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Mental Health Impacts of Child Labour: Evidence from Vietnam and India

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ABSTRACT *A number of recent studies have investigated the relationship between child labour and physical health. However, there has been little empirical evidence that child labour affects children's emotional and behavioural development. This study departs from existing literature by examining the mental health impacts of child labour in Vietnam and India, as measured by the Strengths and Difficulties Questionnaire. The potential endogeneity of child labour is addressed by using rainfall as the instrument. The findings show that children engaged in child labour suffer from mental health issues as measured by peer problems and reduced prosocial behaviour in both countries. There is a significant gender difference in the impact of child labour in India. Finally, doing household chores, an accepted social and cultural work in developing countries is found to be associated with the better mental health of children in Vietnam.*

1. Introduction

Child labour is a common practice in poor households to cope with income loss. In 2013, the International Labour Organisation (ILO) reported that there were approximately 265 million working children in the world – almost 17 per cent of the worldwide child population (International Labour Organization [ILO], 2013). Child labour is more widespread in lower-income countries than high-income countries, and more than half of all child workers are involved in hazardous work (ILO, 2015). It is well established in the literature that children engaging in labour at an early age are associated with negative outcomes, such as reduced schooling, deterioration of physical health, lower employment, and socio-economic opportunities in the long term (Beegle, Dehejia, & Gatti, 2009; Kana, Phoumin, & Seiichi, 2010; Sim, Suryadarma, & Suryahadi, 2017; Wolff, 2008). Interestingly, little is known about the impact of child labour on emotional and behavioural development. Given that poor psychological health in childhood is strongly linked to poor health later in life, and shown to have serious impacts on opportunities in life (Cornaglia, Crivellaro, & McNally, 2015), it is vitally important to understand the relationship between working in early childhood and mental health problems.[1]

It is well established in the literature that child labour is harmful to physical health. Some examples of such harm are long-term exposure to toxins and chemicals, such as fertiliser and pesticides, inclement weather, heavy lifting, or the forced adoption of poor posture (Beegle et al., 2009; O'Donnell, Rosati, & Van Doorslaer, 2005; Sim et al., 2017; Wolff, 2008). Identifying the mental health impacts of child labour, however, is more challenging. Literature in public health has shown

mixed evidence for the effects of working for income on mental health. Long hours of physically demanding repetitive work, over which children have little control, may cause demoralisation and hopelessness. Also, some work requiring isolation from families may further adversely affect their mental health (Al-Gamal, Hamdan-Mansour, Matrouk, & Nawaiseh, 2013; Bandeali, Jawad, Azmatullah, Liaquat, & Israr, 2008; Fekadu, Alem, & Hägglöf, 2006). Conversely, other work may positively affect emotional and behavioural development if it provides useful skills, improves self-esteem, or contributes resources that lift families out of poverty, thereby improving their health status (Alem, Zergaw, Kebede, Araya, & Medhin, 2006).

To date, several studies in the economic literature have begun to examine the link between family income and a child's emotional and behavioural outcomes (Dooley & Stewart, 2007; Khanam & Nghiem, 2016; Violato, Petrou, Gray, & Redshaw, 2011); however, their findings have been inconclusive. For example, Dooley and Stewart (2007) use a sample of 11,474 children in Canada and find that an approximate doubling of a family's income improves a child's prosocial behavioural score by one-tenth of a standard deviation. Using a larger dataset of more than 19,000 children in the UK, Violato et al. (2011) show that the effect of a rise of £10,000 in average annual family income increases the child's school readiness score at age three by 0.37 units of standard deviation. Recently, Khanam and Nghiem (2016) investigate family income and a wide range of child health measures in the Longitudinal Study of Australian Children. Interestingly, the authors find that household income has no significant effect on children's mental health. Notably, most of these studies are conducted in developed countries. Given that the quality of the environment and health-care services in developing countries is generally poorer than in developed countries, it is likely that the issue of mental health is more serious.

In this study, we hypothesise that working in early childhood will worsen children's mental health. We depart from most existing research by using two case studies from the developing world, Vietnam, and India. These are interesting countries to study child labour and mental health for several reasons. Firstly, child labour remains a significant problem in both countries, with one in 10 Vietnamese youngsters aged 5–17 in child labour (International Labour Organization, Ministry of Labour, Invalids and Social Affairs (MOLISA) & General Statistics Office (GSO) of Viet Nam, 2014) and approximately 28 million children aged 5–14 employed in India (United Nations Children's Fund [UNICEF], 2011). Secondly, mental health problems among children are a growing concern in developing countries (Demyttenaere et al., 2004). Malhotra and Patra (2014) provide a systematic review of studies on child mental health in India and find that the prevalence of child psychiatric disorders ranges from seven per cent to 23 per cent, although those data cannot be generalised to the entire country. A more recent report from National Mental Health Survey of India in 2016 shows that the prevalence of mental disorder in the age group of 13–17 years was nearly 7 per cent (Murthy, 2017). In Vietnam 19 per cent of students are found to be above the threshold for social relationship problems, and 24 per cent are above the threshold for behavioural problems (Anh, Minh, & Phuong, 2007).

Examining the short-term impact of early working on child health may raise the problem of endogeneity (Beegle et al., 2009; O'Donnell et al., 2005; Wolff, 2008). This problem occurs when unobserved heterogeneity across families, parents and children is correlated with both child labour status and child health. For example, parents who care for the well-being of their children are likely to keep them from working and, at the same time, devote more resources to their children's health, including their behavioural-emotional development. Additionally, there may be a selection effect among the child population in which children who undertake labour activities are required to be healthy. It is, therefore, difficult to conclude that a causal relationship between child labour and mental health exists.

The literature has proposed different strategies to deal with the endogeneity problem. One solution is to use a generalised method of moments (GMM) with lagged variables of health (Khanam & Nghiem, 2016). Another solution is using an instrumental variable (IV) (Dooley & Stewart, 2007; Wolff, 2008). Our study follows the latter approach and attempts to find an appropriate instrument incorporated from other sources of data. We use rainfall as the instrumental variable for child labour. The validity of our instrument is discussed in the later section.

Finally, we also investigate the mental health impact of doing household chores on children to capture a wider spectrum of child labour. While previous studies have considered household chores as a type of child labour (Kana et al., 2010; Strobl, 2017), their estimation may have been biased as, in the context of developing countries, household chores are accepted forms of social and cultural work. In our sample, the proportion of children doing household chores is much higher than the proportion of children in child labour. Therefore, we examine the impacts of child labour and doing household chores separately in this analysis. We expect that the impact of doing household chores on mental health could be either positive or negative. A reasonable level of child participation in household chores can contribute both to the child's learning and sense of self-worth. However, in some cases, the workload might be excessive or interfere with the child's other activities, which can result in higher depression and other negative outcomes of emotional and behavioural development.

The remainder of this paper is structured as follows. Section 2 discusses the data and presents a descriptive analysis. Section 3 outlines the empirical strategy. Section 4 presents and discusses the estimated results. Section 5 makes some concluding remarks.

2. Data and descriptive analysis

The dataset used in this study is derived from the Young Lives Project, administrated by the Department of International Development at the University of Oxford. This is a long-term international study of childhood poverty that tracks over 15 years the livelihoods of 12,000 children in four developing countries: Vietnam, Peru, Ethiopia, and India. The project employs a multistage sampling design that represents a variety of social, geographic, and demographic groups. The children are selected from 20 sentinel sites (also called 'clusters'). Within each cluster, children are randomly selected. It should be noted that Young Lives are not intended to be a nationally representative survey such as the Demographic and Health Survey (DHS). Rather, as a longitudinal study, it is intended to show changes over time and the impact of earlier circumstances on children's later outcomes. As the variables of our interest, information about mental health, child, and parental characteristics are reported by the primary caregiver of which 96 per cent are the biological mothers of the children, and the remaining four per cent are the fathers.[2]

In each country, two groups of children are followed from 2001–2002 to 2016–2017: 2,000 children born during 2001–2002 (the Young cohort) and 1,000 children born during 1994–1995 (the Old cohort).[3] Information on mental health is only collected for the Old cohort in the first round for Vietnam and India. Therefore, this study is based on the sample of approximately 1,000 children from Vietnam and India each, aged between seven and nine in 2002. As a consequence of missing data for some of the children in the Old cohort, our analyses are based on 978 children in Vietnam and 956 children in India.

2.1. Measures of mental health

Our empirical study employs a measure of child mental health that is based on the Strengths and Difficulties Questionnaire (SDQ). The SDQ, originally developed by Goodman (1997), is a widely used and reliable measure of emotional and behavioural development in both children and parents. In its questionnaire for children, the SDQ has 25 statements grouped into five scales of (1) emotional symptoms, (2) conduct problems, (3) hyperactivity/inattention, (4) peer problems and (5) prosocial behaviour. Respondents are presented with statements about feeling 'lonely', 'depressed' or 'too tired to do things' (for more details, see Table A1 in the Supplementary Online Materials), and asked to rate each statement on a 3-point scale (1 = not true, 2 = somewhat true, 3 = certainly true). The sum of responses to these statements in each scale is calculated as a score of the child's feelings and behaviour. Higher scores on the first four scales of SDQ reflect difficulties, whereas higher scores on the prosocial behaviour reflects strengths. In addition, we adapt the SDQ scores to derive a measure called 'total difficulties', to reflect the child's overall mental health difficulties. Following Goodman (1997), we calculate total difficulties by adding the scores for the first four SDQ scales (i.e. it is based

on 20 items). Given that the interpretation of such a mental health index is difficult, we follow the practice in the literature by standardising the mental health scores within each country, such that the total score for each scale has a mean of zero and a standard deviation of one (Anderson, Cesur, & Tekin, 2015; Khanam & Nghiem, 2016).

Figure 1 shows the distribution of mental health of children in Vietnam and India, based on their responses on the SDQ. It reveals that the distribution of emotional symptoms is symmetrical in Vietnam, while conduct problems and hyperactivity are skewed to the left. The figure also suggests that children in Vietnam are likely to experience peer problem, as illustrated by the right-skewed data. In India, peer problem is common, along with emotional symptoms.

2.2. Measures of child labour

To measure child participation in the labour market, we use the information on whether the child has undertaken any activity in the last 2 weeks to earn money for themselves and/or their family. The activity may be paid or unpaid; it may be agricultural (such as working on a family farm, cattle herding or shepherding), involve other family business (such as making and selling handicrafts) and/or work outside of families in other sectors. We expect that the health impacts of child labour will increase with the number of hours spent working; however, such information is not collected in the first round of the Young Lives Project. The survey used in the Young Lives Project also collects information on whether children do domestic chores, such as fetching water, cleaning, cooking, washing clothes, or shopping. Thus, we use a 0/1 indicator for child labour and doing chores in our analysis.

Table 1 presents the descriptive statistics of the children's mental health by their work status. First, child labour is more prevalent in India (about 33%) than in Vietnam (about 13.4%). Second, the mental health of working children is significantly lower than nonworking children in Vietnam, which suggests an adverse health impact of child labour. The descriptive statistics are mixed for India: working children report less conduct problems and better prosocial behaviour than nonworking children, but have worse outcomes on other dimensions of mental health. In general, the total difficulties score of mental health is higher for working children than for nonworking children in both countries.
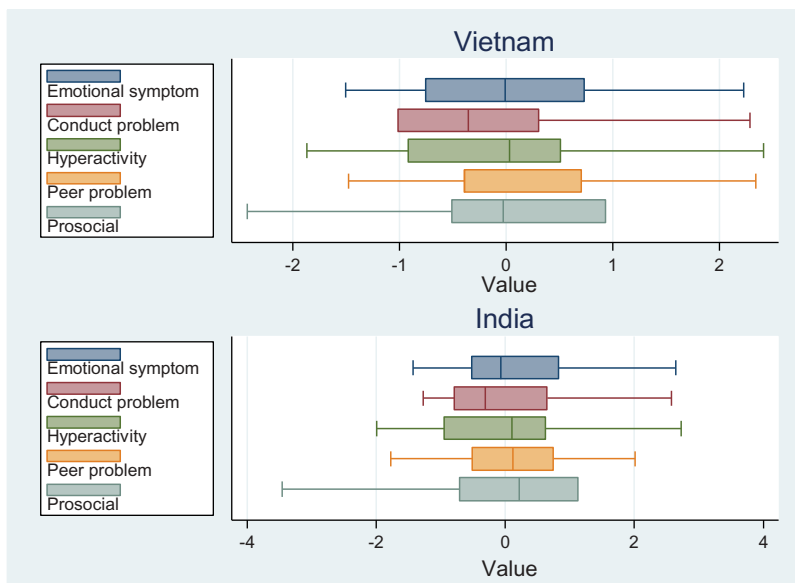
Figure 1. Distribution of standardised scores on the mental health dimensions of the strengths and difficulties questionnaire.

Table 1. Descriptive statistics of children's mental health by their work status

	Vietnam			India		
	Working	Not working	Mean difference significant	Working	Not working	Mean difference significant
Emotional symptoms	0.005	−0.001	0.007	0.147	−0.072	0.007
Conduct problems	0.323	−0.050	0.000	−0.022	0.011	0.001
Hyperactivity	0.333	−0.052	0.000	0.198	−0.097	0.289
Peer problems	0.163	−0.025	0.161	0.042	−0.021	0.652
Prosocial behaviour	−0.471	0.073	0.102	0.203	−0.100	0.002
Total difficulties	0.273	−0.042	0.000	0.150	−0.074	0.055
Number of children	134	866		315	642	

Mean difference (p-value) is calculated from a t-test, where H_0 is equality of means; mental health scores are standardised with a mean of zero and a standard deviation of one; higher SDQ scores indicate a negative outcome for all subscales but the prosocial behaviour.

2.3. Control variables

This study includes a set of control variables that are used in previous studies on child development, including variables on parental and child characteristics (Khanam & Nghiem, 2016; Sim et al., 2017). We use body mass index (BMI), an indicator of current nutritional status, to control for the child's physical health. In some cases, the BMI is considered a proxy for heterogeneity in parental investment in children's health (Beegle et al., 2009). Another important determinant of child labour, shown in previous works, is household income (Kana et al., 2010; Khanam & Nghiem, 2016). The Young Lives Project, however, does not collect information on household income. Therefore, as a proxy for household income, we employ a wealth index that consists of three components: housing quality, housing consumption, and housing services. The wealth index ranges from 0 to 1, with a higher score associates with more wealth in the household.

The instrumental variable in our study, rainfall, is derived from the monthly precipitation of the Gridded Monthly Time Series (Version 4.01) dataset (GMTS), developed by the Centre for Climatic Research, University of Delaware. This dataset contains global historical estimates of rainfall for a grid of 0.5 degree by 0.5 degree of latitude and longitude, where the grid nodes are centred on 0.25 degree. Each grid, thus, will cover an area of 50 square kilometres. This climatic data will then be matched with the household data at the province level (district for the case of India) using the four closest grid points in the GMTS dataset. Monthly precipitation data are available over a 65-year period for Vietnam (1950–2014) and a 55-year period for India (1960–2014).

Table A2 (in the Supplementary Online Materials) presents the summary statistics of the explanatory variables for the full sample and separately by gender. Boys are more likely to participate in the labour market than girls in Vietnam, while the opposite is found in India. Children doing household chores are prevalent in Vietnam, especially in girls. Also, most children in both countries are attending school. In relation to other control variables, the table shows that parental educational level, measured by completion of primary school, is higher in Vietnam than in India, while the average proportion of boys in Vietnam is larger compared with that in India.

3. Model specifications

In this section, we outline the framework used to identify the impact of child labour on mental health. Following Currie and Stabile (2006), we assume mental health to be a function of child labour, the individual child, parent, and family characteristics. Thus, our basic specification is of the form:

$$MH_i = \beta_0 + \beta_1 CL_i + \beta_2 CC_i + \beta_3 PC_i + \beta_4 FC_i + \varepsilon_i, \qquad (1)$$

where MH_i is the mental health of child i measured by the five SDQ scales: emotional symptoms, conduct problems, hyperactivity/inattention, peer problems, and prosocial behaviour. We examine the components represented by these scales separately, as it is unlikely that they are equally affected by child labour; we also examine the impact of working on total difficulties reported by the child. As for the descriptive statistics, all measures of mental health used in the model are standardised with a mean of zero and a standard deviation of one.

With regard to the independent variables, we are primarily interested in the coefficient for the child labour variable (CL_i), defined as a child i who engages in child labour during the first round of the Young Lives Project. CC_i represents child characteristics other than child labour; PC_i and FC_i represent parental and family characteristics, respectively. We first examine the health impacts of child labour on the sample as a whole and then check the robustness of our analysis by examining boys and girls separately.

The economic literature on child labour has shown that an Ordinary Least Squares (OLS) estimation of Equation (1) results in biased estimates attributable to unobservable factors (Beegle et al., 2009; O'Donnell et al., 2005; Wolff, 2008). For example, a selfish parent will certainly spend less money on a child's health and will require the child to work to earn money. In contrast, an altruistic parent is expected to invest more in a child's well-being, spend more on the child's health, and will try to prevent the child from working (Wolff, 2008).

To minimise the effects of unobservable individual characteristics, we control for a wide set of demographic factors that are available in our sample. We then attempt to address the endogeneity issue by using the instrumental variable strategy, described as follows:

$$CL_i = \alpha_0 + \alpha_1 RD_i + \alpha_2 CC_i + \alpha_3 PC_i + \alpha_4 FC_i + v_i \qquad (2)$$

$$MH_i = \gamma_0 + \gamma_1 CL_i + \gamma_2 CC_i + \gamma_3 PC_i + \gamma_4 FC_i + \varepsilon_i \qquad (3)$$

where rainfall deviation (RD_i) in Equation (2) is the instrumental variable for child labour. In this study, Equations (2) and (3) are implemented by the conditional mixed-process (CMP) framework (Roodman, 2011). The CMP approach is designed to jointly estimate two or more equations with correlated errors. Also, CMP has the flexibility to account for the instrumented variable (child labour in this analysis) in the system of equations as a binary or categorical variable. In this case, using traditional 2SLS regression is consistent, but less efficient (Roodman, 2011). Finally, we include fixed effects at the commune level in Vietnam and district level in India to control for any time-invariant characteristics. Given that child labour may be affected by the time of seasonality of agricultural production, we include a set of dummy variables to represent the month of interview in all models.

We now discuss the validity of the instrument used in our analysis. A good instrumental variable is strongly correlated with the probability of children working, and is a variable that also affects their mental health solely through the fact of engaging in child labour. Studies in the literature have proposed a wide range of instrumental variables for child labour (Beegle et al., 2009; Boozer & Suri, 2001; O'Donnell et al., 2005; Sim et al., 2017; Wolff, 2008). For example, Wolff (2008) uses quality of school, measured by the year in which the primary school is built and the pupil-to-teacher ratio, as the instrument. It is assumed that school quality is strongly correlated with school enrolment and thus, with child labour. However, this assumption may be violated as it requires that child education

itself does not lead to better physical health. O'Donnell et al. (2005) use agricultural land owned by households as it is a plausible determinant of both child labour and household living standard. In turn, such an instrument may not be strictly applicable to non-farm households where child labour is also a common practice. Beegle et al. (2009) propose a solution by using variation in rice price to capture its indirect impact on non-farm households, while Sim et al. (2017) use minimum wage levels. Still, such economic indicators are often constant in the short term which results in insufficient variation in the sample.

In this paper, we follow the study of Boozer and Suri (2001) and use rainfall as the instrument for child labour. The choice is motivated by a large body of literature demonstrating a strong association between weather conditions and crop production (Deschênes & Greenstone, 2007; Mendelsohn, Nordhaus, & Shaw, 1994; Schlenker & Roberts, 2009).[4] For example, less rainfall than usual (negative deviation) may lead to crop failure due to lack of water for irritation, while more rainfall than usual (positive deviation) may destroy crop production by providing conditions for insects to develop (thereby increasing cost of pesticides). The income shock caused by crop failure, in turn, will result in a higher probability of child labour. Non-farm households can be argued to be indirectly affected by negative weather conditions, for example, through higher food prices. It should be noted that more rainfall than usual may also improve agricultural activities by increasing water supply. As such, whichever mechanism dominates are not important in our analysis, as long as it has a positive or negative correlation with child labour. Given that the relationship between rainfall and crop production is nonmonotonic, our primary measure of rainfall is the absolute value of deviations:

$$RD_i = |AR_i - HR_i| \qquad (4)$$

where AR_i denotes the actual rainfall in the province where child i is living in the last 12 months before the interview date, and HR_i denotes the historical average rainfall in the same area for the same period. For robustness check, we construct rainfall variable in different periods, namely 3, 6, and 9 months before the interview date. As an alternative measure of rainfall, we construct deviations of actual rainfall from the historical average rainfall. The variable is the natural log of actual rainfall minus the natural log of long-term average rainfall[5]:

$$RD_i = \ln(AR_i) - \ln(HR_i) \qquad (5)$$

While it is not possible to test the exclusion restriction of the instrument, one concern is that a large deviation of rainfall may contribute to changes in environmental conditions, such as the spread of diseases (e.g. malaria and poor sanitation), and thereby affecting child health directly (Cornwell & Inder, 2015; Lohmann & Lechtenfeld, 2015; Thai & Falaris, 2014). In our sample, the range of deviation is within ±30 mm which is relatively small. Still, we conduct a robustness test by restricting our sample to deviation ranging within ±15 mm and find a consistent result.

4. Results and discussion

4.1. Main results

We begin by briefly discussing the impact of child labour on mental health, as presented in Equation (1). We do not expect the estimation to identify a causal relationship; nevertheless, it is a useful starting point for our instrumental variable strategy. The results in Table A3 (in the Supplementary Online Materials) indicate that child labour is strongly associated with overall mental health issues (as measured by total difficulties) in Vietnam and India. As we expected, child labour does not uniformly affect the five dimensions of the SDQ. In Vietnam, children who participate in the labour market are likely to have worse conduct problems, hyperactivity, peer problems, and reduced prosocial behaviour compared to those who do not work.[6] In India, reporting more emotional

symptoms is significantly correlated with child labour, along with hyperactivity and reduced proso-cial behaviour. Given the potential endogeneity of these results, we move to the instrumental variable estimation as presented in Equations (2) and (3).

We first discuss the results of the first stage of the CMP model, presented in Table 2. Note that, due to the use of the CMP model where the first stage and second stage are estimated simultaneously, each outcome variable has a separate first-stage regression. Reassuringly, the differences across columns are small. In overall, there is strong evidence that rainfall deviation is a highly significant predictor of child labour, measured in the different contexts of mental health outcomes. The positive coefficient on rainfall variables indicates that the demand for child labour is dominated by the income shock caused by adverse weather conditions.[7] The significant value of rho implies that the equations should be estimated as a system rather than separately.[8]

Having established that our instrument has power in the first stage, we next present our benchmark results in Table 3. The impact of child labour on mental health outcomes is consistent between countries. Working children in Vietnam report significantly worse outcomes in terms of peer problems and less prosocial behaviour, while hyperactivity problems also matter in India. Specifically, working in early childhood increases the score for peer problems by 1.40 and 1.26 units of standard deviation in Vietnam and India, respectively. In relation to prosocial behaviour, children who work score lower by 2.16 and 0.85 units of standard deviation in Vietnam and India, respectively (a lower score reflects worse behaviour).

In the five scales of SDQ, peer problems and prosocial behaviour are found to be significantly impacted by working in both countries. These outcomes of mental health, therefore, need more

Table 2. Rainfall deviation and child labour: the first stage of conditional mixed-process model

	Dependent variable: Child labour (= 1)					
	Emotional symptom	Conduct problem	Hyperactivity	Peer problem	Prosocial	Total difficulties
Panel A: Vietnam						
Rainfall deviation	0.012***	0.011***	0.012***	0.013***	0.012***	0.012***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.003)	(0.004)
Rho value	0.221	0.011	−0.294	−0.727***	1.202***	−0.501**
	(0.201)	(0.100)	(0.329)	(0.203)	(0.144)	(0.349)
Observations	978	978	978	978	978	978
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
Commune fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: India						
Rainfall deviation	0.146***	0.143***	0.121**	0.142***	0.176***	0.134***
	(0.037)	(0.038)	(0.048)	(0.034)	(0.031)	(0.038)
Rho value	0.315	0.366	−0.582**	−0.376**	0.104**	0.314
	(0.536)	(0.449)	(0.619)	(0.460)	(0.441)	(0.530)
Observations	956	956	956	956	956	956
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses; rainfall deviation represents the absolute value of rainfall anomalies in the last 12 months before the interview date in Young Lives; for completed results, see Table A4 in the Supplementary Online Materials; ***p < 0.01, **p < 0.05, *p < 0.1

Table 3. Child labour and mental health: second stage of conditional mixed-process model

	(1)	(2)	(3)	(4)	(5)	(6)
	Emotional symptom	Conduct problem	Hyperactivity	Peer problem	Prosocial	Total difficulties
Panel A: Vietnam						
Child labour	−0.316	0.328	0.861	1.400***	−2.160***	1.187**
	(0.357)	(0.222)	(0.575)	(0.298)	(0.149)	(0.537)
Observations	978	978	978	978	978	978
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
Commune fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: India						
Child labour	−0.313	−0.350	1.312**	1.264***	−0.851***	−0.111
	(0.204)	(0.213)	(0.603)	(0.290)	(0.183)	(0.259)
Observations	956	956	956	956	956	956
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses; the instrumental variable is rainfall deviation; standard errors are clustered at the province level; higher SDQ scores indicate a negative outcome for all subscales but the prosocial behaviour; for completed results, see Table A5 in the Supplementary Online Materials; ***$p < 0.01$, **$p < 0.05$, *$p < 0.1$

interpretation. Compared to other outcomes of SDQ, peer problems and prosocial are considered to be more external. It is possible that children who engage in the labour market will have less time for other activities, including social activities. Less time interacting with their friends and peers, thus results in a higher probability of having behavioural problems.

Although our main interest is the relationship between child labour and mental health, it is interesting to discover the role of control variables in our analysis as presented in Table A5 (Supplementary Online Materials). In Vietnam and India, the importance of higher parental education is confirmed to reduce mental health problems. For example, higher education of father is associated with lower hyperactivity and peer problems of children in Vietnam, while there is an association between mother education and improving child mental health in India.[9] Children with better physical health, as measured by the BMI index, is associated with a lower probability of developing mental health issues in Vietnam.[10] Children currently enrolled in school in Vietnam appear to have better prosocial skills. Also, living in a household with higher number of boys is associated with the reduction of mental health problems, while a contrast finding is found in the case of India. Finally, children in Vietnam who see their father frequently can show an improvement in their conduct problems and prosocial behaviour.

To test the robustness of our model and for further insight into the magnitude of the impact of child labour on mental health, we construct a binary indicator of mental health using the average value as the cut-off. Such an approach is prevalent in the psychological literature as it focuses attention on the right-hand tail of the distribution, the portion of the distribution where clinical diagnoses of major depression are made (Anderson et al., 2015). Table 4 presents our results, which are consistent with our previous findings. That is, child labour increases the probability of having peer problems in both countries, while it is also associated with worse emotional symptom in India. Finally, the negative impacts of child labour are evident in the prosocial behaviour dimension of mental health.

In this study, we are also interested in examining the effect of doing household chores, a common social and cultural work in developing countries, on mental health. While negative health impacts of

Table 4. Child labour and mental health: mental health as a dummy variable (Vietnam)

	(1)	(2)	(3)	(4)	(5)	(6)
	Emotional symptom	Conduct problem	Hyperactivity	Peer problem	Prosocial	Total difficulties
Panel A: Vietnam						
Child labour	−0.686	−0.493	0.982	1.575***	−2.080***	1.588***
	(0.516)	(1.148)	(0.744)	(0.285)	(0.085)	(0.353)
Observations	978	978	978	978	978	978
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
Commune fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Panel B: India						
Child labour	0.849**	−0.266	1.070**	1.069***	−1.258***	0.402
	(0.344)	(0.711)	(0.522)	(0.350)	(0.051)	(0.660)
Observations	956	956	956	956	956	956
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time interview dummies	Yes	Yes	Yes	Yes	Yes	Yes
District fixed effects	Yes	Yes	Yes	Yes	Yes	Yes

Standard errors in parentheses; the instrumental variable is rainfall deviation; the Table shows results of the second stage of conditional mixed-process model; higher SDQ scores indicate a negative outcome for all subscales but the prosocial behaviour; for completed results, see Table A7 in the Supplementary Online Materials; results of the first stage are presented in Table A6; *** $p < 0.01$, **$p < 0.05$, *$p < 0.1$

child labour have been established in the literature (Beegle et al., 2009; Sim et al., 2017; Wolff, 2008), it is not clear whether the same relationship exists for household chores. Household chores such as cooking, cleaning, and caring for other family members may improve a child's emotional and behavioural development by equipping the child with more skills and helping the child to develop a sense of self-worth. The results, presented in Table 5, confirm our expectations. In Vietnam, doing household chores is significantly associated with better mental health in both boys and girls. For example, children doing chores have better prosocial behaviour by 2.37 and 1.71 units of standard deviation in boys and girls, respectively, compared with children not engaged in doing household chores. The results for the sample from India are mixed. Girls are positively affected by doing household chores, in that they report less emotional symptoms and more prosocial behaviour. However, boys are adversely affected by doing household chores as they report more emotional symptoms, peer problems, and less prosocial behaviour.

4.2. Gender heterogeneity

We now examine the relationship between child labour and mental health in the context of gender. In the psychological literature, depression and other types of mental health problems are more prevalent in boys during childhood, whereas they are more prevalent in girls during adolescence and adulthood (Petersen et al., 1993). Other research suggests that this pattern is attributable to differences in: willingness to acknowledge mental difficulties, the timing of puberty, coping resources, and reactions to stressful life events (Cicchetti & Toth, 1998; Seiffge-Krenke & Stemmler, 2003). If mental health is affected severely by child labour, this could have long-term consequences for girls who are likely to become mothers in the future. Table A8 (in the Supplementary Online Materials) presents our results, which confirm the adverse impacts of child labour on both boys and girls in Vietnam, in terms of peer problem and reduced prosocial behaviour. Also, girls in Vietnam who engage in early working suffer from worse conduct problem than those who do not work. In contrast, we find that

Table 5. Household chores and mental health

	(1)	(2)	(3)	(4)	(5)	(6)
	Emotional symptoms	Conduct problems	Hyperactivity	Peer problems	Prosocial behaviour	Total difficulties
Panel A: Vietnam						
Doing chores (male)	0.251	−0.493*	−1.006	−1.930***	2.371***	−0.902
	(0.331)	(0.269)	(0.678)	(0.244)	(0.234)	(0.789)
Doing chores (female)	0.655	−1.652***	−0.184	−1.418***	1.710***	−1.328*
	(0.728)	(0.301)	(0.819)	(0.363)	(0.256)	(0.733)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations (male sample)	488	488	488	488	488	488
Observations (female sample)	490	490	490	490	490	490
Panel B: India						
Doing chores (male)	1.744***	−0.134	1.800***	1.903***	−1.109***	2.034***
	(0.299)	(0.310)	(0.372)	(0.339)	(0.254)	(0.257)
Doing chores (female)	−0.739**	−0.644*	0.364	0.568	0.677***	−0.307
	(0.337)	(0.380)	(0.447)	(0.523)	(0.245)	(0.283)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Observations (male sample)	466	466	466	466	466	466
Observations (female sample)	490	490	490	490	490	490

Standard error in parentheses; results of the second stage of conditional mixed-process model; results of first stage are not shown; all models include time interview dummies and commune fixed effects; control variables include gender, child's age, BMI index, mother's education and age, father's education, father involvement, divorce, wealth index and boy ratio; higher SDQ scores indicate a negative outcome for all subscales but the prosocial behaviour; ***$p < 0.01$, ** $p < 0.05$, *$p < 0.1$

the mental health of boys and girls in India are affected differently by working. Boys are found to be severely impacted by child labour on all dimensions of the SDQ, except for conduct problems. Interestingly, child labour appears to have a positive impact on girls, as working girls report improved emotional symptoms. However, without further information on the types of labour, we are unable to draw any conclusion from these findings.

4.3. Location of residence heterogeneity

As a further investigation, we study the role of living locations in the relationship between child labour and mental health. This is motivated by the recent finding by Sim et al. (2017) that children engage in different kinds of labour depending on whether they live in a rural or an urban area. For example, agriculture is the most common activity in rural areas, while manufacturing or service activities tend to be more common in urban areas. Since the sample of children living in urban areas in both countries is small (20% in Vietnam and 25% in India), we are unable to examine the mental health impacts of child labour on children living in rural as opposed to those living in urban areas. We, therefore, add an interaction term between child labour and residential location as an indicator variable in the empirical model. Table A9 (in the Supplementary Online Materials) presents the results, which are mixed. In Vietnam, working children who live in urban areas report less emotional and peer problems, and more prosocial behaviour than working children living in rural areas. We find no evidence of such an impact in India except that children working in urban areas have better prosocial behaviour than those in rural areas.

4.4. Roles of formal and informal support

Once we confirm the negative impacts of child labour on mental health, we further examine the role of receiving support from the government and other institutions. In this analysis, we expect that households having benefits from such programs are less vulnerable to rainfall deviation, and children living in those households will thus have better mental health, compared to those without supports. The Young Lives Project provides information on whether households receive support from the formal channel (central and local government) and informal channel (friends and relatives). In the model estimation, we interact rainfall deviation with support variables while keeping the same set of control variables. The results are presented in Table A10 (in the Supplementary Online Materials) which show little evidence of the role of formal support. In contrast, we find that households receiving informal supports are less vulnerable to rainfall deviation, as illustrated by better mental health of children.[11]

5. Conclusion

Much of the literature has focused on the impact of child labour on children's physical health. Research into the mental health impacts of working on children, however, is sparse and/or based on high-income countries. Given the formative importance of early childhood to success in later life, understanding the effects of child labour on children's emotional and behavioural development is imperative. This study departs from most others by examining the adverse mental health impacts of child labour in Vietnam and India. To capture different dimensions of mental health, five scales of the SDQ are employed. The potential endogeneity of child labour and mental health is addressed by using the absolute values of rainfall deviations as the instrument.

   We find strong evidence of the negative impacts of child labour on mental health in Vietnam and India. Reported peer problems and levels of prosocial behaviour are found to be most affected by child labour. There are several explanations for this finding. Undertaking work is associated with missing school and losing time for learning, playing, and peer interaction. In addition, working in a job considered degrading or menial can result in rejection by peers and lowered self-esteem. In India, mental health is affected differently depending on the gender of the child. Boys are negatively affected by child labour on most scales of the SDQ, while girls' reduced emotional symptoms are associated with child labour. Finally, doing household chores can have beneficial effects on the mental health of children in Vietnam, while a mixed result is found in India.

   Overall, our findings contribute to the growing literature on the health consequences of child labour and suggest directions for future research. A key finding of this study is that while child labour has strong effects on emotional and behavioural development, the magnitude and direction of its impacts are different depending on the dimension of mental health examined. Therefore, a worthy area of investigation is to identify the types of child labour that have positive effects and those that have negative effects on mental health. Such a study will require comprehensive data on both child labour and mental health, data that in relation to developing countries is particularly difficult to obtain. In addition, our analysis is based on an assumption that rainfall deviation will lead to a reduction of household income, and these affected households are more likely to ask their children to work in order to compensate the income loss. Unfortunately, information on household income is not available in the first round of Young Lives which does not allow us to directly test this mechanism. This remains an interesting and important area for future research.

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Notes

1. In this study, we apply the ILO's definition of child labour (International Labour Organization, 2015), which refers to the exploitation of children through any form of work that deprives children of their childhood, interferes with their ability to attend regular school, and is mentally, physically, socially or morally harmful. According to ILO minimum age convention (C138) of 1973, child labour refers to any work performed by children under the age of 12, non-light work done by children aged 12–14, and hazardous work done by children aged 15–17. In this study, we define child labour as those who perform any work given that they aged between seven and nine in the first round of Young Lives.
2. For more details about the sampling approach in India and Vietnam, see Kumra (2008) and Nguyen (2008).
3. Informed consent is obtained from everyone involved in the Young Lives Project. Further, anonymity and confidentiality of participants in the survey are protected. More information about the ethical process can be found at: https://www.younglives.org.uk/content/research-ethics.
4. For a recent review of the impact of climate change on agriculture, see Dell, Jones, and Olken (2014).
5. The results are consistent with our main findings (see Table A11 in the Supplementary Online Materials).
6. Note that a higher score of prosocial scale means better prosocial behaviour.
7. Unfortunately, we are not able to directly test the impact of rainfall deviation on household income as this information is not available in the first round of Young Lives (Briones, 2018).
8. Using two-stage least squares approach provides a consistent result. We examine the potential problem of weak instruments using the critical values in Stock and Yogo (2002). We test for weak instruments using the first stage F-statistic and the Kleibergen–Paap Wald F-statistic. Under the null hypothesis, we assume that the instrument is weak. The critical value of 16.38 (Stock & Yogo, 2002) implies a rejection of the null hypothesis in both countries.
9. It should be noted that the relationship between parental education and child mental health is not causal. In fact, differential impacts of parental schooling on child outcomes have been found in the literature (e.g. Behrman & Rosenzweig, 2002; Black, Devereux, & Salvanes, 2005).
10. We acknowledge that child BMI might be endogenous in this context. For example, poor mental health may cause weight gain which is a part of BMI's calculation, or other parental socio-economic status may affect both child BMI and mental health. The literature has shown that overcoming the endogeneity issue is challenging given that weight is not randomly assigned and correlated with a number of unobservable factors. Willage (2018) proposes an ideal instrument for BMI using genetic information derived from a biological sample and laboratory analysis. This information, however, is not available in the context of our study. Still, we attempt to find an instrument for BMI by using an area-based measure. Specifically, we follow Morris (2006) and employ the mean BMI across children living in the same commune (district in India) as the instrument. We argue that area BMI is a good predictor of individual level BMI while controlling for other covariates, and at the same time is less likely to directly affect mental health indicators. The results are presented in Tables A12a and A12b (Supplementary Online Materials) for Vietnam and India, respectively. Firstly, we find consistent impacts of child labour on mental health in both countries. Secondly, we observe a negative correlation between child BMI and mental health, and the relationship is statistically significant. In addition, there is a strong association between child BMI and our instrument (mean area BMI), as illustrated in the first stage of our estimation (see Panel B).
11. The findings should be interpreted with caution given that the amount of support as well as type of support is not available in the Young Lives Project.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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