

Comparison of the Effects of Government and Private Preschool Education on the Developmental Outcomes of Children:

Evidence From Young Lives India

Renu Singh and Protap Mukherjee



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About Young Lives

Young Lives is an international study of childhood poverty, following the lives of 12,000 children in four countries (Ethiopia, India, Peru and Vietnam) over 15 years. www.younglives.org.uk

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Summary

Over the past two decades the importance given to preschool education as laying the foundation for lifelong learning and development has been increasingly recognised. India's 12th Five-Year Plan (2012–17) has conceptualised the pre-primary and early primary sub-stages from 4 to 8 years old as an 'integrated early learning unit', to ensure a sound foundation for every child. With the expansion of private preschools, particularly in urban areas, even the poorest families are opting for low-fee private schools rather than free government services offered through the anganwadis (preschool centres). While evidence from developed countries exists that preschooling can have long-term beneficial effects on children, longitudinal evidence in India regarding the association of preschool education with later developmental outcomes is scarce. In light of this, this working paper draws upon Young Lives panel data to explore whether children who attended private preschools demonstrate higher cognitive skills and enhanced subjective well-being at the age of 12, compared to those who attended government preschools.

Using linear and logistic regression models, as well as propensity score matching techniques, the analysis revealed that children who attended private preschools have significantly higher mathematics scores and more positive subjective well-being than children who attended government preschools. However, there is no significant association of private preschools with higher PPVT scores. Another important finding is that entering preschool after the age of 4, is shown to have a significant negative association with both cognitive achievement, as demonstrated by mathematics and PPVT scores, and affective domain, as measured by subjective well-being at the age of 12. The propensity score matching reveals that children who had private preschool education scored nearly 10 times and 13 per cent higher in mathematics scores and subjective well-being respectively at the age of 12 than children whose preschool education was provided by the Government.

Given that the recently enacted National Policy on Early Childhood Care and Education recognises early childhood education as the foundation for all future learning and as a sorely neglected area, it is clear that policymakers must prioritise early childhood education, and quality within preschools be closely monitored, to ensure that the most disadvantaged children have access to high-quality preschool education programmes.

1. Introduction

Early childhood education (ECE) programmes are viewed by experts in education as an indispensable foundation for lifelong learning and development. ECE has been considered to promote a more active, 'constructive' child learner and foster cooperative learning through play, which is considered an important vehicle for learning and growth (Halpern 2013). Integrated, intensive, high-quality early childhood interventions are known to be effective in promoting child development and to avert the loss of young children's development potential (Engle et al. 2007). This was prefigured by Heckman (2000), who emphasised that 'early learning begets later learning and early success breeds later success, just as early failure breeds later failure'. In many countries ECE has not been given the policy attention it deserves. Globally ECE has the lowest investment of all the stages of education, which leads to many children becoming marginalised in the longer term, even though they are going through their most impressionable years and an intervention at this point could be hugely beneficial.

Various authors have pointed out advantages associated with preschool education, both in the short and long term. For example, Rutter (1985) suggested that 'learning how to learn may be as important as the specifics of what is learned' (p. 700), while Sylva (1994) found that the most critical skills and attitudes learned through early experiences in preschool included acquiring a learning orientation and beginning a 'pupil career' with confidence. Recent meta-analyses drawing together the evidence across decades of research and evaluation provide us with evidence to confidently posit that preschool programmes can have a substantial impact on early learning and development. Drawing upon studies such as the Perry Pre-school Project, researchers have proved that there are long-term social and economic advantages associated with preschool attendance (Currie 2001; Barnett 2008). Positive effects on children's development have been highlighted for language, literacy and early maths skills; for social and emotional outcomes; and for health (Yoshikawa et al. 2013). Research also highlights that high-quality early learning environments have a strong effect on academic and social outcomes at elementary level (Melhuish et al. 2008). However, only a few early intervention studies have tracked the effects of high-quality early child care and education into the high school years and beyond (Vandell et al. 2010).

Given the current debate about the number of private preschools increasing in India, this working paper aims to compare the association of government and private preschool education with later development by analysing the following question:

Do children enrolled in private preschools demonstrate higher cognitive and affective skills at the age of 12 than those enrolled in government preschools?

The paper is organised as follows: Section 2 describes the context of the research, both the situation in India and the literature on international ECE. Section 3 describes the sample and nature of both the quantitative and qualitative data used from the Young Lives survey. Then, Section 4 outlines the statistical methods adopted for the study. Section 5 pertains to results, which include findings from bivariate analysis and from multivariate regression models. Section 6 sums up the findings and draws relevant policy implications from the research.

2. The context: the preschool landscape in India and a review of relevant literature

2.1. Legislative background

Soon after its independence, India made a commitment to provide free and compulsory education to all children up to the age of 14. In 1950 the Government of India passed Article 21A of the country's Directive Principles, which stated that '[t]he state shall endeavour to provide within a period of ten years from the commencement of the Constitution for free and compulsory education for all children until they complete the age of 14 years.' However, this Directive Principle was amended in 2001 by dividing children aged 0–14 into two groups. Children aged 6–14 were given the right to free and compulsory education under Article 21A, and children below 6 years of age were covered by an amendment to the Indian Constitution, namely a new article, Article 45, which directs that '[t]he State shall *endeavour* to provide early childhood care and education for all children until they complete the age of six years' (emphasis mine). Education for children in the age group 6–14 years was further strengthened by the passing of the Right to Free and Compulsory Education Act, 2009, which made elementary education (Grades 1–8) a fundamental right. Much to the chagrin of activists and early childhood education practitioners, children under 6 were left out of the ambit of Right to Education Act – in short, children under 6 years of age do not have a fundamental right to preschool education. A diagram of the structure of the Indian school system is in the Appendix (Figure A1).

2.2. Government preschools: Integrated Child Development Services (ICDS) and pre-primary classes attached to government primary schools

In terms of schemes related to ECE, more than four decades ago the 1974 National Policy for Children laid the groundwork for recognising the importance of integrated service delivery for young children. In 1975 India launched 33 projects on an experimental basis, as part of what is now the world's largest publicly funded child development programme, called the Integrated Child Development Services (ICDS). ICDS has since been expanded to cover the whole country and provides six services related to early childhood care and education (ECCE), including nutritional support (in the form of a hot cooked meal served at school) and health services, to 158.7 million children (aged 0–6 years) through 1.3 million *anganwadi* centres (preschools). Preschooling or ECE, is a critical element of ECCE and is an integral component of the ICDS programme. Though ECE was highlighted as a significant area for intervention in the 11th Five-Year Plan (2007–12), with the age group 3–6 years identified as the 'most critical period when the foundations are laid for life-long development and the realisation of full potential', the data are disappointing (MWCD 2006). Currently ICDS reaches about 75.7 million children, only 48 per cent of children aged 3–6 years (MWCD 2011). The third round (2005–6) of the National Family Health Survey (IIPS and Macro International 2007) shows that around 56 per cent of children in preschool were enrolled in

anganwadis. However, only 31 per cent of them were attending the centres regularly. A large variation is also found in access to ECCE between states (CREATE 2010).

The 12th Five-Year Plan (2012–17) has conceptualised the upper pre-primary and early primary sub-stages, from 4 to 8 years, as an ‘integrated early learning unit’, to help ensure a sound foundation for every child. In September 2013, the Government approved the National Policy on Early Childhood Care and Education. The significance of the policy is that for the first time special emphasis has been given to developing and expanding the education component of ICDS, with all state governments directed to develop their own ECE curricula. The recently restructured ICDS also makes a clear statement regarding conversion of all anganwadi centres into ‘vibrant ECCE centres’ – a very positive development for India’s hitherto neglected 159 million children in the 0–6 years age group.

However, the NPECCE still needs to be implemented, both in letter and in spirit, and responsibility for children’s early education continues to be divided between the Ministry of Women and Child Development on the one hand, which caters for 3–6 year olds through anganwadi centres, and the Ministry of Human Resource Development on the other, which oversees formal primary education. Though the Right to Free and Compulsory Education Act 2009, mandates that all children should enter Grade 1 at 6 years of age, today the majority of children are entering primary school at the age of 5, since education is a ‘concurrent’ subject and individual states decide the age of entry into formal schooling. The recent 23rd Joint Review Mission of the Sarva Shiksha Abhiyan (Education for All) programme, conducted by the Ministry of Human Resource Development, highlighted that 19.43 per cent of government schools already had a pre-primary section (PPS) attached (MHRD 2016). In six states more than 80 per cent of primary schools had a PPS section, in 16 states more than 15 per cent of government schools had a PPS, and in 20 states/Union Territories more than 10 per cent of government schools had PPSs.

The latest data available indicate that 64.5 per cent of 3 year olds and 76.3 per cent of 4 year olds in rural India are attending anganwadis (ASER 2014). This excludes the urban statistics, since no database is available for children attending ECE programmes in urban locations, particularly covering the private sector.

2.3. Private preschools

It is important to note that the last two decades have seen an increasing number of private preschools entering the education arena in both urban and rural India. These range from schools in one-room tenements to impressive preschools equipped with the latest equipment and staffed by qualified professionals. Recent research indicates a proliferation of low-fee private schools and preschools penetrating at a phenomenal pace even into the remotest rural and tribal areas as providers of preschool and primary education (Sood 2014; Singh 2014).

The rising educational segregation that results from young children from better-off families being sent to private preschools, and the resulting social inequity, is an area of increasing concern. Analysing data collected in Madhya Pradesh and Chhattisgarh, CREATE (2010) highlighted that there was considerable variation in access to preschool, with children, belonging to marginalised groups, particularly girls, depending on government pre-primary schools, whereas boys and those belonging to higher socio-economic groups were more likely to be attending private schools. Many of these private preschools carry the tag ‘English-medium’. Streuli et al. (2011) posit that the promise of private school providers that children will be rapidly initiated into English-medium learning and teaching, even at kindergarten level,

has been especially attractive to aspiring parents, although not always delivered in practice once they have enrolled their children.

The recent National Council of Education Research and Training position paper on ECCE (NCERT 2015) highlighted that despite expanded access, the quality of ECCE available to children is not developmentally appropriate. It varies from a minimal provision of songs and rhymes in most anganwadis, to a downward extension of the primary curriculum, delivered in a didactic and teacher-centred fashion, in private preschools; both of these are detrimental to children's early learning and development. Ensuring that children have access to appropriate and high-quality ECCE is therefore necessary, and will in turn contribute to reducing exclusion in society (Singh 2013).

2.4. Literature review: evidence of the long-term effect of preschool education and the differences between government and private preschools

The literature about education in the West is replete with examples of evidence of returns to investment in ECE, though the effects vary in size based on the programme (DeCicca and Smith 2011; UNESCO 2010; Grantham McGregor et al. 2007; Heckman and Masterov 2007; Engle et al. 2007, Belfield et al. 2006; Woodhead 2006). Multiple meta-analyses conducted over the past 25 years of 23 comparative studies of early childhood interventions, including both quasi-experimental and randomised studies, have found preschool education to produce an average immediate effect of about half (0.50) a standard deviation on cognitive development (Camilli et al. 2010). While research on the association between preschool and cognition has shown convincing evidence of a positive relationship (for example, Peisner-Feinberg et al. 2001), the association between preschool education and children's social emotional outcomes remains less conclusive (Sylva et al. 2011; Sammons et al. 2007).

Existing literature demonstrates that expenditure on services for young children can be a country's most powerful investment, with returns over the life course many times the amount of the original investment (Irwin et al. 2007). Sending children to preschool can therefore be perceived to be among the most important investments in their later development. Since children accumulate skills over time and there is sufficient evidence to prove that children have certain sensitive periods during their first five years for domains related to cognitive functioning, such as language and concept development, children born into poor and socially disadvantaged families are likely to enter school with an academic disadvantage because without preschool intervention, they may not get the stimulation they require. Halpern (2013) has highlighted that ECE provision remains divided by social class and, to some degree, race, while researchers such as Barton and Coley (2008) have highlighted group-level contrasts associated with social class and ethnicity, in vocabulary, and in pre-literacy and pre-mathematics skills. Using longitudinal data, Loeb et al. (2007) found that exposure to a centre programme of at least half a day (per day) yielded cognitive benefits for most children and that greater benefits could accrue from interventions that started earlier than the age of 4. A World Bank study (2005) also found that by the time children in many countries reached school, they were at a significant disadvantage in cognitive and social ability as compared to peers who attended preschool.

The developing world in general, and India in particular, has very few examples of research, in particular longitudinal research, that has captured the impact of preschool education on later developmental outcomes. A study undertaken by NCERT (Kaul 1998) on about 38,000 children across eight Indian states demonstrated 15 to 20 per cent better retention rates in

primary school for children who had gone through ECCE as compared to those who had not. Using empirical evidence from Young Lives, (Woodhead et al. 2009) show that by the time most of the Younger Cohort children in the samples in Ethiopia, India, Peru and Vietnam had started school, inequalities in readiness for school were already well established, and the opportunities for reducing these inequalities through schooling were very limited in practice. Using Young Lives data from Ethiopia, Woldehanna and Gebremedhin (2012) found that preschool attendance had a statistically significant positive impact on the cognitive development of children at both 5 and 8 years old.

While a large number of studies of children from developed countries have highlighted the long-term effect of preschool education, limited studies have looked at these outcomes on the basis of preschool type. Barnett (2008) concluded that in the USA programmes across the public and private sectors have produced similar results when operating with the same resources and standards as part of the same pre-kindergarten programme. A recent study related to disadvantaged children in the USA (Coley et al. 2016) stated that after adjusting for differential selection into early education centres (EECs) through propensity score weighting, low-income children who attended private EECs showed higher maths, reading, and language skills at the age of 5, with children attending Head Start and government centres also showing heightened maths and reading skills in comparison to children experiencing only parent care. No differences were found in children's behavioural skills at the age of 5 in relation to the type of early education centre. Penn (2011) found that in the UK, the for-profit sector has been the main vehicle for implementing government policy and that it was particularly problematic. She highlighted that:

for-profit care is volatile, dependent on local markets for uptake of places, expensive for parents, and frequently of poor quality. There is substantial evidence to suggest it does not offer parents increased choice, nor does it provide more flexible provision, although it removes the burden of doing so from the government. (p. 159)

Another study, conducted to investigate differences in the provision of private and public ECE centres in Kenya (Sitati et al. 2016), concluded that there were no significant differences in the provision of classrooms and furniture between the government and private ECE centres. However, significant differences existed in the provision of water and sanitation and the prevalence of play, in favour of the government ECE centres. Li et al. (2016), examining Chinese preschools, found that ECE quality was higher in urban than in rural areas, in government than in private kindergartens, and in programmes containing children whose parents had high levels of education than in those where parents were less well educated, although quality was relatively low overall. On the other hand, Ahmad et al. (2013), drawing upon analysis of government and private preschools in Pakistan, concluded that in private preschools infrastructure was much better and more individual attention was paid to children and 'the situation was worse in public preschools'. It is evident that results are mixed and differences exist regarding the provision of services by government and private preschools, depending on the context.

Regarding studies of preschool type in India, a recent longitudinal study (CECD 2015) tracking 13,000 4-year-old children in Assam, Rajasthan and Telangana since 2011, found that between the ages of 3.5 and 4.5, 43 per cent of the children attended private institutions and that this proportion increased each year, with more boys enrolling in both private preschools and PPSs. The increase in the popularity of private preschools is largely due to the perception that they provide a better-quality education since they are labelled as offering 'English-medium' teaching. Sood (2014) concluded that:

while there is a lack of fit between parental aspirations and the services offered at the anganwadi ... the private sector seems to be making the most of the situation by luring the parents through introducing early schooling. Unfortunately in the entire scheme of things, the worst sufferers are the young children[,] whose needs for holistic development are not met appropriately either through public or by the private sector provisions.

2.5. Importance of comparing private and government schools in India

Early learning environments must be recognised as major arenas of social experience and an obvious way of creating a more tolerant, civilised and plural world community. Concerted efforts must be made to provide young children with experiences that will enable them to learn how to live tolerantly and respectfully with people from different backgrounds.

Given that there is little evidence available in India regarding the cognitive and affective outcomes of children at the age of 12 (on the basis of their preschool education), and none of the existing longitudinal studies have tracked children beyond primary school, in this working paper we compare the cognitive and affective skills of older children who attended government or private preschools.

Recognising that children deserve a level playing field, we estimate the long-term effects of private and government preschools, by drawing upon quantitative and qualitative research evidence from four rounds of the Young Lives longitudinal study in undivided Andhra Pradesh (bifurcated into two states in 2014, called Telangana and Andhra Pradesh). When we examine the preschool attendance at the age of 5 of the Older Cohort children, who were 8 years old in Round 1 (2002), we find that 40 per cent had not attended any preschool, while 41 per cent had attended government institutions and 19 per cent had attended private preschool. By contrast, only 13 per cent of the Younger Cohort children were not attending preschool when they were 5 years old in Round 2 (2006). Of the 87 per cent who were attending, 53 per cent were enrolled in government schools (ICDS/anganwadis) and 34 per cent in private preschools. This appears to indicate that over the years more children were being enrolled in preschools in general and private preschools in particular.

3. Data

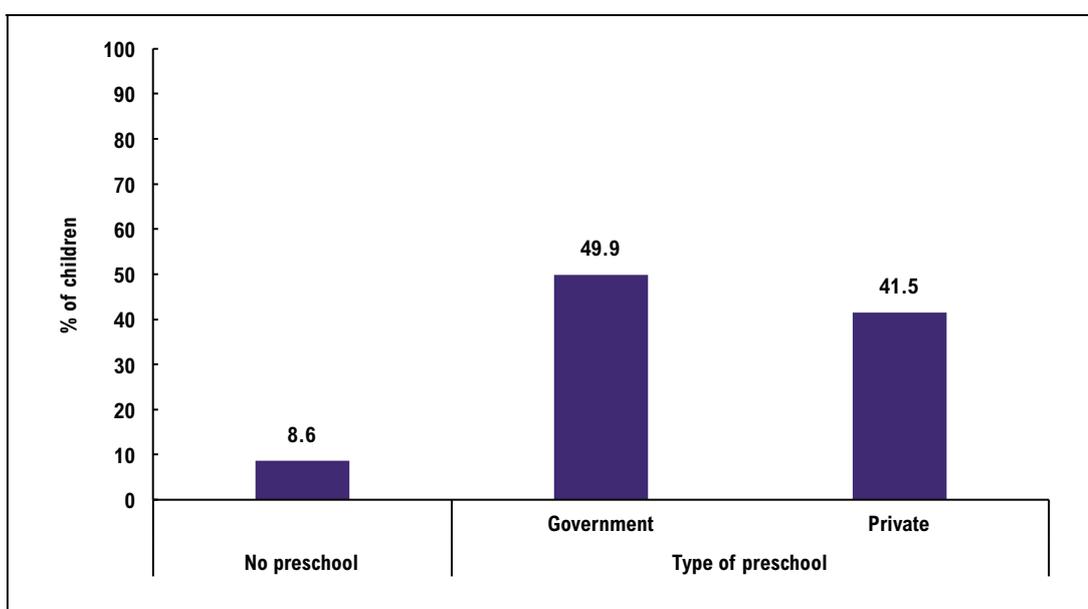
Young Lives is a longitudinal study of childhood poverty in four developing countries (Ethiopia, India (undivided Andhra Pradesh), Peru and Vietnam). It tracks two cohorts of children in each country over 15 years (2002–17): a Younger Cohort, born in 2001–2, of 2,000 children, and an Older Cohort, born in 1994–5, of 1,000 children. To investigate the effects of ECE on young children's long-term cognitive development and subjective well-being at the age of 12, we use Young Lives data on the Younger Cohort in India. Data from four rounds of the quantitative survey and the first round of the qualitative survey (2007) have been used. In Round 1 of the quantitative survey (2002) the Younger Cohort children were around 1 year old, in Round 2 (2005) around 5 years old, in Round 3 (2009) approximately 8 years old, and in Round 4 (2013) they were around 12 years old. They were approximately 6–7 years old when the first round of the qualitative survey was conducted in 2007. The data collected in all four quantitative rounds include information on children and their families'

access to key services, and children’s work, time-use patterns and social relationships, as well as core economic indicators such as assets. In addition, there are also data on children’s nutritional status, cognitive and schooling outcomes, and subjective well-being. It is important to note that Young Lives oversamples poor families in order to study the causes, consequences and effects of poverty, and the results cannot be generalised to the whole population of the state.

Young Lives qualitative research uses a range of methods, including one-to-one interviews, group discussions and creative activities (such as drawings of a child ‘doing well’/‘doing badly’, and body mapping). Qualitative interviews were recorded, transcribed and translated (Crivello et al. 2013). The first round of qualitative interviews consisted of focus group discussions with teachers and anganwadi workers, as well as caregivers and children themselves. The qualitative data used in this paper form an integral part of the research, since they provide critical information related to the quality of education in preschools, as perceived by stakeholders such as primary school teachers and caregivers, which is not captured in the quantitative research.

This paper draws upon data related to preschool attendance for the Younger Cohort. We find that preschool enrolment increased between Round 2 and Round 3 of the survey. During Round 2, only 53 per cent of the children at age 4–5 years were reported to be attending government preschool and this increased to 87 per cent by Round 3. Drawing upon data collected in Rounds 3 and 4, Figure 1 shows that less than 9 per cent of the sampled children did not attend preschool, close to half the children attended government anganwadis, and 41 per cent attended private preschools.

Figure 1. *Percentage of Younger Cohort children by preschool attendance and types of preschool attended*



Source: Young Lives India, Younger Cohort, Round 3 (2009) and Round 4 (2013).

Given that children may have joined preschool between Rounds 2 and 4, we use data about their education history (which included preschool attendance and type of preschool, government or private) collected for all children in Rounds 3 and 4 to estimate how many

Young Lives children ever attended preschool and determine the type of preschool they were at.¹ Round 1 data provide information on children's gender, caste,² stunting status³ and parental education. The data on cognitive development and subjective well-being at the age of 12 are drawn from Round 4. We also draw upon Round 2 data for Peabody Picture Vocabulary Test (PPVT) scores and scores in the quantitative Cognitive Development Assessment test (CDA-Q), which are used as predictor variables in the regression analysis. The use of PPVT and CDA-Q scores as lagged scores⁴ in regression analysis controls for children's ability to a large extent, in order to yield consistent estimates for the variables that may be correlated with ability. Data relating to subjective well-being were gathered through the use of a 'ladder of well-being', an adaptation of Cantril's 'self-anchoring ladder', in Round 4, when the children were 12 years old. It is important to note here that as our focus is on examining the differential effects of government and private preschool, we have analysed only those children who attended either government or private preschool (N = 1,750).

Below are the predictors used in the paper:⁵

Individual: gender, caste, birth order, stunting status, lagged PPVT scores and lagged CDA-Q scores.

Household: urban/rural location, mother's education, father's education, baseline wealth index.⁶

Preschool: age of entry into preschool, type of preschool, quality of preschool as perceived by caregivers.⁷

-
- 1 A few children enrolled in preschool as late as the age of 10/11 years (two children in 2011 and nine children in 2010). As these children joined preschool after 2009, we have used Round 3 and Round 4 data to estimate the total number of children that attended preschool.
 - 2 Caste in India is divided into four official categories. Scheduled Tribes, Scheduled Castes and Backward Classes are recognised in the Constitution of India as historically disadvantaged, while Other Castes are the more privileged and socially and educationally advanced castes.
 - 3 Children's stunting status is calculated from anthropometric data from Round 2 (2006) when the children were approximately 5 years old. Stunting is defined as low height-for-age which 'reflects a process of failure to reach linear growth potential as a result of suboptimal health and/or nutritional conditions' (WHO 2016). Children whose height-for-age z-scores are below minus two standard deviations from the median height-for-age of the reference population are considered as stunted.
 - 4 Lagged PPVT scores and lagged CDA-Q scores are used as predictor variables for PPVT and mathematics test scores respectively at age 12 in regression analysis. The logic is that the PPVT score at the age of 8 probably has an influence on the PPVT score at age 12, and CDA-Q score at an early age may influence later achievement in mathematics at age 12.
 - 5 See Table A1 in Appendix for more details.
 - 6 The baseline wealth index is taken from Round 1 (2002). The wealth index is a composite index that reflects the welfare of household members in terms of quality of the dwelling (for example, the materials of the walls, roof, etc.), use of durable goods (whether the household owns a radio, TV, bicycle, etc.), and access to basic services (whether the household has drinking water, electricity, etc.).
 - 7 Caregivers were asked about their opinions on the standard of care and teaching at preschool during Round 2 (2006) when children were around 5 years old and supposed to complete preschool education. Due to the lack of data on quality of preschool education, we use this variable as the proxy as perceived by caregivers.

4. Methodology

On the basis of data about children's educational history, we put children into three categories: those who attended a private preschool, those who attended a government preschool, and those who did not attend preschool. However, in the multivariate analysis, we only consider children who were enrolled in either government or private preschools since we are analysing the effects of preschool attendance on developmental outcomes at the age of 12.

As mentioned earlier, we want to examine the influence of type of preschool on three dependent variables that are used as proxies for the development of a child at the age of 12. The first two dependent variables of interest are: (1) cognitive achievement as measured by the PPVT; and (2) mathematics test scores. The PPVT examines receptive vocabulary and is an untimed and norm-referenced test, offering both raw scores and standard scores. In the PPVT, the recipient hears a word, such as 'lamp', in their mother tongue and is asked to identify one out of four pictures which corresponds with the word. The PPVT was originally developed in 1959 by Dunn and Dunn, and the third version of it was used in the survey (Dunn and Dunn 1997).

Mathematics ability was assessed with 30 questions in Round 4 when the Younger Cohort were 12 years old. This test is about computation related to questions on addition, subtraction, multiplication, division, fractions and decimals selected from the Trends in International Mathematics and Sciences Study (TIMSS) and measured on a scale from zero to 30.⁸

The third dependent variable of interest relates to the affective domain, viewed in terms of subjective well-being, namely children's views about their own well-being. In this instance it was captured by showing children a picture of a ladder in Round 4 (2013), when they were 12 years old, and saying to them:

There are nine steps on this ladder. Suppose we say that the ninth step, at the very top, represents the best possible life for you and the bottom represents the worst possible life for you. Where on the ladder do you feel you personally stand at the present time?

Three preschool-related variables have been used in this paper.

1. Type of preschool. This is our main variable of interest. Type of preschool is categorised into public preschool or private preschool.
2. Age of entry into preschool. This has three categories: entry before age 4, entry at age 4, and entry at age 5 and after.
3. Quality of preschool. This is a subjective variable. In Round 2, caregivers were asked about their opinion of the standard of care and teaching at preschool. Owing to a paucity of direct information related to the quality of education in preschool classrooms, the authors decided to use this variable as a proxy for the quality of preschool education in India.

⁸ For further information on TIMSS, which has measured trends in mathematics and science achievement at the Grades 4 and 8 in around 60 countries since 1995, see www.timss.bc.edu.

4.1. Model specifications

Following Woldehanna (2011), we analysed the type of preschool education with the developmental outcomes of a child at the age of 12, as measured by two cognitive achievement test scores, the PPVT and the mathematics test, as well as one subjective well-being measure. Although our main interest was to examine the effects of the type of preschool education on three developmental outcomes at a later age, it might well be that these outcomes at the age of 12 are influenced by factors other than early childhood education or preschool education in particular (Woldehanna 2011). For this reason, we used a set of socio-economic control variables to improve the robustness of the results. For instance, nutritional status in early childhood is one of the most important determinants of the cognitive development and subjective well-being of a child, so we included a stunting variable (height-for-age z-score).

For the first two dependent variables, cognitive achievement as measured by the PPVT and mathematics test scores at age 12, we adopted a multiple linear regression model using ordinary least squares (OLS) to examine the influence of preschool variables. We chose linear regression over logistic or probit models because we wanted our dependent variable on cognitive scores to be continuous in form so that we do not lose any information. Using many control variables in linear regressions to examine the effect of preschool experience on the cognitive development of a child, we also reduced the possibility of omitted variable bias in our analysis (Loeb et. al. 2007).

4.1.1. Multiple linear regression specification

Dependent variable (Y) = $b_0 + b_1 \text{gender} + b_2 \text{caste} + b_3 \text{place in the birth order} + b_4 \text{stunting status} + b_5 \text{lagged PPVT score / CDA score} + b_6 \text{urban/rural location} + b_7 \text{mother's education} + b_8 \text{father's education} + b_9 \text{baseline wealth index} + b_{10} \text{age of entry into preschool} + b_{11} \text{type of preschool} + b_{12} \text{quality of preschool} + e$

Where b_0 = intercept,

b_1 to b_{12} = regression coefficients for individual predictors and

e = error term.

4.1.2. Binary logistic regression specification

For subjective well-being, we selected a logistic regression model, and the raw scores generated by the ladder were categorised into a binary variable 'negative' (coded '0') and positive' (coded '1'). The logistic regression model allows us to establish a relationship between a binary outcome variable and a group of predictor variables. It models the logit-transformed probability as a linear relationship with the predictor variables.

So let subjective well-being (Y) be a binary response variable

$Y_i = 1$ if the subjective well-being is positive in observation i

$Y_i = 0$ if the subjective well-being is negative in observation i

$X = (X_1, X_2, \dots, X_{12})$ be a set of explanatory variables

Hence the model would be

$$P(Y) = \frac{e^{b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n}}{1 + e^{b_0 + b_1x_1 + b_2x_2 + \dots + b_nx_n}}$$

Where,

P: probability of Y occurring, in this case 'positive' subjective well-being

e: natural logarithm base

b₀: interception at y-axis

b₁: line gradient

b_n: regression coefficient of X_n

The above logit model estimates the outcome in terms of probability ranging between 0 and 1, which is a restricted range. Hence, for the ease of understanding and interpretation, the results are transformed to log odds (logit transformation), which ranges from negative infinity to positive infinity. And the equation for estimating log-odds would be

$$\text{logit}(p) = \log(p/(1-p)) = \beta_0 + \beta_1x_1 + \dots + \beta_{12}x_{12}$$

The odds ratio thus obtained explains the likelihood of showing 'positive' subjective well-being of a category in comparison to a reference category of the same variable.

To make our results more robust, we also used propensity score matching (PSM) techniques to assess the impact of preschool on cognitive development and subjective well-being at the age of 12 and substantiate the OLS and logistic regression estimation results.

As Woldehanna (2011) pointed out for inferring causality, selecting an appropriate comparison group through PSM can offer an alternative way to obtain comparable results and can be compared to OLS. The matching assumptions ensure that the only remaining relevant difference between the two groups is programme participation (type of preschool in this case) provided that the differences can be captured by the observables and there is no individual effect.

In the estimation of the propensity score of the type of preschool, the explanatory variables used are those that could affect both the type of preschool attended and the dependent variables (cognitive outcomes and subjective well-being). Hence the variables we selected for PSM were gender, caste, place in the birth order, stunting status at the age of 5, both mother's and father's educational levels, urban/rural location, age of entry into preschool and quality of the preschool as perceived by the caregivers.

5. Results

5.1. Preschool attendance

As the preschool variables are the variables of interest in this paper, we begin by providing a brief overview of preschool attendance among our sample.

In this context, we have a situation where 1,750 children in the age group 3–6 either accessed preschools which were within the public domain, i.e. ICDS or anganwadi centres, which were free, or attended kindergarten classes within private schools, which were of varying quality and charged a fee. There were also 165 children who did not access any preschool and may have joined primary school or Grade 1 directly.

Table 1 shows that out of the total sample of 1,915 children, 8.6 per cent did not attend any preschool; 91.4 per cent of the children were found have enrolled in preschool, with 41.5 per cent attending private preschools and 49.9 per cent attending government institutions. We can also see that out of the 1,750 children who attended preschool, 21.3 per cent entered preschool below the age of 4, 37.3 per cent entered at the age of 4, and 41.4 per cent entered preschool at the age 5 or later.

Table 1. *Preschool variables*

Type of preschool	%	N
No preschool	8.6	165
Government preschool	49.9	955
Private preschool	41.5	795
Total	100	1,915
Age of entry into preschool		
Below 4 years old	21.3	373
4 years	37.3	653
5 years and above	41.4	724
Total	100	1,750
Quality of preschool		
Good	53.2	820
Fair	40.6	626
Bad	6.2	95
Total	100	1,541

Source: Young Lives India, Younger Cohort (2006–13).

It is interesting to note that while the preschool programme of the anganwadis is aimed at 3 to 6 year olds, statistics indicate that the age range of children attending anganwadis is on average moving downwards to 2 to 4 years and children are moving into schools, either government or private, at around 4 years old (ASER 2014). In the first round of the qualitative survey (2007), an anganwadi worker interviewed explained why the poorest children younger than 3 years old were entering ICDS or government preschools, while those younger than 5 were entering primary school:

The age prescribed by the ICDS is 3 years. However children who are less than 3 years also come to the anganwadi. While some of them come along with their older siblings, the others are sent all by themselves. The parents leave them here when they go to work.

The children [should] start primary school after completion of 5 years. This is the age prescribed by the Government. Some private schools admit children who are less than 5 years by changing their date of birth and increasing their age.

The implication of the second part of her statement is that the aspirations of better-off families for an early educational start for their children was influencing the general age of entry into primary school. We also questioned parents about their perception of the quality of care provided in the preschools their children attended, and only half the parents perceived services to be of good quality.

5.1.1. Reasons for attending preschools

Parents and caregivers interviewed during Round 2 were asked about their reasons for choosing preschools. Table 2 presents the percentage distribution of factors behind the selection of preschools as perceived by caregivers, by type of preschool. The majority of parents perceived preschool as a preparatory ground for formal schooling (nearly 60 per cent) and most of these responses came from parents whose children were admitted to government preschools. The second most common reason given for choosing a preschool was because the school adopted English as the medium of instruction (15 per cent) and 34 per cent of parents who sent their children to private schools chose this as a major reason for choosing the preschool. Nineteen per cent of caregivers also mentioned other reasons for choosing preschools.

Table 2. *Reasons for caregivers' choice of preschool, by type of preschool*

Type of preschool	Reason for choice			
	English medium	Good education	To help child prepare for school	Other
Government	4.43	3.23	68.18	24.16
Private	34.05	10.87	43.67	11.41
Overall	15.21	6.02	59.87	18.9

Source: Young Lives India, Younger Cohort, Round 2 (2006).

Most of the private preschools are attached to primary schools and children spend around two years in preschool before entering Grade 1. It is important to remember that private preschools are heterogeneous in nature and remain the preferred option of those who can afford to pay a fee.

Qualitative data from interviews with parents capture further detail about the reasons they chose particular preschools, as well as the reasons why they chose to send their children to preschool. A focus group discussion of mothers of Younger Cohort children in Katur highlighted their perception of preparatory work done by getting children used to a routine.⁹ In their view, "An anganwadi gives some sort of preparation to the child to go to primary school. Children do not cry or find it difficult to adjust when they go to the primary school from here." Muntaj, a Muslim girl living in Hyderabad, attended the anganwadi from the age of 2 and then joined primary school at the age of 5. Her mother feels that attending anganwadi was a "good thing, since she got habituated to studies".

9 In order to preserve the anonymity of respondents, their names, and the names of research locations, are pseudonyms.

The next most popular reason for sending children to preschool was that they could start to learn English. This applied mainly to private schools. Srikanth's mother was very pleased that her son was attending an 'English-medium' private primary school, which he joined when he was 3. She said that the teachers were from outside her village and she was happy that they did not teach in Telugu. This was also true for Jagati's mother, who chose an urban English-medium private school for her daughter, since English is not used as a medium of instruction in Government schools and she was thinking about her daughter's future:

We talk in Telugu in home and outside ... But in degree and in all the studies English is must. In Intermediate [secondary school] also, all are English medium only. So we prefer English medium.

Qualitative data also helped to reveal why poorer children did not attend preschool. Staff in anganwadis interviewed during Round 1 explained some of the reasons why the poorest children moved straight into government primary schools rather than attending ICDS preschools:

Even though the [anganwadi] teacher and the ayah [helper] visit homes to convince parents to send children to [anganwadi or government] preschool, families may not send for various reasons. Scheduled Caste families in particular will stop elder child to assist in household work if mother is pregnant or to take care of younger siblings ... Also primary school mid-day meal provided to all children attracts children and parents of lower castes in the community who are deprived of food. The teachers in the primary school allow these [underage] children to informally sit along with their siblings and serve them food. So they are going to the government primary school also.

As mentioned earlier, ICDS serves supplementary nutrition as part of its integrated services. Some preschools also help with children's nutrition, by serving a kind of porridge fortified by vitamins. It appears that some parents consider the government preschool or anganwadi as a food distribution centre rather than a place of learning. An anganwadi worker told us that "parents and the children at preschool are treating it as a centre for providing supplementary nutrition. They think that this preschool is only for providing the nutrition supplement."

Other parents perceive the quality of education provided in anganwadis as being of little or no value. The same anganwadi worker said, "Some other parents feel that children are not provided with education [in the government preschool or anganwadi] as in the primary school and feel that they [children] are not learning anything here." Raju's mother, a construction worker in Poompuhar, preferred to move her son to primary school after six months of his attending the anganwadi. She explained that:

Raju attended anganwadi from the age of about 3 or 4. He didn't learn anything in that anganwadi. Simply going and coming ... they teach nothing ... they make the children sit for hours ... at specific time they feed them and send them back; that's all.

Shanmukha Priya's mother (Backward Class, poorest tercile) also shared that although she sent her daughter to a government preschool for a year, Shanmukha Priya did not learn anything. She complained that "There is no specific advantage [of anganwadi centre or government preschool], not much contribution ... They don't teach at all ... hence we have changed the school."

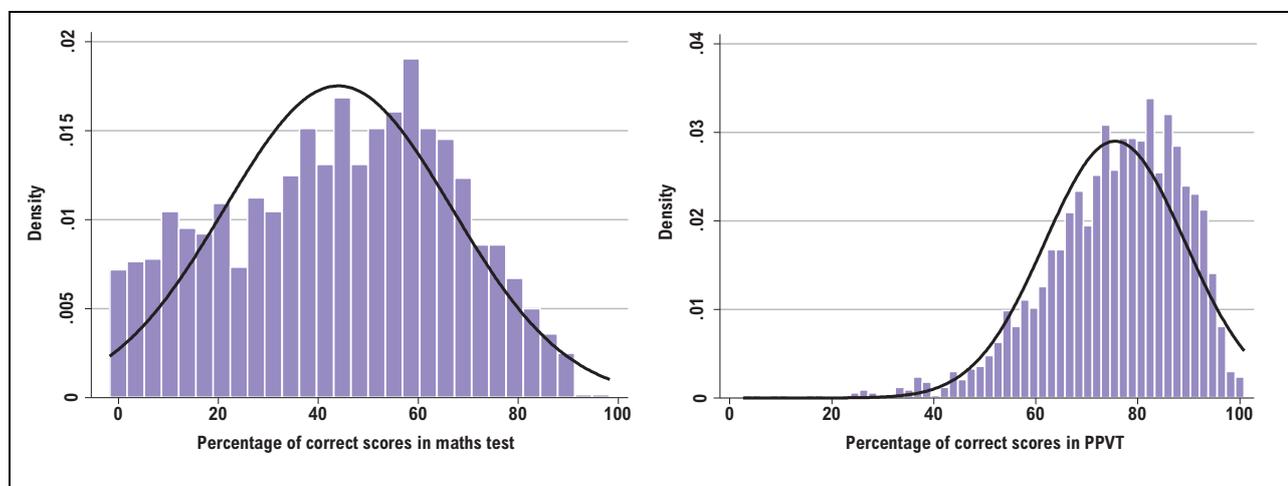
5.2. Dependent variables

5.2.1. Cognitive achievement

Before interpreting the results obtained from bivariate and multivariate analysis, we present a brief explanation of the three dependent variables against which the effects of preschool are examined. As mentioned earlier, cognitive achievement has been evaluated on the basis of PPVT and mathematics test scores drawn from the tests administered to children at 12 years old in the Round 4 survey (2013).

Figure 2 presents the distribution of both mathematics test scores and PPVT scores. Histograms with normal distribution are presented to show the distribution of these two cognitive achievement variables. The graphs show that the mean mathematics scores obtained by children are much lower than mean PPVT scores. Also from the shape of the normal curve, it is visible that standard deviation is higher in case of mathematics test scores than PPVT scores.

Figure 2. Histogram of mathematics and PPVT scores at age 12



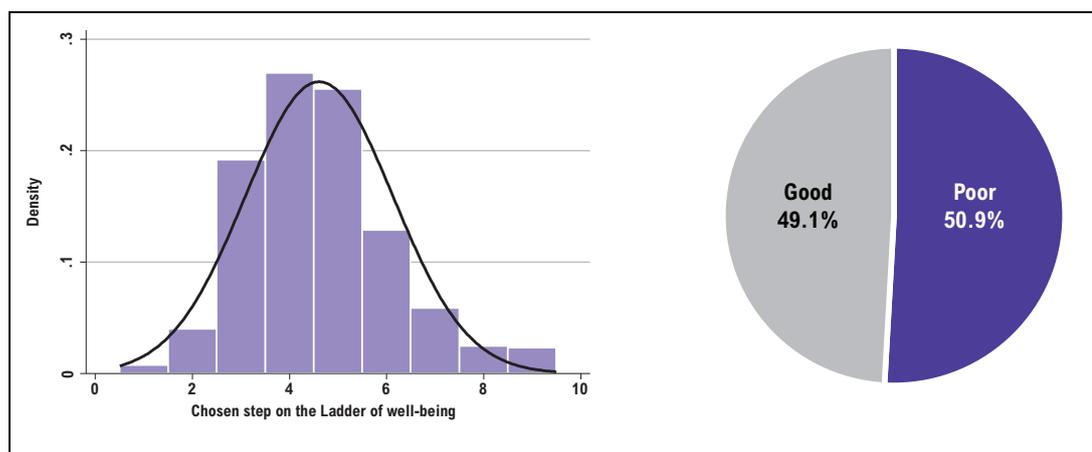
Source: Young Lives India (2013).

5.2.2. Subjective well-being

Subjective well-being is an important indicator of children's satisfaction with their personal situation. Roberts (2010) commented on the subjective element of well-being by noting that a child's 'sense of well-being' involves an internal experience and assessment of 'feeling all right'.

Figure 3 shows a histogram with a normal distribution curve and the coded binary form of the scores of the ladder of well-being, also shown in a pie chart. It can be seen that almost half of the children reported having positive subjective well-being and the other half showed negative subjective well-being.

Figure 3. *Distribution of levels of subjective well-being reported by 12 year olds*



Source: Young Lives India, Younger Cohort, Round 4 (2013).

5.3. Bivariate analysis

5.3.1. *Type of preschool*

Before carrying out the main analysis, it is beneficial to outline which categories of children attended private school and who attended government schools. Table 3 shows the percentage distribution of children who attended government or private preschool by all the independent variables that we considered for multivariate analysis.

Table 3 reveals that more boys (51.2 per cent) attended private preschool than girls (38.7 per cent). There was also a caste differential in preschool attendance. Around 74 per cent of children from Other Caste backgrounds were enrolled in private school, which was highest amongst all the caste groups, followed by children from the Backward Classes (46.6 per cent). On the other hand, attendance at private preschool was much lower amongst Scheduled Caste and Scheduled Tribe children, with less than a quarter of Scheduled Tribe children and 29 per cent Scheduled Caste children attending private preschools.

Analysing by children's place in the birth order, first-born children are found to be more likely (52.8 per cent) to attend private preschool than later-born children (36.8 per cent). It is interesting to note that more children who were not stunted attended private preschool (50.8 per cent) than children who were stunted (35.6 per cent).

In India in general, and in Andhra Pradesh in particular, urban/rural location is clearly related to type of preschool since urban children have a higher chance of attending private preschool than rural children, who usually attend government preschool since private preschools are more prevalent in urban areas. Our findings also show that in urban areas 86 per cent of children attended private preschools, compared to 32 per cent of children from rural areas.

Type of preschool attended also seems to be associated with parental education. For example, children with mothers with secondary and higher education were more likely (81 per cent) to attend private preschools than children whose mothers had not completed secondary level (34.1 per cent). The same is true for children with educated fathers (fathers with secondary education and above). Furthermore, households' prosperity played an important role in determining the type of school that children attended. Our results show that

the mean wealth index was much higher for children who attended private preschools (0.53) compared to children who attended public preschools (0.31).

Table 3. *Percentage distribution of children attending government and private preschool, by background variables*

Variable	Type of preschool	
	Government	Private
Gender		
Male	48.8	51.2
Female	61.3	38.7
Caste		
Scheduled Castes	71.5	28.5
Scheduled Tribes	76.0	24.0
Backward Classes	53.4	46.6
Other Castes	25.6	74.4
Birth order		
First	47.2	52.8
Later	63.2	36.8
Stunting status (Round 2)		
No	49.2	50.8
Yes	64.4	35.6
Urban/rural location		
Urban	14.5	85.5
Rural	68.3	31.7
Mother's education		
Below secondary	65.9	34.1
Secondary and above	19.0	81.0
Father's education		
Below secondary	69.6	30.4
Secondary and above	29.7	70.3
Wealth index (Round 1)	0.314	0.527

Source: Young Lives (2002–13).

5.3.2. *Later developmental outcomes (at age 12)*

The relationship between type of preschool, age of entry into preschool and quality of preschool on the one hand, and later developmental outcomes in terms of cognitive achievement scores and subjective well-being on the other, is discussed here on the basis of the bivariate analysis presented in Table 4. Additionally, we present kernel density distribution of standardised mathematics and PPVT scores by these preschool variables in Figure 4.

It is important to emphasise at this point that preschool attendance is not the only variable that may be associated with test scores and subjective well-being at the age of 12. There may be many other factors involved, for example, type of primary school attended, quality of schooling, family support, and varied opportunities for learning.

Results show that there are significant differences in the achievement scores of children who went to different types of preschool. Children who attended private preschool scored better in both the PPVT and mathematics tests (78.8 per cent and 50.4 per cent respectively) at age 12 than the children who attended government preschools (74.0 and 38.8 respectively). Equally, attendance at private preschool seems to have a better effect on children's well-

being at age 12. Results show that the percentage of children reporting positive subjective well-being was only 18 per cent amongst children who attended government preschool, whereas 30 per cent of children who went to private preschools reported the same.

Findings also reveal that children who entered preschool at an early age (below 4 years old) were more likely to have good cognitive achievement scores and subjective well-being than children who entered preschool at a later age. The mathematics and PPVT scores at age 12 were 49.7 and 79.4 respectively for children who entered preschool before the age of 4. These were significantly higher than the scores obtained by children who entered preschool at age 5 or after (39.8 and 73.7 respectively). The same association is found between age of entry and subjective well-being. Among the children who entered preschool before they were 4 years old, the percentage reporting positive subjective well-being is 29.3, in comparison to 19.6 per cent among the children who entered preschool aged 5 years or more.

The relationship between the quality of preschool, as perceived by caregivers, and the three developmental variables at age 12 shows that children of caregivers who perceived the preschool to be of good quality performed better in both cognitive tests and had higher subjective well-being compared to children whose parents reported their child's preschool to be of 'bad' quality. There were gaps of 9.6 and 21.5 percentage points respectively between the mathematics scores and subjective well-being measures of children in good- and bad-quality preschools. Though a similar pattern is observed for the PPVT, the difference between good- and bad-quality preschool is not as sharp.

Table 4. *Outcomes at age 12 by preschool attendance and quality*

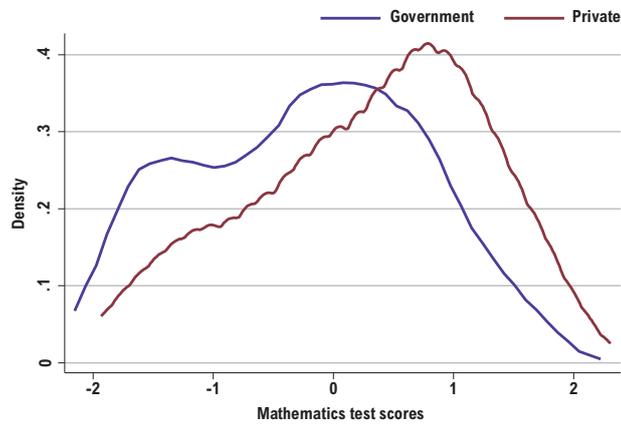
Preschool attendance	Cognitive achievement		Subjective well-being	
	Maths	PPVT	Negative	Positive
Type of preschool				
Government	38.8	74.0	82.0	18.0
Private	50.4	78.8	69.6	30.4
Age of entry into preschool				
Below 4 years old	49.7	79.4	70.7	29.3
4 years	45.8	77.1	75.2	24.8
5 and above	39.8	73.7	80.4	19.6
Quality of preschool				
Good	46.5	77.5	72.2	27.8
Fair	41.9	74.9	77.8	22.2
Bad	36.9	71.8	93.7	6.3

Source: Young Lives (2006–13).

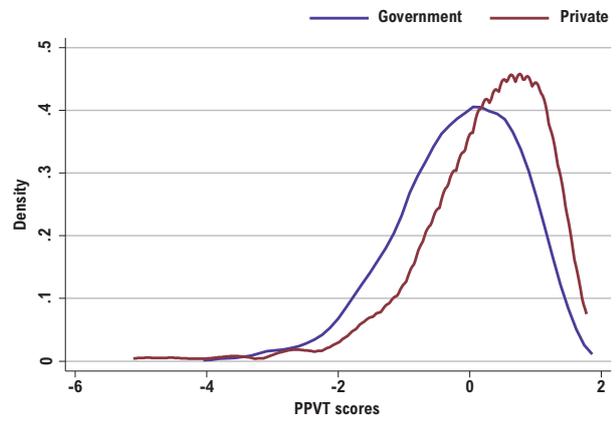
Figure 4. *Distribution of achievement scores by preschool variables*

Type of preschool

Mathematics test scores

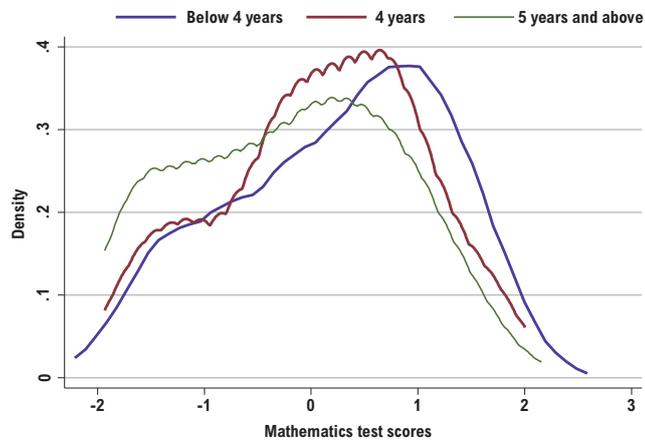


PPVT scores

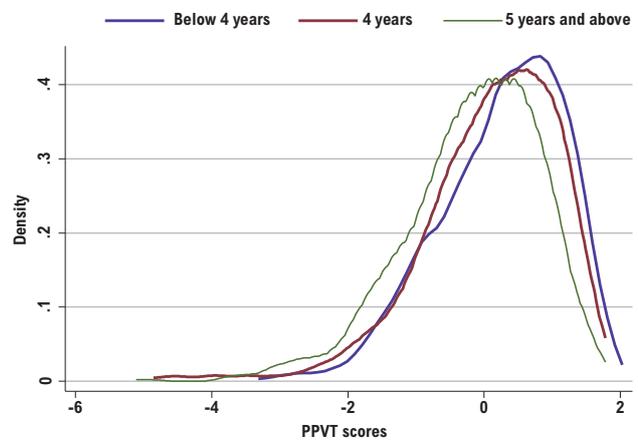


Age of entry into preschool

Mathematics test scores

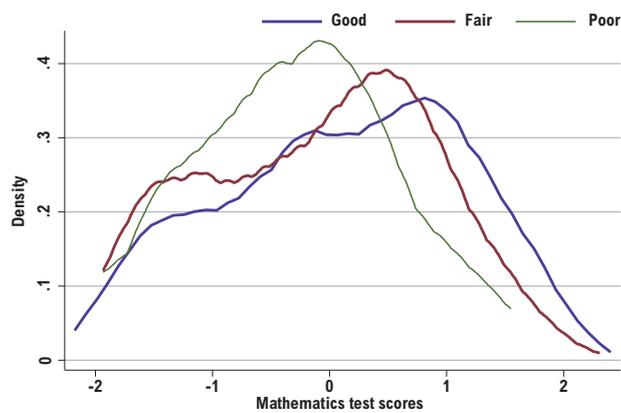


PPVT scores

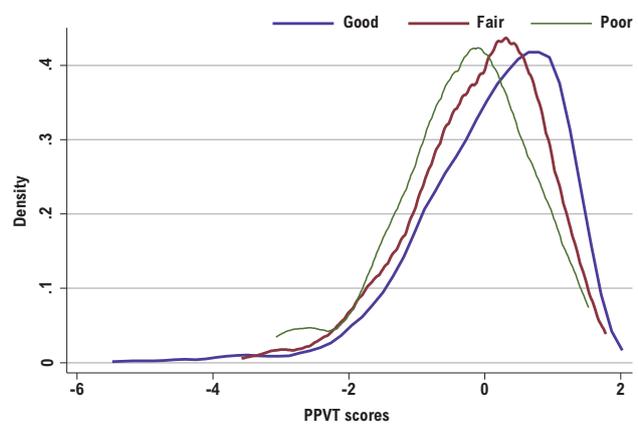


Quality of preschool as perceived by caregivers

Mathematics test scores



PPVT scores



Source: Young Lives (2006–13).

5.4. Multivariate analysis

In this section, we examine the effects of preschool variables on children's outcomes at the age of 12, after controlling for other variables. For cognitive development, we used a multiple regression model (employing OLS) and for subjective well-being, we adopted a logistic regression model. After carrying out both OLS and logistic regressions, to check the endogeneity in the model, we further carried out PSM techniques for all three dependent variables.

5.4.1. *Impact of preschool education on cognitive development*

In order to examine the effect of preschool education on the cognitive development of those children receiving ECE by preschool type, two multiple linear regression analyses were carried out with PPVT and mathematics scores at the age of 12 as the dependent variables. Besides type of preschool, age of entry into preschool and quality of preschool were also considered. Gender, caste, place in the birth order, stunting status, lagged PPVT scores for examining later PPVT results and lagged CDA-Q scores for examining mathematics test scores at age 12, urban/rural location, parental education, and baseline wealth index were taken as the control variables in the regression models. Table 5 shows the results from the multiple linear regression analysis.

After controlling for all necessary individual and household variables, the three preschool variables do not all emerge as significant predictors of both PPVT and mathematics test scores based on the OLS regression results. Findings show that the effect of private preschooling is significantly visible on mathematics test scores but not on PPVT scores. Children who attended private preschools performed significantly better in mathematics tests (e.s. = 3.51)¹⁰ compared to children who attended government preschools. On the other hand, although the effect of private preschool on PPVT test scores was positive, the association between these two variables does not emerge as statistically significant.

Age of entry into preschool is as significant predictor for both PPVT and mathematics test scores. In general, the regression coefficients show that age of entry of a child into preschool is inversely related their performance in both PPVT and mathematics tests. It is interesting to note that the negative effect of late entry into preschool is found to be higher on mathematics test scores (e.s. = -5.41) than on PPVT scores (e.s. = -3.59).

Though parental perception of the quality of preschool does not show any statistically significant effect on PPVT and mathematics test scores, the regression coefficients show that preschools perceived by caregivers as being of poor quality were negatively associated with both scores. We also introduced lagged PPVT test scores and lagged CDA-Q scores that children achieved at the age of 5 as a control variable. We find that lagged PPVT score (0.22) and lagged CDA-Q score (0.21) are also significantly and positively associated with PPVT score and mathematics test score respectively at the age of 12.

As well as preschool variables, it is important to examine other control variables and their relationships with cognitive scores. Results show that urban/rural location, wealth index, caste, stunting status and place in the birth order also emerge as significant predictor variables for both PPVT and mathematics scores. After controlling for other factors,

¹⁰ e.s.= regression coefficients as effect size

residence in rural areas is found to have significantly positive impact on children's cognitive scores compared to urban location, but the effect size is found to be higher on mathematics scores (10.24) than PPVT scores (4.71). As expected, baseline wealth index is positively significantly associated with test scores, and a higher effect is observed again on mathematics scores (18.89) than on PPVT scores (10.04).

Stunting status and a higher place in the birth order are found to have significant negative effects on the test scores. Not being the first-born child was found to have a negative effect on both PPVT scores (-2.43) and mathematics scores (-3.24), in comparison to first-born children. Similarly, being stunted is found to be negatively associated with both test scores, though again the effect is higher on mathematics scores (-2.43) than on PPVT scores (-2.06). We observe that caste has different effects on PPVT and mathematics test scores as well. Controlling for other variables, Scheduled Caste children were most likely to perform better than others in the PPVT, while Backward Class children performed significantly better in mathematics.

Table 5. *Effects of preschool variables on cognitive development at age 12 (multiple linear regression analysis)*

Variable	PPVT		Maths test	
	Coefficient	Standard error	Coefficient	Standard error
Preschool variables				
Type of preschool				
Government				
Private	1.27	0.894	3.51**	1.440
Age of entry into preschool				
Below 4 years old				
4 years	-1.02	0.924	-1.77	1.483
5 and above	-3.59***	0.957	-5.41***	1.524
Quality of preschool education				
Good				
Fair	-0.33	0.744	0.77	1.191
Poor	-1.45	1.476	-0.12	2.357
Control variables				
Gender				
Male				
Female	-1.84***	0.694	-0.58	1.119
Caste				
Scheduled Castes				
Scheduled Tribes	-4.36***	1.217	0.33	1.920
Backward Classes	-1.29	0.924	3.24**	1.499
Other Castes	-2.31**	1.159	2.93	1.857
Birth order				
First				
Later	-2.43***	0.692	-3.24***	1.117
Stunting status (R2)				
No				
Yes	-2.06***	0.735	-2.43**	1.191
Lagged test score (R2)a				
	0.22***	0.037	0.21***	0.032
Location				
Urban				
Rural	4.71***	1.096	10.24***	1.756
Mother's education				
Below secondary				
Secondary and above	1.17	1.000	8.18***	1.594

Variable	PPVT		Maths test	
	Coefficient	Standard error	Coefficient	Standard error
Father's education				
Below secondary				
Secondary and above	3.32	0.855	7.11***	1.381
Wealth index (baseline)	10.04***	2.603	18.89***	4.200
Constant	69.62	2.134	8.42	4.687
Round 2	0.1685		0.2432	
Adjusted Round 2	0.1584		0.2336	

Notes: Significance *** at the 1% level, **at the 5% level and *at the 10% level.

^a We have used two different lagged scores in the regression analysis. For examining the mathematics and PPVT scores at age 12, the lagged scores we used respectively are CDA-Q and PPVT scores.

Source: Young Lives (2002–13).

5.4.2. Impact of preschool education on subjective well-being

A logistic regression model was adopted to examine whether the preschool variables have any influence on subjective well-being at the age of 12. As mentioned above, subjective well-being is categorised into 'negative' (coded '0') and 'positive' (coded 1). The odds ratio¹¹ from logistic regression analysis is further used to explain the likelihood of attaining 'positive' subjective well-being at the age of 12 in comparison to a reference category.

Results show that after adjusting for other predictor variables, the type of preschool and the age of entry into preschool have significant effects on children's subjective well-being at the age of 12. Children who attended private preschool were 1.8 times more likely to show positive subjective well-being than children who attended government preschool. Regarding the age of entry into preschool, the earlier the entry, the better the child's subjective well-being at 12 years old. Children who entered preschool at the ages of either 4 or 5 and above are shown to have, respectively, 18 per cent and 24 per cent less likelihood of having positive subjective well-being than children who entered preschool below the age of 4. Though not a significant predictor of subjective well-being, parental perception of the quality of the preschool is shown to have a positive effect on subjective well-being. Children attending preschools which were considered to be of 'poor' quality by caregivers are found to be 30 per cent less likely to show positive subjective well-being at 12 than children who attended 'good-quality' preschools.

As well as these preschool variables, control variables relating to background were also shown to influence well-being at the age of 12. Children from the Backward Classes, those living in rural locations, those whose mothers and fathers both had secondary education or above, and those from households with a high baseline wealth index also displayed significant positive subjective well-being when aged 12. Backward Class children are found to be 1.5 times more likely than Scheduled Castes children to display positive subjective well-being, and children from rural locations 1.7 times more likely than those from urban locations.

11 In this paper, odds ratio has been used from binary logistic regression model where coefficients in logistic regression are given in terms of the log odds. Since all our preschool variables along with other controls (except baseline wealth index which is a continuous variable) are categorical variables, we have used odds ratio in examining the likelihood of having 'positive' subjective well-being of a category in comparison to the 'reference' category. The following three outcomes can be possible from the odds ratio.

- Odds ratio = 1: no difference from the reference category
- Odds ratio > 1: more likely to have 'positive' subjective well-being than reference category
- Odds ratio < 1: less likely to have 'positive' subjective well-being than reference category.

Children whose mothers had secondary education or above are 1.7 times more likely than those with less-educated mothers to have positive subjective well-being. Interestingly, children whose fathers had secondary education or above are 1.3 times more likely to show positive subjective well-being, thereby demonstrating the bigger effect of mothers' education on children's affective domain. Not surprisingly, the baseline wealth index is shown to have a significant positive association with positive subjective well-being at the age of 12.

Table 6. *Likelihood of having 'positive' subjective well-being by preschool and other control variables (odds ratio from logistic regression analysis)*

Variable	Subjective well-being at age 12		
	Odds ratio	Standard error	Z Value
Preschool variables			
Type of preschool			
Government ^(Ref)			
Private	1.76***	0.257	3.86
Age of entry into preschool			
Below 4 years old ^(Ref)			
4 years	0.82	0.127	-1.25
5 and above	0.76*	0.117	-1.81
Quality of preschool education			
Good ^(Ref)			
Fair	0.97	0.118	-0.28
Poor	0.70	0.173	-1.44
Control variables			
Gender			
Male ^(Ref)			
Female	0.92	0.107	-0.68
Caste			
Scheduled Castes ^(Ref)			
Scheduled Tribes	1.21	0.241	0.94
Backward Classes	1.48**	0.230	2.52
Other Castes	1.29	0.250	1.32
Birth order			
First ^(Ref)			
Later	0.95	0.109	-0.49
Stunting status (Round 2)			
No ^(Ref)			
Yes	1.03	0.126	0.22
Location			
Urban ^(Ref)			
Rural	1.67***	0.311	2.75
Mother's education			
Below secondary ^(Ref)			
Secondary and above	1.65***	0.274	3.02
Father's education			
Below secondary ^(Ref)			
Secondary and above	1.28*	0.180	1.77
Wealth index (baseline)			
Constant	0.24	0.083	-4.13
Log likelihood	-892.18966		
Number of observations	1,389		

Notes: Significance *** at the 1% level, **at the 5% level and *at the 10% level.

^(Ref) = Reference category

Dependent variable: subjective well-being '0' if negative or '1' if positive.

Source: Young Lives (2002–13).

5.4.3. Propensity score matching

The idea behind adopting PSM techniques is to reproduce the treatment group among the non-treated, this way re-establishing experimental conditions in a non-experimental setting (Blundell et al. 2008). In this analysis, children who attended private preschools belong to the treatment group and children who attended government preschools are considered as the non-treated group. Hence, to examine the differential effects of types of preschool on children's cognitive achievement and subjective well-being in later childhood, we initially estimated propensity scores by running logit regressions of types of preschool on a set of observed covariates (discussed in Section 4). We then extracted only the average treatment effect on the treated (ATET) from the PSM final results.

Though it is possible to estimate both the average treatment effect across the entire population and the ATET, we are confined to the latter in order to check the robustness of the previous OLS and logistic estimates, similar to Woldehanna (2011). The ATET here is the average difference between the cognitive scores/subjective well-being measures of the private preschool attendees and those of the government preschool attendees. Table 7 presents a summary of the results obtained from the PSM analysis.

Table 7. *Impact of type of preschool on cognitive achievement and subjective well-being of children at age 12 (PSM estimation)*

Private verses government preschools	Average treatment effect on the treated			
	Coef.	Std. Err.	z	P>z
Mathematics score	9.898***	2.099	4.72	0.00
PPVT score	1.858	1.151	1.61	0.11
Subjective well-being	0.130**	0.054	2.41	0.02

Notes: Significance ***at 1% and **at 5%.

PSM reveals that children who attended private preschools scored nearly ten times higher in mathematics at the age of 12 than children who attended government preschools, which is statistically significant. Though no significant association is found between PPVT scores at age 12 and type of preschool, the analysis points to the fact that children who attended private preschools scored 1.9 times higher than children who attended government preschools. Results for subjective well-being are statistically significant for those who attended private preschools, but the difference between private and government preschool is not very large. The results show that children from private preschools had 13 per cent higher positive subjective well-being than children from government preschools. Thus, the results obtained from the PSM substantiate our earlier estimates from OLS and logistic regression analysis.

6. Conclusion and policy implications

Our analysis clearly demonstrates that preschool variables (types of preschool, age of entry into preschool, and caregivers' perception of the preschool) have a strong association with the cognitive outcomes and subjective well-being of children at the age of 12. Children who attended private preschool have significantly higher chances of having higher mathematics scores and positive subjective well-being than children who attended government preschool. While the PPVT scores are not significantly higher, children who attended private preschools do show higher scores than those who attended government preschools. Undoubtedly, the addition of lagged test scores has strengthened the results by controlling for exogenous factors that might have affected the results, while the PSM results confirm the findings from the regression analysis. However, we acknowledge that the children's experiences in other learning environments (for example, elementary school, family) have to be taken into account when interpreting these results. Also, given that we have used only one variable related to the quality of preschool education, based on the perception of the caregivers, which may be subjective in nature, we recognise the limitation of the data related to quality.

A very interesting finding, related to the significant negative association between all three dependent variables and children entering preschool older than 4, has important policy implications. The fact that children who entered preschool by the age of 4 had higher cognitive achievement scores and more positive subjective well-being at the age of 12 than those children who made a later entry into preschool makes a strong case for investment in early years education. Enabling children to enter preschool at an early age and providing them with an age-appropriate curriculum is an urgent requirement if we wish to equip our children with a strong social and academic foundation that will help them as they grow older.

Besides preschool variables, many control variables also generated results that have significant implications for policy. Certain caste groups showed a significant association with more positive outcomes in later childhood, as did wealth, and maternal and paternal secondary education.

6.1. Policy implications

The above analysis shows that, among our sample at least, having attended a private preschool has a positive effect on children's cognitive and subjective well-being even at the age of 12, when children were at upper primary school. Given this, it is important for policymakers to recognise the long-term benefit of preschool education and give it the attention and priority it deserves.

6.1.1. *Focus on implementation of National Policy on Early Childhood Care and Education*

As the recently enacted National Policy on Early Childhood Care and Education (MWCD 2013) recognises ECE as the foundation for all future learning and as a sorely neglected area, it is clear that policymakers must prioritise ECE. Given the importance of implementing the quality standards suggested for institutions catering to children between 3 and 6 years

old, it is time that this national policy was implemented and a decentralised mechanism established for enforcing quality standards across both the private and public sector.

6.1.2. Special attention to disadvantaged groups

Special attention must be given to the most disadvantaged children, such as first-generation learners and those belonging to the poorest households, as well as marginalised caste groups and girls, to ensure equitable access to good-quality preschools.

6.1.3. Provide an early start through the addition of preschool classes to government primary schools

Given that results for 12 year olds who had enrolled in preschools prior to age 4 were significantly higher in mathematics and subjective well-being, it might be prudent to consider the addition of preschool classes to formal primary government schools. As almost 17 per cent of primary government schools have a pre-primary class attached to them, there is reason to encourage greater convergence between ICDS and the vehicle for the universalisation of elementary education, Sarva Shiksha Abhiyan. Children aged 4 could be encouraged to join the kindergarten class, which needs to be opened in every primary school. This will not only allow smooth transition from preschool to primary school, but also have a positive impact on the attendance of older siblings, particularly girls, who often have to miss school to look after their younger siblings.

6.1.4. A holistic view of ECE: the need of the hour

It would be opportune to take a more holistic view of childhood and develop a strategy for early learning in the new education policy that is being developed, looking beyond the current structural and resourcing issues that preoccupy the policy agenda. Emphasising cognitive, psycho-social and physical development of all children during the early years curriculum will lay a strong foundation for children's future success in elementary grades.

All the above policy initiatives will require coordinated planning and implementation, and it is time that we ensured that children between the ages of 3 and 6 years old do not fall between the Ministry of Women and Child Development and the Ministry of Human Resource Development. In light of the global commitment to the post-2015 Sustainable Development Goals, it is critical that the nation take its task of investing in young children at the most important time in their development very seriously. One of the first steps should be a move towards making education of all children under 14 years old a fundamental right.

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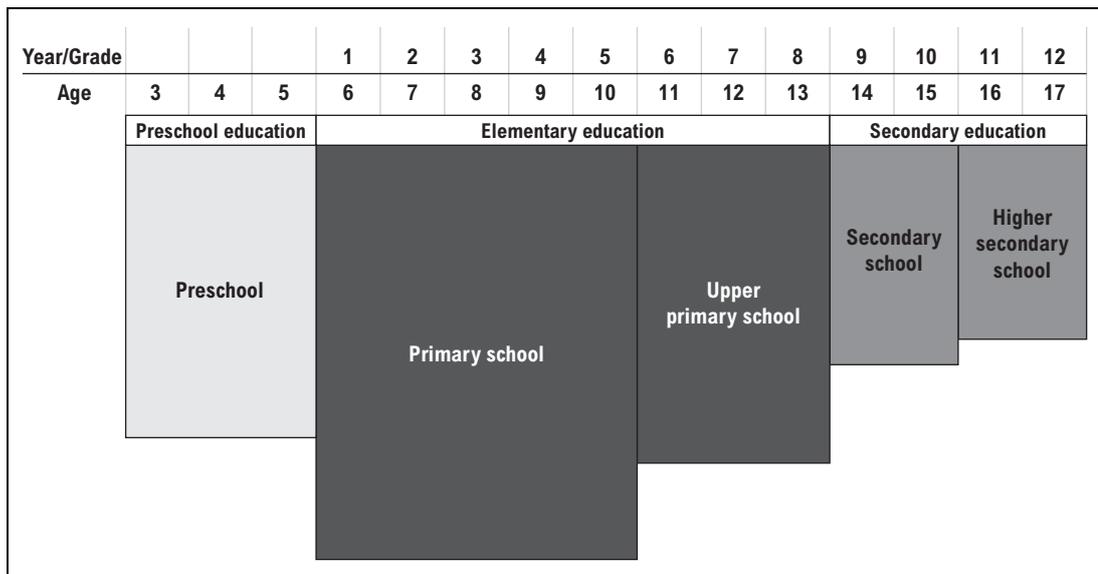
Appendix

Table A1. *Description of variables*

Variable	Description	Round
Preschool variables		
Type of preschool	Public preschool = 0 Private preschool = 1	R3 / R4
Age of entry into preschool	Below 4 = 1 4 years = 2 5 and above = 3	R3 / R4
Quality of preschool as perceived by caregivers	Good = 1 Fair = 2 Bad = 3	
Control variables		
Gender	Male = 1 Female = 2	R1
Caste	Scheduled Caste = 1 Scheduled Tribe = 2 Backward Class = 3 Other Castes = 4	R1
Place in the birth order	First = 1 Later = 1	R1
Stunting status	Not stunted = 0 Stunted = 1	R2
Location	Urban = 1 Rural = 2	R1
Mother's education	Below secondary = 0 Secondary and above = 1	R1
Father's education	Below secondary = 0 Secondary and above = 1	R1
Baseline wealth index	Raw scores	R1
Lagged CDA-Q score at age 8	Raw scores	R2
Lagged PPVT score at age 8	Raw scores	R2

Source: Young Lives India, Younger Cohort, 2002–13.

Figure A1. *Structure of the Indian school system*



Comparison of the Effects of Government and Private Preschool Education on the Developmental Outcomes of Children: Evidence From Young Lives India

Over the past two decades the importance given to preschool education as laying the foundation for lifelong learning and development has been increasingly recognised. India's 12th Five-Year Plan (2012–17) has conceptualised the pre-primary and early primary sub-stages from 4 to 8 years old as an 'integrated early learning unit', to ensure a sound foundation for every child. With the expansion of private preschools, particularly in urban areas, even the poorest families are opting for low-fee private schools rather than free government services offered through the anganwadis (preschool centres). While evidence from developed countries exists that preschooling can have long-term beneficial effects on children, longitudinal evidence in India regarding the association of preschool education with later developmental outcomes is scarce. In light of this, this working paper draws upon Young Lives panel data to explore whether children who attended private preschools demonstrate higher cognitive skills and enhanced subjective well-being at the age of 12, compared to those who attended government preschools.

Using linear and logistic regression models, as well as propensity score matching techniques, the analysis revealed that children who attended private preschools have significantly higher mathematics scores and more positive subjective well-being than children who attended government preschools. However, there is no significant association of private preschools with higher PPVT scores. Another important finding is that entering preschool after the age of 4, is shown to have a significant negative association with both cognitive achievement, as demonstrated by mathematics and PPVT scores, and affective domain, as measured by subjective well-being at the age of 12. The propensity score matching reveals that children who had private preschool education scored nearly 10 times and 13 per cent higher in mathematics scores and subjective well-being respectively at the age of 12 than children whose preschool education was provided by the government.

Given that the recently enacted National Policy on Early Childhood Care and Education recognises early childhood education as the foundation for all future learning and as a sorely neglected area, it is clear that policymakers must prioritise early childhood education, and quality within preschools be closely monitored, to ensure that the most disadvantaged children have access to high-quality preschool education programmes.



An International Study of Childhood Poverty

About Young Lives

Young Lives is an international study of childhood poverty, involving 12,000 children in 4 countries over 15 years. It is led by a team in the Department of International Development at the University of Oxford in association with research and policy partners in the 4 study countries: Ethiopia, India, Peru and Vietnam.

Through researching different aspects of children's lives, we seek to improve policies and programmes for children.

Young Lives Partners

Young Lives is coordinated by a small team based at the University of Oxford, led by Professor Jo Boyden.

- *Ethiopian Development Research Institute, Ethiopia*
- *Pankhurst Development Research and Consulting plc, Ethiopia*
- *Centre for Economic and Social Studies, Hyderabad, India*
- *Save the Children India*
- *Sri Padmavathi Mahila Visvavidyalayam (Women's University), Andhra Pradesh, India*
- *Grupo de Análisis para el Desarrollo (GRADE), Peru*
- *Instituto de Investigación Nutricional, Peru*
- *Centre for Analysis and Forecasting, Vietnamese Academy of Social Sciences, Vietnam*
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