics, lagged time allocation, as well as lagged mathematics and self-efficacy scores. Standard errors are reported in parentheses, clustered at each country's cluster level. p -Values for equality of coefficients are reported.

Table 7. Estimates for self-esteem by sex

	Ethiopia		India		Peru		Vietnam	
	Male	Female	Male	Female	Male	Female	Male	Female
Leisure omitted								
Domestic work	-0.019 (0.015)	-0.012 (0.022)	0.026 (0.027)	-0.020 (0.021)	0.013 (0.018)	0.009 (0.014)	0.001 (0.016)	0.000 (0.015)
Economic work	0.017 (0.013)	-0.014 (0.018)	0.013 (0.016)	-0.020 (0.014)	0.011 (0.019)	0.010 (0.019)	0.004 (0.010)	0.015 (0.012)
Studying outside school	0.012 (0.031)	0.009 (0.030)	0.029 (0.025)	-0.026 (0.023)	0.034 (0.023)	0.071*** (0.022)	0.034** (0.014)	0.027 (0.021)
Attending school	0.038** (0.017)	-0.005 (0.023)	0.016 (0.015)	-0.014 (0.012)	0.020 (0.012)	0.040*** (0.012)	0.004 (0.011)	0.022 (0.013)
Sleep	0.031 (0.024)	0.007 (0.046)	-0.045* (0.026)	-0.049 (0.036)	-0.010 (0.022)	0.029 (0.022)	0.012 (0.017)	-0.028 (0.026)
Lagged self-esteem	0.124*** (0.033)	-0.001 (0.029)	0.063** (0.029)	0.056* (0.030)	0.153*** (0.038)	0.216*** (0.029)	0.197*** (0.045)	0.191*** (0.034)
R-squared	0.203	0.233	0.104	0.106	0.114	0.121	0.140	0.127
Domestic = economic work	0.003	0.901	0.626	0.977	0.920	0.952	0.874	0.346
Study = leisure	0.521	0.636	0.520	0.617	0.538	0.172	0.133	0.829
Domestic work = leisure	0.009	0.755	0.673	0.763	0.557	0.0577	0.850	0.240
Economic work = leisure	0.236	0.629	0.704	0.578	0.499	0.154	0.958	0.558
School omitted								
Domestic work	-0.057*** (0.020)	-0.007 (0.023)	0.010 (0.024)	-0.006 (0.020)	0.001 (0.015)	-0.016 (0.013)	-0.001 (0.015)	-0.025 (0.017)
Economic work	-0.021 (0.017)	-0.009 (0.019)	-0.003 (0.008)	-0.006 (0.010)	-0.007 (0.013)	-0.016 (0.018)	0.001 (0.008)	-0.009 (0.012)
Studying outside school	-0.026 (0.040)	0.014 (0.030)	0.013 (0.020)	-0.012 (0.024)	0.020 (0.021)	0.044* (0.023)	0.034* (0.018)	-0.001 (0.019)
Leisure	-0.038** (0.017)	0.005 (0.023)	-0.016 (0.015)	0.014 (0.012)	-0.017 (0.013)	-0.038*** (0.012)	-0.001 (0.011)	-0.030* (0.015)
Sleep	-0.007 (0.025)	0.012 (0.034)	-0.060** (0.027)	-0.035 (0.037)	-0.025 (0.020)	0.002 (0.022)	0.009 (0.016)	-0.052* (0.025)
Lagged self-esteem	0.124*** (0.033)	-0.001 (0.029)	0.063** (0.029)	0.056* (0.030)	0.153*** (0.037)	0.217*** (0.030)	0.198*** (0.045)	0.191*** (0.033)

(continued)

Table 7. (Continued)

	Ethiopia		India		Peru		Vietnam	
	Male	Female	Male	Female	Male	Female	Male	Female
R-squared	0.203	0.233	0.104	0.106	0.113	0.121	0.140	0.129
Domestic = economic work	0.00280	0.901	0.626	0.977	0.669	0.995	0.893	0.313
Study = leisure	0.706	0.754	0.263	0.280	0.160	0.00134	0.0187	0.179
Domestic work = leisure	0.226	0.590	0.334	0.345	0.359	0.174	0.974	0.739
Economic work = leisure	0.217	0.451	0.410	0.165	0.582	0.249	0.882	0.122
Observations	815	736	958	798	859	839	874	821

Notes: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. All estimates control for adolescent, caregiver and household characteristics, lagged time allocation, as well as lagged mathematics and self-esteem scores. Standard errors are reported in parentheses, clustered at each country's cluster level. p -Values for equality of coefficients are reported.

domestic work harms girls' self-efficacy more than boys in all countries. The estimates are significant only in India and Vietnam, but magnitudes are much larger and more negative for girls in all countries. This is similarly seen for economic work. While the coefficient sizes seem larger for domestic work compared to economic work, an F-test cannot reject the null that the coefficient estimates between these types of work are different. When leisure is omitted, there is little evidence of sex differences.

Leisure time that reduces school time reduces girls' self-esteem more than for boys in Peru and Vietnam, but the opposite is true for boys in Ethiopia. Boys in Ethiopia who do an additional hour of domestic work instead of attending school have significantly lower self-esteem than girls, and this estimate is significantly different to the magnitude of economic work. When leisure is omitted, the significant associations of educational activities on Peruvian adolescents' self-esteem are mainly driven by girls.

Samples are primarily rural except for Peru, but work and education trade-offs may be larger in rural areas because of types of work and distance to schools. Section 10 of the [Supplementary Material](#) reports estimates by urban-rural locality. The estimates show little variation in the four countries except India, where the detrimental associations of domestic or economic work are primarily seen in rural areas for self-efficacy, not for self-esteem. Estimates for Vietnam suggest that negative associations of domestic work are driven by urban areas but is weakly significant at the 10 per cent level.

7. Discussion

In combination with findings by Keane et al. (2020), I show that domestic and economic work in the YL countries are detrimental for both adolescents' cognitive and non-cognitive skills only if it crowds out school/study time rather than leisure. This expands on Borga (2019) who previously found that work activities (paid or unpaid) are associated with a reduction in cognitive and non-cognitive achievements, which do not uncover how the results differ according to whether an additional hour of work come at the expense of fewer hours in school compared to fewer hours in leisure. In addition to both these studies, I find that attending school or studying at the expense of leisure are only productive for adolescents' self-efficacy and self-esteem in Peru, not in the other three YL countries, which may be explained by Peru's sample (that is, nationally representative and urban).

My findings are mostly relevant for self-efficacy, suggesting that the influences of activities are different for self-efficacy and self-esteem. Since doing work and attending school are more task achievement-based time inputs, these activities may be more strongly associated to self-efficacy compared to self-esteem which are more affective. In addition, Chen et al. (2004) argue that self-efficacy is more malleable compared to self-esteem, which may explain why I find its sensitivity to time inputs at age 15.

I also find that domestic work harms girls' self-efficacy more than boys, in contrast to Borga (2019) who does not find gendered differences. This difference in finding is likely because I use the YL younger cohort, where adolescents do less paid work, but hides the prevalence of domestic work which burdens girls more. My findings highlight gendered inequalities of time use if unpaid domestic work is not considered a form of work for adolescents.

8. Conclusion

Work in developing countries may be harmful to youth skills development, but it depends on the country studied, the type of work, and the substitution between activities. This provides important context in analyzing child labor, which is of a sensitive nature in policy and the media. Policies that aim to reduce adolescents' time in work should consider whether spare time

will be shifted into education (if returns are high enough) and not leisure, given barriers to education.

Future studies that examine young people's time allocation in developing countries should account for the full set of activities. Additionally, this study is limited since YL data is unable to distinguish between different types of 'leisure' activities, that is, resting and playing. Future research in developing countries should collect more disaggregated information on leisure to help broaden empirical research on young people's development in a more holistic way rather than the sole focus on child labor.

Notes

1. Yorke and Portela (2018) report on the validity and reliability of the scales and find that in previous rounds of the data (Rounds 2 and 3), the statements 'Other people in my family make all the decisions about how I spend my time' and 'I have no choice about the work I do - I must do this sort of work' is negatively correlated with other items of the scale. The authors suggest that adolescents may view these statements positively, where obedience may be an attractive attribute. This means that these statements were interpreted differently and the scale is not parsimonious.
2. In the full sample, at least 87 per cent of caregivers are the adolescents' mother, and at least 90 per cent of caregivers are the adolescent's biological parent.
3. All items are positively worded because reverse-coded items during the pilot performed poorly.
4. Estimates for a latent model of non-cognitive skills is estimated and reported in Section 6 of the [Supplementary Material](#).

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Data availability statement

I report there are no competing interests to declare. The views expressed here are those of the author and not of Young Lives, the University of Oxford or its funders. The Young Lives data can be accessed online through the UK Data Service. All Young Lives data published on the UK Data Service are safeguarded. The latest round of the data at time of writing can be accessed via doi:10.5255/UKDA-SN-8357-1. Codes for this paper are available upon request to the author.

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